Program

Integrated Master of Computer Applications

(Revised with effect from 2018-2019 AY onwards)

Faculty of Sciences

Table of Contents

Contents   Pg. No.

Program Outcomes

PO1	**Computational Knowledge** - Acquire knowledge of Computing Fundamentals, Basic Mathematics, Computing Specialization, and Domain Knowledge of proper computing models from defined problems.
PO2	**Problem Analysis -** Identify, invent, research activities to provide solutions for complex computing problems using fundamental concepts of Mathematics, Computing Science and Relevant Domains.
PO3	**Design and Development -** Design and develop a solution for complex problems in domains like Banking, Insurance, Healthcare Systems and Multimedia and Mass Communications.
PO4	**Research Activity -** Apply Research based knowledge and methodologies to design, analyse and interpretation of data and find the solutions for complex problems by applying right tools.
PO5	**Continuous learning** - Confidence for self and continuous learning to improve knowledge and competence as a computing professional.
PO6	**Modern tool usage** - Adapt and apply modern computing tools to analyse and resolve problems.
PO7	**Professional ethics -** Understand professional ethics and Cyber regulations and develop the youth with social commitments.
PO8	**Personality development -** Understand Management Principles and apply these to develop software as a team member and mange projects efficiently for multidisciplinary environments.
PO9	**Communication Efficacy -** Communicate effectively with computing society in both verbal and written form
PO10	**Social Responsibility -** Find and access Social and Environmental issues for local and global needs and give relevant solutions for them.
PO11	**Creativity and Entrepreneurship -** Find out right opportunity for entrepreneurship and create and add value for the betterment of an individual and society at large.

Program Specific Outcomes

PSO1	Understanding the concepts and applications in in the field of Computing Sciences like Web designing and development, Mobile application development, and Network and communication technologies.
PSO2	Understand the technological developments in modern era and apply along with the learnt to develop real world applications
PSO3	Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
PSO4	Gain knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.

Evaluation Scheme and Grading System

R.14 Evaluation pattern for theory courses:

Continuous Assessment (CA) (Max.Marks)					End-Semester Examination (Max.Marks)	Grand Total (Max.Marks)
Assignment/Quiz/Viva-voce		Periodical Test		Total CA (Max.Marks)		
I	II	I	II			
10	10	15	15	50	50	100

R.14.1

The academic performance of each student in each course will be assessed on the basis of Internal Assessment (including Continuous Assessment) and an end-semester examination.

Normally, the teachers offering the course will evaluate the performance of the students at regular intervals and in the end-semester examination.

In theory courses (that are taught primarily in the lecture mode), the weight for the Internal Assessment and End-semester examination will be 50:50. The Internal assessment in theory courses shall consist of at least two periodical tests, weekly quizzes, assignments, tutorials, viva-voce etc. The weight for these components, for theory-based courses shall be 20 marks for the Continuous assessment, comprising of Quizzes, assignments, tutorials, viva-voce, etc. and 15 marks each for both the Periodical Tests.

At the end of the semester, there will be an end-semester examination of three hours duration, with a weight of 50 marks, in each lecture-based course.

R.14.2 Evaluation pattern for Lab courses:

In the case of laboratory courses and practical, the relative weight for Internal assessment and End-semester examination will be 80:20. The weight for the components of Internal assessment will be decided by the course committee/class committee at the beginning of the course.

R14.3 Evaluation pattern for course having both Theory and Lab. components:

Courses having only one hour per week for lecture/tutorial, be treated as a Lab. course, for evaluation purposes; and evaluation pattern will be 80 marks for continuous assessment of lab work and 20 marks for end-semester lab examination.

Courses having two hours per week for theory and/or tutorials, be given a weight of 60 marks and 40 marks for the Theory and Lab. components, respectively; The Lab. component evaluation will be based on continuous evaluation, without any end-semester practical evaluation. 10 marks will be for continuous assessment of the theory portion, 10 marks for each of the two periodical tests, 30 marks for the theory end-semester examination and 40 marks for continuous assessment of lab. Work.

Courses having three hours per week for theory and/or tutorials, be given a weight of 70 marks and 30 marks for the Theory and Lab. components, respectively; The Lab. component evaluation will be based on continuous evaluation, without any end-semester practical evaluation. 15 marks will be for continuous assessment of the theory portion, 10 marks for each of the two periodical tests, 35 marks for the theory end-semester examination and 30 marks for continuous assessment of lab. work.

R.14.4 Evaluation pattern for Project work:

The continuous assessment of project work will be carried out as decided by the course committee. At the completion of the project work, the student will submit a bound volume of the project report in the prescribed format. The project work will be evaluated by a team of duly appointed examiners.

The final evaluation will be based on the content of the report, presentation by student and a viva-voce examination on the project. There will be 40% weight for continuous assessment and the remaining 60% for final evaluation.

If the project work is not satisfactory he/she will be asked to continue the project work and appear for assessment later.

R.15 PUBLICATION / INTERNSHIP

R.15.1 All students, if they are to be considered for award of Degree at the time of graduation, are required to have published ONE paper in Scopus-indexed Journal/Conference.

R.15.2 Additional 10 marks will be awarded for each Publication, subject to a maximum of ONE paper per semester.

The additional marks shall be awarded in the semester in which the paper is published or presented, if applied for, within 10 days of the publication of results of the concerned semester. The additional marks can be awarded to any course(s) where the student has to improve his/her grade.

R.15.3 All publications shall be in Scopus-indexed Journals/Conferences and shall be as per the guidelines prescribed by the University.

R.15.4 Students who have undergone Internship at reputed organisations or National / International Institutions, **with the prior approval** of the concerned Departmental Chairperson and the Head of the School, may be considered for waiver of the requirement of publication, for the award of Distinction. However, the decision of the Departmental Chairperson and the Head of the School, in this regard, shall be final.

R.15.5 Co-curricular Activities

The students during their period of study in the University are encouraged to indulge in sports, arts, Social/Community service and Seva activities. Grace marks (5 to 10 marks) shall be awarded for representing AMRITA University in Sports, Cultural and Seva activities. The procedure for awarding these marks will be published by the University from time to time.

R.17 Grading System

R.17.1 Based on the performance in each course, a student is awarded at the end of the semester, a letter grade in each of the courses registered. Letter grades will be awarded by the Class Committee in its final sitting, without the student representatives.

The letter grades, the corresponding grade points and the ratings are as follows:

Letter Grade	Grade Points	Ratings
0	10.00	Outstanding
A+	9.50	Excellent
A	9.00	Very Good
B+	8.00	Good
B	7.00	Above Average
C	6.00	Average
P	5.00	Pass
F	0. 00	Fail
FA	0. 00	Failed due to insufficient attendance
I	0. 00	Incomplete (awarded only for Lab. courses/ Project / Seminar)

W		Withheld

R.17.2 'FA' grade once awarded stays in the record of the student and is replaced with the appropriate grade when he/she completes the course successfully later.

Students who have secured an 'FA' in a course must re-register for the course or register for the course, if offered, under run-time re-do mode.

R.17.3 A student who has been awarded 'I' Grade in a Lab course, due to reasons of not completing the Lab., shall take up additional Lab. whenever offered next and earn a pass grade, which will be reflected in the next semester's grade sheet.

The 'I' grade, awarded in a Project/Seminar course, will be subsequently changed into appropriate grade, when the student completes the requirement during the subsequent semester. If he/she does not complete it in the next semester, it will be converted to 'F' grade.

R.17.4 A student is considered to have successfully completed the course and earned the credit, if he/she scores a letter grade 'P' or better in that course.

R.22 Semester Grade Point Average (SGPA)

On completion of a semester, each student is assigned Semester Grade Point Average (SGPA) which is computed as below for all courses registered by the student during that semester.

$$SGPA = \sum C_i Gp_i \bigg/ \sum C_i$$

where C_i is the credit for i th course in that semester and Gp_i is the grade point for that course.

The summation is over all the courses registered by the student during the semester, including the failed courses. The SGPA is rounded off to two decimals.

R.23 Cumulative Grade Point Average (CGPA)

The overall performance of a student at any stage of the Degree programme is evaluated by the Cumulative Grade Point Average (CGPA) up to that point of time.

$$CGPA = \sum C_i Gp_i \bigg/ \sum C_i$$

where C_i is the credit for ith course in any semester and Gp_i is the grade point for that course.

The summation is over all the courses registered by the student during all the semesters up to that point of time, including the failed courses. The CGPA is also rounded off to two decimals

R.25 Classification of successful candidates:

R.25.1 A student shall be considered to have successfully completed the programme, if he/she has:

i)   registered and successfully completed all the core courses, electives and projects as mentioned in the curriculum;

ii)   earned the required minimum number of credits as specified in the curriculum corresponding to the programme, within the stipulated time;

iii)   published a paper at Scopus-indexed Journal/Conference.

R.25.2 Candidates who have successfully completed the programme, within a period of ten semesters from entering the programme, shall be classified as follows:

Candidates securing a CGPA of 8.00 and above – FIRST CLASS WITH DISTINCTION *

Candidates securing a CGPA between 6.50 and 7.99 – FIRST CLASS

and the same be mentioned in the Degree certificate;

(*subject to satisfying the condition mentioned at Publication and Internship and having passed all the courses, in the first attempt, in ten semesters, from the date of joining the programme)

If the programme is completed after ten semesters of study, the candidates securing even a CGPA of 8.00 and above, shall be classified to have completed the programme, only with FIRST CLASS.

Curriculum Structure – Integrated BCA – MCA (2018)

Course Code	Course Title	L T P	Cr	ES	Course Code	Course Title	L T P	Cr	ES
	SEMESTER 1					**SEMESTER 2**			
18CUL101	Cultural Education I	2 0 0	2		18CUL111	Cultural Education II	2 0 0	2	
18ENG101	Communicative English	2 0 2	3		18ENG121	Professional Communication	1 0 2	2	
	Language I	2 0 0	2			Language II	1 1 0	2	
18MAT102	Mathematical Foundation	3 1 0	4		18MAT112	Discrete Mathematics	3 1 0	4	
18ENV300	Environmental Science and Sustainability	3 0 0	3		18CSA114	Database Management System	3 1 0	4	
18CSA103	Computer Essentials	3 0 2	4		18CSA113	Programming in C	3 1 0	4	
18CSA101	Computational Thinking and Problem Solving	3 0 0	3		18CSA111	Computer Organization	3 1 0	4	
18CSA182	Computational Thinking and Problem Solving Lab	0 0 2	1		18CSA183	Database Management System Lab-I	0 0 2	1	
					18CSA184	Programming in C Lab	0 0 2	1	
	TOTAL		**22**			TOTAL		**24**	
	SEMESTER 3					**SEMESTER 4**			
18AVP201	Amrita Value Programme I	1 0 0	1		18AVP211	Amrita Value Programme II	1 0 0	1	
18SSK201	Life Skills I	1 0 2	2		18SSK211	Life Skills II	1 0 2	2	
18MAT208	Statistical and Numerical Methods	3 1 0	4		18CSA214	Computer Networks	3 1 0	4	
18CSA209	Data Structures and Algorithms	3 1 0	4		18CSA215	Java Programming	3 1 0	4	
18CSA206	Object Oriented Programming using C++	3 1 0	4		18CSA216	Web Technologies	3 1 0	4	
18CSA201	Operating System	3 1 0	4		18CSA211	Software Engineering	3 0 2	4	
18CSA207	Principles of Management and Accounting	3 0 0	3			Open Elective A	3 0 0	3	
18CSA283	Data Structures and Algorithms Lab-I	0 0 2	1		18CSA285	Java Programming Lab-I	0 0 2	1	
18CSA284	Object Oriented Programming using C++ Lab	0 0 2	1		18CSA286	Web Technologies Lab	0 0 2	1	
	TOTAL		**24**			TOTAL		**24**	
	SEMESTER 5					**SEMESTER 6**			
18SSK301	Life skills III	1 0 2	2		18CSA317	Computer Graphics	3 0 0	3	
18CSA307	C# and .NET Framework	2 0 2	3		18CSA318	Cryptography and Cyber Security	4 0 0	4	
18CSA306	Advanced Java and J2EE	3 0 0	3		18CSA319	Python Programming	2 0 2	3	
	Elective A	3 0 0	3			Elective B	3 0 0	3	

18CSA390	Live in Labs / Open Elective B	3 0 0	3		18CSA383	Computer Graphics Lab	0 0 2	1	
18CSA389	Mobile Application Development Lab	0 1 2	2			**TOTAL**		**14**	
18CSA388	Advanced Java and J2EE Lab	0 0 2	1		18CSA399	Project (For Exit Option)		6	
18CSA391	Comprehensive Technical VIVA-Voce		2			**TOTAL**		**20**	
18CSA392	Minor Project		3			**TOTAL (For Exit Option)=136**			
	TOTAL		**22**						
	SEMESTER 7					**SEMESTER 8**			
18CA301	Advanced Computer Networking and Internet	3 0 1	4		18CA313	Web Services and Cloud	3 0 1	4	
18CA305	Design and Analysis of Algorithms	3 1 0	4		18CA312	Data Mining and Applications	3 0 1	4	
18CA303	Advanced Software Engineering	3 0 1	4		18CA311	Computer Language Engineering	3 1 0	4	
18MA304	Basics of Operations Research	3 1 0	4			Elective – I	3 0 0	3	
18CA302	Advanced Databases	3 0 0	3			Elective - II	3 0 0	3	
	Lab 1	0 0 2	1		18EN600	Technical Writing*	0 0 1	P/F	
	Lab 2	0 0 2	1		18CA391	Research Learning and Problem Formulation	0 0 2	1	
						Lab 3	0 0 2	1	
	TOTAL		**21**			**TOTAL**		20	
	SEMESTER 9					**SEMESTER 10**			
18CA401	Design Patterns	3 1 0	4		18CA497	Dissertation Phase II		12	
18CA402	System Security	3 1 0	4						
	Elective - III	3 0 0	3						
	Management Elective	3 0 0	3						
	Lab 4	0 0 2	1						
18CA496	Dissertation Phase I		5						
	TOTAL		**20**			TOTAL		**12**	
				LANGUAGES					
	Paper I					**Paper II**			
18HIN101	Hindi I	1 0 2	2	B	18HIN111	Hindi II	1 0 2	2	B
18KAN101	Kannada I	1 0 2	2	B	18KAN111	Kannada II	1 0 2	2	B
18MAL101	Malayalam I	1 0 2	2	B	18MAL111	Malayalam II	1 0 2	2	B
18SAN101	Sanskrit I	1 0 2	2	B	18SAN111	Sanskrit II	1 0 2	2	B
18TAM101	Tamil I	1 0 2	2	B	18TAM111	TAMIL II	1 0 2	2	B
	Elective A, B					**Elective I, II, III**			

Code	Title	L T P	Cr	E		Code	Title	L T P	Cr	E
18CSA331	Artificial Intelligence	3 0 0	3	E		18CA331	Big Data Analytics and Visualization	3 0 0	3	E
18CSA332	Architecture and Deployment of Secure and Scalable WAN	3 0 0	3			18CA332	Bioinformatics	3 0 0	3	E
18CSA333	Client Server Computing	3 0 0	3			18CA333	Business Intelligence	3 0 0	3	E
18CSA334	Embedded Systems	3 0 0	3			18CA334	Computational Intelligence	3 0 0	3	E
18CSA335	Enterprise Resource Planning Management	3 0 0	3			18CA335	Computer Graphics and Visualization	3 0 0	3	E
18CSA336	Knowledge Management	3 0 0	3			18CA336	Database Administration	3 0 0	3	E
18CSA337	LAN Switching and Advanced Routing	3 0 0	3			18CA337	Deep Learning for Natural Language Processing	3 0 0	3	E
18CSA338	Micro Processor Systems	3 0 0	3			18CA338	Digital Image Processing	3 0 0	3	E
18CSA339	Multimedia and Graphics	3 0 0	3			18CA339	Distributed Computing.	3 0 0	3	E
18CSA340	Social and Professional Issues in Computing	3 0 0	3			18CA340	Advanced Operating System and Distributed Computing Distributed Computing.	3 0 0	3	E
18CSA341	Soft Computing	3 0 0	3			18CA431	Information Retrieval	3 0 0	3	E
18CSA342	Systems and Network Administration	3 0 0	3			18CA432	Introduction To Intelligent Systems and Machine Learning	3 0 0	3	E
						18CA433	Modern Web Application Development using Mean Stack	3 0 0	3	E
						18CA434	Network Management and System Administration	3 0 0	3	E
						18CA435	Network Security	3 0 0	3	E
						18CA436	Open-Source Systems	3 0 0	3	E
Management Electives (Any One)						18CA437	Semantic Web Technologies	3 0 0	3	E
18HU433	Principles of Economics and Management	3 0 0	3	E		18CA438	Software Quality Assurance	3 0 0	3	E
18HU434	Software Project Management	3 0 0	3	E		18CA439	Structure and Interpretation of Computer Programs	3 0 0	3	E
Lab						18CA440	Wireless Communications and Networks	3 0 0	3	E
18CA383	Data Structures and Algorithms Lab-II	0 0 3	1							

	18CA384	Java Programming -II	0 0 3	1								
	18CA385	GUI Programming using VB.Net	0 0 3	1								
	18CA386	Android Application Development	0 0 3	1								
	18CA387	Web Development using ASP.NET	0 0 3	1								
	18CA388	Operating Systems Lab	0 0 3	1								
	18CA389	Database Management Systems Lab-II	0 0 3	1								
	18CA481	Web and XML Programming using Java and J2EE	0 0 3	1								
	18CA482	Angular and Node JS Lab	0 0 3	1								
	18CA483	Network and Grid Simulation Lab	0 0 3	1								
	18CA484	Bio-informatics Lab	0 0 3	1								
	18CA485	Computer Organization and Architecture Lab	0 0 3	1								

COURSE OBJECTIVES, COURSE OUTCOMES, SYLLABUS

<u>SEMESTER I</u>

18CUL101   **CULTURAL EDUCATION I**   **2 0 0 2**

Objectives: Love is the substratum of life and spirituality. If love is absent life becomes meaningless. In the present world if love is used as the string to connect the beads of values, life becomes precious, rare and beautiful like a fragrant blossom. Values are not to be learned alone. They have to be imbibed into the inner sprit and put into practice. This should happen at the right time when you have vitality and strength, when your hearts are open.

The present course in value education is a humble experience based effort to lead and metamorphosis the students through the process of transformation of their inner self towards achieving the best. Amma's nectarous words of wisdom and acts of love are our guiding principles. Amma's philosophy provides an insight into the vision of our optimistic future.

Course Outcomes

CO1	Helps the students to imbibe values into their inner sprit and put it into real life practice.
CO2	Help the students towards achieving the best through the process of transformation of their inner self
CO3	Provides the students an insight into the vision of optimistic future.

Introduction to Indian Culture
Introduction to Amma's life and Teachings
Symbols of Indian Culture
Science and Technology in Ancient India
Education in Ancient India
Goals of Life – Purusharthas
Introduction to Vedanta and Bhagavad Gita
Introduction to Yoga
Nature and Indian Culture
Values from Indian History
Life and work of Great Seers of India (1)

TEXTBOOKS:
1. The Glory of India (in- house publication)
2. The Mother of Sweet Bliss. (Amma's Life & Teachings)

EVALUATION PATTERN: 14.1

18ENG101   **Communicative English   2-0-2-3**

Objectives:

To help students obtain an ability to communicate fluently in English; to enable and enhance the students skills in reading, writing, listening and speaking; to impart an aesthetic sense and enhance creativity

Course Outcomes

CO1	Students will heighten their awareness of correct usage of English grammar in writing and speaking
CO2	Students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening
CO3	Students will improve their reading fluency skills through extensive reading

Course Contents:
Unit I
Kinds of sentences, usage of preposition, use of adjectives, adverbs for description, Tenses, Determiners- Agreement (Subject – Verb, Pronoun- Antecedent) collocation, Phrasal Verbs, Modifiers, Linkers/ Discourse Markers, Question Tags
Unit II
Paragraph writing – Cohesion - Development: definition, comparison, classification, contrast, cause and effect - Essay writing: Descriptive and Narrative
Unit III
Letter Writing - Personal (congratulation, invitation, felicitation, gratitude, condolence etc.) Official (Principal / Head of the department/ College authorities, Bank Manager, Editors of newspapers and magazines)
Unit IV
Reading Comprehension – Skimming and scanning- inference and deduction – Reading different kinds of material –Speaking**:** Narration of incidents / stories/ anecdotes- Current News Awareness
Unit V
Prose: John Halt's 'Three Kinds of Discipline*'* [**Detailed**]

Max Beerbohm's 'The Golden Drugget' [**Detailed**]

Poems: Ogden Nash- 'This is Going to Hurt Just a Little Bit' [**Detailed**]

Robert Kroetsch– 'I am Getting Old Now', Langston Hughes-'I, Too'[**Detailed**]

Wole Soyinka- 'Telephone Conversation' [**Non-Detailed**]

Kamala Das- 'The Dance of the Eunuchs'[**Non-Detailed**]

Short Stories:Edgar Allan Poe's 'The Black Cat*', Ruskin Bond's 'The Time Stops at Shamili'* [**Non-Detailed**]

CORE READING:

1. *Ruskin Bond, Time Stops at Shamli and Other Stories, Penguin Books India Pvt Ltd, 1989*
2. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006
3. *Beerbohm, Max, The Prince of Minor Writers: The Selected Essays of Max Beerbohm (NYRB Classics), Phillip Lopate (Introduction, Editor), The New York Review of Book Publishers.*
4. *Edger Allan Poe. The Selected Works of Edger Allan Poe. A Running Press, 2014.*
5. *Online sources*

References:

6. *Ruskin Bond, Time Stops at Shamli and Other Stories, Penguin Books India Pvt Ltd, 1989*
7. *Martinet, Thomson, A Practical English Grammar, IV Ed. OUP, 1986.*
8. *Murphy, Raymond, Murphy's English Grammar, CUP, 2004*
9. *Online sources*

EVALUATION PATTERN: 14.1

| 18MAT102 | MATHEMATICAL FOUNDATION | 3 1 0 4 |

Objectives: The primary objective of this course is to provide mathematical background and adequate experience on various topics of basic mathematics like Set Theory,Matrix,Differential calculus etc.. This course will extend student's Logical ability.

Course Outcomes

CO1	Study and solve problems related to connectives ,predicates and quantifiers under different situations.
CO2	Develop basic knowledge of matrices and to solve equations using Cramer's rule.
CO3	Know the concept of eigen values .
CO4	To develop the knowledge about derivatives and know various applications of differentiation.
CO5	Understand the basic concepts of Mathematical reasoning, set and functions

Unit 1

Basic concepts of set theory - Mathematical logic-introduction-statements-connectives-negation, conjunction, disjunction- statement formulas and truth tables- conditional and bi-conditional statements- tautology-contradiction-equivalence of formulas-duality law-Predicates and Quantifiers, Arguments.

Unit 2

Operations on sets - power set- venn diagram Cartesian product-relations -functions- types of functions -composition of functions.

Unit 3

Matrix algebra-Introduction-Types of matrices-matrix operations- transpose of a matrix - determinant of matrix - inverse of a matrix- Cramer's rule

Unit 4

Matrix: finding rank of a matrix - normal form-echelon form-Cayley Hamilton theorem-Eigen values

Unit 5

Differential calculus - Functions and limits - Simple Differentiation of Algebraic Functions — Evaluation of First and Second Order Derivatives – Maxima and Minima

TEXT BOOKS:

P.R.Vittal-Business Mathematics and Statistics,Margham Publications,Chennai,

REFERENCE:

B.S.Vatsa-Discrete Mathematics –New Age International Limited Publishers,New Delhi

EVALUATION PATTERN: 14.1

18ENV300   ENVIRONMENTAL SCIENCE AND SUSTAINABILITY   3 0 0 3

Objectives: EVS is a multidisciplinary scholastic field which efficiently considers human cooperation with the earth in light of a legitimate concern for taking care of complex issues.

Ecological examinations unites the standards of the physical sciences, business/financial aspects and sociologies to take care of contemporary natural issues.

Course Outcomes

CO1	**Understanding sustainable developements, need for environmental education, Contribution of famous personalities in Environment.**
CO2	**Make out the aboitic and boitic factors of environment, Understanding the importance of different types of ecosystems**
CO3	**Study of bio diversity , different types of diversity in nature giving importance to India as a mega diversity nation.**
CO4	**Understanding linear and cyclic resource management with more emphasis to air, water, soil resources.**
CO5	**Be familiar with Environment Impact Assesment & Environment Management Plan**

Unit 1
State of Environment and Unsustainability, Need for Sustainable Development, Traditional conservation systems in India, People in Environment, Need for an attitudinal change and ethics, Need for Environmental Education, Overview of International Treaties and Conventions, Overview of Legal and Regulatory Frameworks.

Environment: Abiotic and biotic factors, Segments of the Environment, Biogeochemical Cycles, Ecosystems (associations, community adaptations, ecological succession, Food webs, Food chain, ecological pyramids), Types of Ecosystems – Terrestrial ecosystems, Ecosystem Services, Economic value of ecosystem services, Threats to ecosystems and conservation strategies.

Biodiversity: Species, Genetic & Ecosystem Diversity, Origin of life and significance of biodiversity, Value of Biodiversity, Biodiversity at Global, National and Local Levels, India as a Mega-Diversity Nation (Hotspots) & Protected Area Network, Community Biodiversity Registers. Threats to Biodiversity, Red Data book, Rare, Endangered and Endemic Species of India. Conservation of Biodiversity. People's action.

Impacts, causes, effects, control measures, international, legal and regulatory frameworks of: Climate Change, Ozone depletion, Air pollution, Water pollution, Noise pollution, Soil/ land degradation/ pollution

Unit 2
Linear vs. cyclical resource management systems, need for systems thinking and design of cyclical systems, circular economy, industrial ecology, green technology. Specifically apply these concepts to: Water Resources, Energy Resources, Food Resources, Land & Forests, Waste management.

Discuss the interrelation of environmental issues with social issues such as:
Population, Illiteracy, Poverty, Gender equality, Class discrimination, Social impacts of development on the poor and tribal communities, Conservation movements: people's movements and activism, Indigenous knowledge systems and traditions of conservation.

Unit 3
Common goods and public goods, natural capital/ tragedy of commons, Cost benefit analysis of development projects, Environment Impact Assessment (EIA), Environment Management Plan (EMP), Green business, Eco-labeling, Problems and solutions with case studies.

Global and national state of housing and shelter, Urbanization, Effects of unplanned development case studies, Impacts of the building and road construction industry on the environment, Eco-homes/ Green buildings, Sustainable communities, Sustainable Cities.

Ethical issues related to resource consumption, Intergenerational ethics, Need for investigation and resolution of the root cause of unsustainability, Traditional value systems of India, Significance of holistic value-based education for true sustainability.

TEXTBOOKS/ REFERENCES:
1. *R. Rajagopalan, Environmental Studies: From Crisis to Cure. Oxford University Press, 2011, 358 pages. ISBN: 9780198072089.*
2. *Daniel D. Chiras, Environmental Science. Jones & Bartlett Publishers, 01-Feb-2012, 669 pages. ISBN: 9781449645311.*
3. *Andy Jones, Michel Pimbert and Janice Jiggins, 2011. Virtuous Circles: Values, Systems, Sustainability. IIED and IUCN CEESP, London.*
   URL:http://pubs.iied.org/pdfs/G03177.pdf
4. *Annenberg Learner, The Habitable Planet, Annenberg Foundation 2015. URL: http://www.learner.org/courses/envsci/unit/pdfs/textbook.pdf.*

EVALUATION PATTERN: 14.1

18CSA103　　　　　　　　**COMPUTER ESSENTIALS**　　　　　**3 0 2 4**

Objectives: Te Computer Essentials module sets out basic ideas and abilities identifying with the utilization of use of devices, file creation and management, networks, and information security. Provides abilities to oversee PCs, gadgets, and information safely and viably.

Course Outcomes

CO1	Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers,
CO2	operating systems, functions of o/s, classification of operating systems, kernel, shell, basics of unix, shell programming, booting
CO3	databases, why databases are used, users, sql, datatypes in sql, introduction of queries - select, alter, udate, delete, truncate, using where, and or in not in
CO4	internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching
CO5	web programming basics, introduction of html and css programming

Unit-1
Introduction to computers: Characteristics of computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Supercomputers. Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Microprocessor, Storage units, Input and output Devices. How CPU and memory works. Program execution with illustrative examples. Introduction to microcontrollers.
Lab Component- PC Assembly,
Unit-2
Operating System Fundamentals
Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities,The Unix Operating System, Basic Unix commands,Microkernel Based Operating System, Booting,
Lab Component- OS installation, Basic unix commands
Unit-3
Introduction to Database Management Systems
Database, DBMS, Why Database -File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of SQL-DDL with constraints, DML, DCL, TCL
Lab Component
Create: Table and column level constraints- Primary key, Foreign key, Null/ Not null, Unique, Default. Check, Alter, Drop, Insert, Update, Delete, Truncate, Select: using WHERE, AND, OR, IN , NOT IN
Unit-4
Internet Basics

Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System.
Lab Component: Web Browsing, Emails, Searching
Unit-5
Web Basics
Introduction to web,web browsers, http/https, URL, HTML5,CSS
Lab Component -HTML5 & CSS
TextBook
J. Glenn Brookshear,"Computer Science: An Overview", Addision-Wesley, Twelfth Edition, 2014

EVALUATION PATTERN: 14.3

18CSA101   COMPUTATIONAL THINKING AND PROBLEM SOLVING   3 0 0 3

Objectives:
This course includes taking care of issues, structuring frameworks, designing and solving problems. This course is intended to present the programming ideas, program development cycle and covers different instruments and systems for critical thinking.
Course Outcomes

CO1	Understand the basic concepts of NUmber System like binary, decimal, octal, Hexa-decimal including conversions, Boolean expressions etc
CO2	Understand the basic concepts of computational thinking, including sequential logic, abstractions, problem-solving and some basic algorithms like divide and conquer, greedy method etc
CO3	Possess the ability to design and develop programs to solve basic computational problems, develop algorithms and flowcharts
CO4	Possess the ability to extend their knowledge towards learning programming concepts like arrays, recursion & factorization etc
CO5	To get the idea of various searching and sorting techniques, text and pattern matching techniques

Unit 1
Basics
Introduction, Information and data, Number Systems-Binary, Hexadecimal, Octal, Conversion, BCD, Data encoding. Boolean Algebra, Simplification of Boolean expression.
Unit 2
Problem Solving
Problem definition, Problem decomposition, Abstraction, Greedy Method, Divide and Conquer.
Unit-3
Algorithmic Thinking

Algorithm and Flowcharting, Name binding, Selection, Repetition.
Unit 4
Data organization: List and Arrays, Modularization, Problem Solving: Factoring and Recursion Techniques,
Unit-5
Searching and Sorting Techniques, Text processing and Pattern matching.
TEXT BOOKS:
1. David Riley and Kenny Hunt , Computational thinking for modern solver, Chapman & Hall/CRC, 2014
2. R.G. Dromey , "How to solve it by Computer", PHI, 2008

EVALUATION PATTERN: 14.1

18CSA182 COMPUTATIONAL THINKING AND PROBLEM SOLVING LAB 0 0 2 1

Objectives: The course conveys the concepts of designing and developing solutions to various problems using tools like excel and flowgarithms.

Course Outcomes

CO1	Understand the various conditional structures, Logical operations using Excel
CO2	Understand the working of various excel functions that operate on numeric, text,date data types
CO3	Develop flowcharts using flowgarithms
CO4	Implement the concept of arrays and recursion using flowgarithms
CO5	implement various searching and sorting techniques, text and pattern matching techniques using flowgarithms

Unit-1 Excel
Unit-2 Excel
Unit3-Flowgarithm
Unit-4-Scratch

EVALUATION PATTERN: 14.2

<u>**SEMESTER II**</u>

18CUL111   CULTURAL EDUCATION II   2 0 0 2

Objectives: Love is the substratum of life and spirituality. If love is absent life becomes meaningless. In the present world if love is used as the string to connect the beads of values, life becomes precious, rare and beautiful like a fragrant blossom. Values are not to be learned alone. They have to be imbibed into the inner sprit and put into practice. This should happen at the right time when you have vitality and strength, when your hearts are open.

The present course in value education is a humble experience based effort to lead and metamorphosis the students through the process of transformation of their inner self towards achieving the best. Amma's nectarous words of wisdom and acts of love are our guiding principles. Amma's philosophy provides an insight into the vision of our optimistic future.

Course Outcomes

CO1	Helps the students to imbibe values into their inner sprit and put it into real life practice.
CO2	Help the students towards achieving the best through the process of transformation of their inner self
CO3	Provides the students an insight into the vision of optimistic future.

Bhagavad Gita and Life Management
Historicity of Ramayana and Mahabharata
Overview of Patanjali's Yoga Sutras
Highlights of Indian Mythology
Indian Society: Its Strengths and Weaknesses
Role & Position of Women in Indian Society
Indian Models of Economy, Business and Management
Health and Lifestyle related issues
Conservation of cultural heritage
Life and work of Great Seers of India (2)

TEXTBOOKS:
1. The Glory of India (in- house publication)
2. Sanatana Dharma (A Compilation of Amma's teachings on Indian Culture)

EVALUATION PATTERN: 14.1

| 18ENG121 | **Professional Communication** | 1- 0-2-2 |

Objectives:

To convey and document information in a formal environment; to acquire the skill of self projection in professional circles; to inculcate critical and analytical thinking.

CO1	Understand the role of communication in personal & professional success.
CO2	Develop awareness of appropriate communication strategies.
CO3	Build and maintain healthy and effective relationships.
CO4	Identify and apply strategies to improve communication especially in meetings
CO5	Enables students to build up language and specialized abilities such as meeting, management and documentation, argumentation, conflict resolution, interpersonal and intercultural skills, professional presentations and employment starters.

Unit I
Vocabulary Building: Prefixes and Suffixes; One word substitutes, Modal auxiliaries, Error Analysis: Position of Adverbs, Redundancy, misplaced modifiers**,** Dangling modifiers – Reported Speech

Unit II
 Instruction, Suggestion & Recommendation - Sounds of English: Stress, Intonation
 - Essay writing: Analytical and Argumentative

Unit III
Circulars, Memos – Business Letters - e - mails

Unit IV
Reports: Trip report, incident report, event report - Situational Dialogue - Group Discussion

Unit V
Listening and Reading Practice - Book Review

References

1. FelixaEskey. Tech Talk, University of Michigan. 2005

2. Michael Swan. Practical English Usage, Oxford University Press. 2005

3. Anderson, Paul. Technical Communication: A Reader Centered Approach, V Edition, Hercourt, 2003.

4. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata Mc Graw Hill Pub. Co. New Delhi. 2005. Tenth Edition.

5. *Thampi, G. Balamohan. Meeting the World: Writings on Contemporary Issues. Pearson, 2013.*

6. *Lynch, Tony. Study Listening. New Delhi: CUP, 2008.*

7. *Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.*

8. *Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.*

9. *Syamala, V. Effective English Communication For You (Functional Grammar, Oral and Written Communication): Emerald, 2002.*

EVALUATION PATTERN: 14.2

18MAT112   **DISCRETE MATHEMATICS**   **3 1 0 4**

Objectives

To give an insight to develop logical thinking and its application to computer science by learning Boolean algebra, number theory, counting techniques and graph theory.

Course Outcomes

CO1	To understand the basic concepts of Mathematical reasoning, set and functions.
CO2	To understand various counting techniques and principle of inclusion and exclusions.
CO3	Understand the concepts of various types of relations, partial ordering and equivalence relations.
CO4	Apply the concepts of generating functions to solve the recurrence relations.
CO5	Familiarise the fundamental concepts of graph theory and shortest path algorithm.

Unit 1

Binary operations, group, semi group,monoid, abelian group, subgroup(simple theorems without proof) Boolean algebra-definition-principle of duality-theorems.

Unit 2

Basic Counting Principles, Generating Functions, Euler's phi-function and its Application to Cryptography.

Unit 3

Relations and their properties - relation matrix, graph of a relation - types of relations - equivalence relation - n-ary relations

Unit 4

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence relations, Divide and Conquer Algorithms and Recurrence relations, Generating Functions, Inclusion Exclusionprinciples and their Applications.

Unit 5

Introduction to Graph Theory: Graphs, Bipartite Graphs, Eulerian and Hamiltonian Graphs, Graph Connectivity.

TEXTBOOK:

Kenneth H. Rosen, Discrete Mathematics and its Applications, McGraw Hill.

REFERENCES

1. R. P. Grimaldi, "Discrete and Combinatorial Mathematics", Pearson Education, Fifth Edition, 2007.

2. Thomas Koshy, "Discrete Mathematics with Applications", Academic Press, 2005.

EVALUATION PATTERN: 14.1

18CSA114   DATABASE MANAGEMENT SYSTEM   3 1 0 4

Objectives: The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Course Outcomes

CO1	Master the basic concepts of DBMS like data independence and three schema architecture.
CO2	Be familiar with the CODD's rules and E-R Model and also have clear picture about the structure of the relational databases.
CO3	Master the concept of normalization and different types of normalization.
CO4	Be familiar with the basics of query evaluation techniques and query optimization and also to get a clear picture about transaction processing.
CO5	Master the basics of SQL and construct queries using SQL and also write programs using PL/SQL.

UNIT 1

Introduction - Data Independence - The Three Levels Of Architecture - The External Level - Conceptual Level - Internal Level - Client/Server Architecture- System Structure , Instance and schema, Data Models, Types of DBMS

UNIT 2

Keys - CODD's Rules, Design Issues -ER – Model –Attribute types- Weak Entity Sets - Extended ER Features –ER to Relational Mapping, Structure Of Relational Databases

UNIT 3

Normalization –Anomalies- Functional Dependency: Armstrong's axioms- closure of a relation and closure of attribute– Lossless decomposition-1NF, 2NF, 3NF, Boyce - Codd Normal Form

UNIT 4

The Relational Algebra -- Query Processing and Optimization: Evaluation of Relational algebra expressions-Query Equivalence-Transaction Processing: ACID properties, states of a transaction- Introduction to concurrency control-Deadlock-Recovery.

UNIT 5

Built in SQL functions- Set operations, Sub Queries-Joins-DCL – TCL- Views – Sequences – Index – Locks

PL/SQL Basics – Exceptions – Cursors - Stored Functions – Triggers

TEXTBOOKS:

1. Silberschatz. Korth. Sudarshan: Database System Concepts - 6thEdition Mcgraw-Hill International Edition

2. Ivan Bayross: Sql- PL/SQL The Programming Language Of Oracle- 4rd   Edition- Bpb Publications

REFERENCE:

1. C.J.   Date: An Introduction To Database Systems - Eighth Edition - Pearson Education Asia

2. Kevin   Loney -   George Koch: Oracle 9i The Complete Reference Mcgraw-Hill   International Edition

3. "Fundamentals of Database Systems" by Elmasri and Navathe

EVALUATION PATTERN: 14.1

18CSA113   **PROGRAMMING IN C**   **3 1 0 4**

Objectives: This **course** is designed to provide complete knowledge of **C** language. Students learns programming constructs develop logic and create programs and applications in **C**.

Course Outcomes

CO1	Be familiar with the C Programming language which includes the structure of a C program, Tokens, Expressions, Operators etc.
CO2	Develop conditional and iterative statements to write C programs.
CO3	Inscribe C programs that uses pointers to access arrays and strings.
CO4	Exercise user defined functions to solve real time problems.
CO5	Be familiar with the user defined data type including structures and unions and also access files in C.

Unit1
Introduction to C language - structure of 'C' program, Programming elements(tokens) –Classes of data types –Declaration of variables, assigning values to variables, defining symbolic constants, escape sequences (backslash character constants), Operators–operator precedence and associativity, Expressions – Evaluation of expressions, type conversions(type casting).

Unit 2
Input and Output operations – formatted and unformatted input and output–Conversion specifiers- Conditional and Control structures

Unit 3
Arrays – single dimensional arrays - declaration –memory representation– initialization and access. 2D arrays and multidimensional arrays.

Strings – defining strings, initializing, accessing, character handling functions, arithmetic operations on characters, character by character input and output, string handling functions, array of strings and its features.

Pointers –Introduction, declaring and initializing pointer variables, pointer expressions, pointers and arrays, pointers and strings, array of pointers.

Unit 4
Functions – definition-declaration-prototypes and function call- actual and formal arguments-types of functions- call by value-call by reference-nesting of functions-recursive functions-pointers to functions-storage class specifiers.

Enumerated data types- Preprocessor directives – Macros - File inclusion, Command line arguments.

Unit 5
Structures – definition-declaration-initialization-accessing structures- array of structures, array within structures, structures within structures, self-referential structures, pointers to structures, uses of structures.

Union- definition- union of structures.

Files – Reading and writing files - file handling functions – file opening modes – file operations

TEXTBOOKS:
1.   "Let us C", YashavantKanetkar, 13th Edition, BPB Publications.
2.   "Programming in ANSI C", E. Balagurusamy, Sixth Edition, Tata McGraw-Hill Publishing Company Limited.

REFERENCES:
1. "Test your C skills", YashavantKanetkar,
2. "Exploring C", YashavantKanetkar,

EVALUATION PATTERN: 14.1

18CSA111   COMPUTER ORGANIZATION   3 1 0 4

Objectives: This course is intended to teach the basics involved in data representation and digital logic circuits used in the computer system. This includes the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design. This course will also expose students to the basic architecture of processing, memory and i/o organization in a computer system.

Course Outcomes

CO1	Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.
CO2	Be familiar with the functional units of the processor such as the register file and arithmetic-logical unit
CO3	Be familiar with the representation of data, addressing modes, instructions sets
CO4	Understand ways to take advantage of instruction level parallelism for high performance processor design
CO5	Categorize memory organization and explain the function of each element of a memory hierarchy

Unit1
SOP and POS Expressions, Karnaugh Map Simplification - Universal gates, Sequential circuits and combinational circuits, Flip Flops, Registers, Counters, Decoder, Encoder, Multiplexer, De-multiplexer, Arithmetic circuits,

Unit 2
Computer Organization and Design - Instruction Codes- Computer Registers- Computer Instructions - Instruction Cycle - Memory Reference Instructions - Input Output configuration
Unit 3
Central Processing Unit: Introduction- General Register Organization - Stack Organization - Instruction Formats - Addressing Modes - Data Transfer and Manipulation - Conditional Branch Instructions - Program Interrupts
Unit 4
Pipeline and Vector Processing

Parallel Processing - Pipelining - Arithmetic Pipeline - Instruction Pipeline - Vector Processing - Array Processors

Unit 5

Memory Organization

Memory Hierarchy - Types of Memory - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory

Computer Arithmetic – Introduction - Multiplication Algorithm - Booth's Algorithm.

TEXTBOOKS:

1. M Morris Mano - Computer System Architecture - PHI - Third Edition
2. Gideon Langholz, Abraha& Joe L Mott - Digital Logic Design - World Scientific Publishing Co Ltd

REFRENCES:

1. P Pal Chaudhuri - Computer Organization and Design - PHI - Second Edition
2. Thomas C Bartee - Digital Computer Fundamentals - Tata Mc Graw Hill - Sixth Edition
3. Carl V Hamcher - Computer Organization 5th Edition – Mc Graw Hill

EVALUATION PATTERN: 14.1

18CSA183   DATABASE MANAGEMENT SYSTEM LAB-I   0 0 2 1

Objectives: Imparting the knowledge about the database and SQL concepts to design databases for various applications.

Course Outcomes

CO1	Design and implement a database schema for a given problem domain.
CO2	Populate and query a database using SQL DDL and DML commands.
CO3	Be familiar with creating various database objects like view, sequence, synonym, index etc.
CO4	Inscribe PL/SQL programs using exception handling and cursors.
CO5	Exercise creating stored procedures, functions and database triggers.

Built in SQL functions- Set operations, Sub Queries-Joins-DCL – TCL- Views – Sequences – Index – Locks

PL/SQL – Exceptions – Cursors - Stored Functions – Triggers

EVALUATION PATTERN: 14.2

18CSA184 **PROGRAMMING IN C LAB** **0 0 2 1**

Objectives:
The purpose of this course is to introduce to students to the field of programming using C language. The students will be able to enhance their analysing and problem solving skills and use the same for writing programs in C.

Course Outcomes

CO1	Develop C programs that uses conditional and iterative statements.
CO2	Inscribe C programs that handles various types of arrays and strings.
CO3	Develop C programs that used pointers to access arrays.
CO4	Create user defined functions to solve the real time problems.
CO5	Develop C programs to execute file handling and to create user defined data types in C,

Operators- Arithmetic, Relational, Ternary, Logical, Bitwise
Control Statements-if, if-else, nested if, if-else if, switch, goto
Looping Control-while, for, do-while
Arrays-one-dimensional- creating, displaying merging, searching, sorting, reversing
Arrays-Two-dimensional- creating, displaying, Operations on 2D arrays
Strings-String functions, manipulation of strings, multi strings
Pointers – Pointer arithmetic, Array of pointers, pointer to array
Functions – passing arguments, returning values, recursive functions, pointers as arguments
Structures-Initializing, members as array, variables as array, passing structures to functions, pointers to structures
Union-Enum types, preprocessors-macros, macro with arguments, nested macro, file inclusion, command line arguments
File Handling

EVALUATION PATTERN: 14.2

SEMESTER III

| 18AVP201 | AMRITA VALUES PROGRAMME I | 1 0 0 1 |
| 18AVP211 | AMRITA VALUES PROGRAMME II | 1 0 0 1 |

Objectives: Amrita University's Amrita Values Programme (AVP) is a new initiative to give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.

Amrita Values Programmes emphasize on making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

Students shall have to register for any two of the following courses, one each in the third and the fourth semesters, which may be offered by the respective school during the concerned semester.

Course outcomes:

CO1	To make students familiar with the rich tapestry of Indian life, culture, arts, science and heritage.
CO2	To give exposure to students about richness and beauty of Indian way of life.

Courses offered under the framework of Amrita Values Programmes I and II

Insights into Indian Classical Music

The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svaram – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala,- Sapta talas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

Insights into Traditional Indian Painting

The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Sixs limbs of Indian paintings) and the contextual stories from ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriyal, Rajput, Tanjore etc.

Insights into Indian Classical Dance

The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the Abhinava Bharati. The course introduces various styles of Indian classical dance such as Bharatanatyan, Mohiniyatton, Kuchipudi, Odissy, Katak etc. The course takes the students through both contextual theory as well as practice time.

Indian Martial Arts and Self Defense

The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala's traditional Kalari Payattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.

Social Awareness Campaign

The course introduces the students into the concept of public social awareness and how to transmit the messages of social awareness through various media, both traditional and modern. The course goes through the theoretical aspects of campaign planning and execution.

Temple Mural Arts in Kerala

The traditional percussion ensembles in the Temples of Kerala have enthralled millions over the years. The splendor of our temples makes art enthusiast spellbound, warmth and grandeur of color combination sumptuousness of the outline, crowding of space by divine or heroic figures often with in vigorous movement are the characteristics of murals.

The mural painting specially area visual counterpart of myth, legend, gods, dirties, and demons of the theatrical world, Identical myths are popular the birth of Rama, the story of Bhīma and Hanuman, Shiva, as Kirata, and the Jealousy of Uma and ganga the mural painting in Kerala appear to be closely related to, and influenced by this theatrical activity the art historians on temple planes, wood carving and painting the architectural plane of the Kerala temples are built largely on the pan-Indians almost universal model of the vasthupurusha.

Organic Farming in Practice

Organic agriculture is the application of a set of cultural, biological, and mechanical practices that support the cycling of farm resources, promote ecological balance, and conserve biodiversity. These include maintaining and enhancing soil and water quality; conserving wetlands, woodlands, and wildlife; and avoiding use of synthetic fertilizers, sewage sludge, irradiation, and genetic engineering. This

factsheet provides an overview of some common farming practices that ensure organic integrity and operation sustainability.

Ayurveda for Lifestyle Modification:

Ayurveda aims to integrate and balance the body, mind, and spirit which will ultimately leads to human happiness and health. Ayurveda offers methods for finding out early stages of diseases that are still undetectable by modern medical investigation. Ayurveda understands that health is a reflection of when a person is living in harmony with nature and disease arises when a person is out of harmony with the cycles of nature. All things in the universe (both living and non-living) are joined together in Ayurveda. This leaflet endow with some practical knowledge to rediscover our pre- industrial herbal heritage.

Life Style and Therapy using Yoga

Yoga therapy is the adaptation of yogic principles, methods, and techniques to specific human ailments. In its ideal application, Yoga therapy is preventive in nature, as is Yoga itself, but it is also restorative in many instances, palliative in others, and curative in many others. The therapeutic effect comes to force when we practice daily and the body starts removing toxins and the rest is done by nature.

EVALUATION PATTERN: 14.1

18SSK201   **LIFE SKILLS I**   **1 0 2 2**

Objectives: Bridge the gap between a student and a student becoming an employee or an entrepreneur. Aims to provide students with the knowledge and skills to understand and participate in the modern business scenario and the world of economics so as to prepare them to achieve success in their career.

Course outcomes

	Soft Skills:
CO1	At the end of the course, the students would have developed self-confidence and positive attitude necessary to compete and challenge themselves. They would also be able to analyse and manage their emotions to face real life situations.
CO2	At the end of the course, the students shall learn to examine the context of a Group Discussion topic and develop new perspectives and ideas through brainstorming and arrive at a consensus.

CO3	At the end of the course, the students will have the ability to prepare a suitable resume. They would also have acquired the necessary skills, abilities and knowledge to present themselves confidently. They would be sure-footed in introducing themselves and facing interviews.
CO4	At the end of the course the students will have the ability to analyse every question asked by the interviewer, compose correct responses and respond in the right manner to justify and convince the interviewer of one's right candidature through displaying etiquette, positive attitude and courteous communication.
	Aptitude:
CO5	At the end of the course, the student will have acquired the ability to analyse, understand and classify questions under arithmetic, algebra and logical reasoning and solve them employing the most suitable methods. They will be able to analyse, compare and arrive at conclusions for data analysis questions.
CO6	At the end of the course, students will be able to interpret, critically analyse and solve logical reasoning questions. They will have acquired the skills to manage time while applying methods to solve questions on arithmetic, algebra, logical reasoning, statistics and data analysis and arrive at appropriate conclusions.
	Verbal:
CO7	At the end of the course, the students will have the ability to understand the nuances of English grammar and apply them effectively.

CO8	At the end of the course, the students will have the ability to relate, choose, conclude and determine the usage of right vocabulary.
CO9	At the end of the course, the students will have the ability to decide, conclude, identify and choose the right grammatical construction.

Soft skills and its importance: Pleasure and pains of transition from an academic environment to work-environment. Need for change. Fears, stress and competition in the professional world. Importance of positive attitude, self-motivation and continuous knowledge upgradation.

Self Confidence: Characteristics of the person perceived, characteristics of the situation, Characteristics of the Perceiver. Attitude, Values, Motivation, Emotion Management, Steps to like yourself, Positive Mental Attitude, Assertiveness.

Presentations: Preparations, Outlining, Hints for efficient practice, Last minute tasks, means of effective presentation, language, Gestures, Posture, Facial expressions, Professional attire.

Vocabulary building: A brief introduction into the methods and practices of learning vocabulary. Learning how to face questions on antonyms, synonyms, spelling error, analogy etc. Faulty comparison, wrong form of words and confused words like understanding the nuances of spelling changes and wrong use of words.

Listening Skills: The importance of listening in communication and how to listen actively.

Prepositions and Articles: A experiential method of learning the uses of articles and prepositions in sentences is provided.

Problem solving; Number System; LCM &HCF; Divisibility Test; Surds and Indices; Logarithms; Ratio, Proportions and Variations; Partnership; Time speed and distance; work time problems;

Data Interpretation: Numerical Data Tables; Line Graphs; Bar Charts and Pie charts; Caselet Forms; Mix Diagrams; Geometrical Diagrams and other forms of Data Representation.

Logical Reasoning: Family Tree; Linear Arrangements; Circular and Complex Arrangement; Conditionalities and Grouping; Sequencing and Scheduling; Selections; Networks; Codes; Cubes; Venn Diagram in Logical Reasoning.

TEXTBOOKS:
1.   A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
2.   Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K:

Pan Books.
3.   Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.
4.   The Hard Truth about Soft Skills, by Amazone Publication.
REFERENCES:
1.   Quantitative Aptitude, by R S Aggarwal, S Chand Publ.
2.   Verbal and Non-verbal Reasoning, R S Aggarwal, S Chand Publ.
3.   Data Interpretation, R S Aggarwal, S Chand Publ.
4.   Nova GRE, KAPAL GRE, Barrons GRE books;
5.   Quantitative Aptitude, The Institute of Chartered Accountants of India.
6.   More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.
7.   The BBC and British Council online resources
8.   Owl Purdue University online teaching resources
9.   www.thegrammarbook.com online teaching resources
10.   www.englishpage.com online teaching resources and other useful websites.

EVALUATION PATTERN: 14.1

18MAT208   STATISTICAL AND NUMERICAL METHODS   3 1 0 4

Objectives: The main objective of this course is to understand and implement various concepts of numerical analysis and statistics to solve real life problems.

Course Outcomes

CO1	Study the relationship of a dependent variable on an independent variable.
CO2	Understand the various types of probability distributions and its applications
CO3	To understand the meaning and process of differentiation
CO4	Provide numerical answers to complex problems of scientific and engineering nature.
CO5	Develop an idea of numbers, its divisibility and properties

Unit 1
Statistics-Introduction -Measures of average-AM-Median-Mode, Measures of dispersion and its coefficients – Range – QD – SD-MD
Unit 2
Correlation- Karl Pearson's and Spearman's rank correlation, Regression- regression equations, regression coefficients
Unit 3

Permutations – combinations – Probability-addition theorem, multiplication theorem, independent events,conditional probability,Baye's theorem,Probability distribution-Binomial,Poisson, Normal.

Unit 4

Interpolation- Newton's forward &backward method- Lagrange's Method,Curve fitting-fitting a straight line

Unit 5

Solutions of Numerical, Algebraic and transcendental methods- bisection method, Newton Raphson method,Simultaneous linear equations -Gauss elimination

TEXT BOOKS:

P.R.Vittal-Business Mathematics and Statistics,Margham Publications,Chennai,

REFERENCE:

1. H.S.Hall and S.R.Knight: Higher Algebra –AITBS Publishers India.

2. M.K.Venkataraman: Numerical methods in Science and Engineering-National Publishing Company,Chennai

EVALUATION PATTERN: 14.1

18CSA209   **DATA STRUCTURES AND ALGORITHMS**   **3 1 0 4**

OBJECTIVES: **This course is intended to introduce abstract concepts and shows how those concepts are useful in problem solving, and then shows how the abstractions can be made concrete by using a programming language. Equal emphasis is placed on both the abstract and the concrete versions of a concept. The only prerequisite for students is an understanding in programming.**

Course Outcomes

CO1	Student will be able to understand the memory organization and use of various data structures
CO2	Learn the working of various searching and sorting algorithms
CO3	Able to develop applications using suitable data structures
CO4	Understand the tree and tree traversal concepts
CO5	Gives an idea about graphs and finding shortest path

Unit 1. Algorithm Analysis

Basic mathematical review, RAM model of computation, Pseudocode conventions, Worst case, Average case and Best case analysis, Asymptotic Analysis, Back Substitution Method, masters method, Euclid's algorithm, Exponentiation.

Unit 2: Searching and Sorting

Linear Search, Binary Search – Analysis, Bubble Sort, Insertion Sort, Merge sort, Quick Sort

Unit 3. Linear Data Structures

Abstract Data Type, List ADT: Singly linked lists, Doubly linked lists, Circular Linked Lists, Stack ADT implementation and applications, Queue ADT: Implementation and Application. Circular Queue, Priority Queue

Unit 4. Non-Linear Data Structures.

Basic concepts of trees, Implementation of trees, Traversal, Binary tree, Expression tree, Binary search tree, AVL tree, Heap

Unit 5. Graphs

Adjacency matrix, Adjacency list, bfs, dfs, MST Prims and Kruskals, Dijkstras algorithm

Text Book: Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education

References: 1. Samanta, Debasis. Classic data structures. PHI Learning Pvt. Ltd., 2004.

2. Cormen, Thomas H. Introduction to algorithms. MIT press, 2009.

EVALUATION PATTERN: R14.1

18CSA206   OBJECT ORIENTED PROGRAMMING USING C++   3 1 0 4

Objectives: The course is designed to provide complete knowledge of Object Oriented Programming through C++ and to enhance the programming skills of the students by giving practical assignments to be done in labs.

Course Outcomes

CO1	Provides basic concepts of OOPS
CO2	Learn to use programming constructs in C++
CO3	Understand how abstraction is implemented using C++
CO4	Demonstrate the pinter concepts
CO5	Able to develop applications using templates and files

UNIT 1

Introduction to C++, Object Oriented Concepts, Basics of C++ environment, Classes & Object, Data members, Access specifiers, Defining member functions, inline member functions, nesting of member functions, Array within a class, Static data members, Constant members , Arrays of

objects, Objects as arguments, Returning objects, Constructors, Default Constructors, Parameterized constructors, Copy constructors, Destructors, friend functions, friend classes.

UNIT 2

Compile time polymorphism, function overloading, Overloading operators, Overloading unary, Overloading binary, Overloading using friends, Overloading constructor Manipulation of strings using operators, overloading constructors, Inheritance, Base classes and derived classes, Protected members, Types, constructors in base derived classes,

UNIT 3

Run time Polymorphism, function overriding, virtual base class, Virtual functions, pure virtual function, Abstract classes, class containership. Exception handling- basics of exception handling, exception handling mechanism, throw , catch, rethrow exceptions.

UNIT 4

Fundamentals of pointers, New, Delete operators, pointer declarations, operations on pointers, passing pointers to function, passing an entire array to a function, pointers and two-dimensional arrays, array of pointers, passing functions to other functions, pointers to structures, this pointer.

UNIT 5

class templates, class templates with multiple parameters, function templates, function templates with multiple parameters, Data files -C++ stream classes, unformatted and formatted I/O operations, Opening and closing of files, File modes, File pointers and manipulation, Sequential input and output operations , Updating a file, Error handling during file operations.

TEXT / REFERENCES:

1. E. Balagurusamy "Object-Oriented Programming With C++", Fifth Edition, Tata Mcgraw-Hill Publishing Company Ltd

2. H.M. Deitel and P.E. Deital,"C++ How to Program", Eighth Edition Prentice Hall of India,1998.

EVALUATION PATTERN: R14.1

18CSA201   **OPERATING SYSTEM**   3 1 0 4

Objectives: Fundamental concepts and designs will be covered along with the practical aspects that pertain to the most popular operating systems such as Unix/Linux and Windows, and some instructional operating systems will be studied as well.

Course Outcomes

CO1	Understand the basic concepts of OS with different types of OS, different services along with the various system calls
CO2	Get the knowledge of process management, various operations on process and Inter process communication
CO3	Understand the various process scheduling algorithms
CO4	Learn about deadlocks, methods of handling deadlocks, preventing deadlocks etc
CO5	Get a knowledge of memory management -paging and segmentation etc

UNIT 1

Introduction to Operating Systems: Mainframe systems-Desktop systems-Multiprocessor systems-
Distributed systems-Clustered systems-Real-time systems-Handheld systems
Operating System Structures: System components-Operating System services-System calls-System Programs-
System Structures-System Design and Implementation-System Generation.

UNIT 2

Process Management: Process Concept-Process Scheduling-Operations on processes-Cooperating processes-Inter Process Communication
CPU Scheduling: Basic concepts-Scheduling criteria-Scheduling Algorithms-First Come Firstserved Scheduling, Shortest job First Scheduling, Round Robin Scheduling, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling.
Process synchronisation:Background,critical section problem, semaphores, monitors,producer consumer problem, dining philosophers problem, readers and writers problem.

UNIT 3

Deadlocks: System Model-Deadlock Characterization-Methods for handling Deadlocks-Deadlock Prevention-Deadlock Avoidance-Deadlock detection-Recovery from deadlock.

UNIT 4

Memory Management: Background-Swapping-Contiguous Memory allocation-Paging-Segmentation-Segmentation with Paging. Virtual Memory: Background-Demand paging-Process creation-Page replacement-Allocation of Frames-Thrashing.

UNIT 5

I/O Systems: Overview, I/O Hardware

Mass storage structure- Disk structure, disk scheduling, disk management.

Case Study:- Unix System

TEXT BOOK:

Abraham SilberSchartz- peter B Galvin-Greg Gagne, Operating system Concepts. Eighth Edition, Addison-Wesley(2003)

REFERENCES:

1. S.Godbole - Operating Systems - Tata McGraw Hill Publications
2. H.M Deitel - Operating Systems - Second Edition - Pearson Edition Asia

EVALUATION PATTERN: R14.1

18CSA207   PRINCIPLES OF MANAGEMENT AND ACCOUNTING   3 0 0 3

OBJECTIVES: The objective of this course to enable the students to have a basic knowledge of principles of management and to provide theoretical and practical aspects of various systems of accounting.

Course Outcomes

CO1	Observe and evaluate the influence of historical forces on the current practice of management.
CO2	Explain how organizations adapt to an uncertain environment and identify techniques managers use to influence and control the internal environment.
CO3	Practice the process of management's four functions: planning, organizing, leading, and controlling.
CO4	Identify and properly use vocabularies within the field of management to articulate one's own position on a specific management issue and communicate effectively with varied audiences.
CO5	Evaluate leadership styles to anticipate the consequences of each leadership style.

Unit 1

Management: meaning and definition, importance of management, administration and management, functional management, functions of management, levels of management

Unit 2

Financial Accounting: Meaning and important terms, accounting concepts, double entry book keeping, types of accounts, journal, ledger, trial balance.

Unit 3
Final Accounts: Preparation of Trading and Profit and Loss Accounts and Balance Sheet, adjustments relating to outstanding expenses, prepaid expenses, accrued income unearned income, depreciation and bad and doubtful debts.

Unit 4
Financial Statement Analysis, Trend Analysis

Unit 5
Cost Accounting: Meaning and Definition, difference between cost accounting and financial accounting, elements of cost, Cost sheet, Expenses excluded from cost.
Reference Books:
1. DinkarPagare – Principles of Management, Sultan Chand and Sons
2. Vineeth, Shabu – Principles of Management and Accounting, Kalyani Publishers
3. S.P. Jain, K.L. Narang – Financial Accounting, Kalyani Publishers
4. S.P. Jain, K.L. Narang – Cost Accounting, Kalyani Publishers

EVALUATION PATTERN: R14.1

18CSA283   DATA STRUCTURES AND ALGORITHMS LAB-I   0 0 2 1

Objectives: The **course** is designed to develop skills to design and analyse simple linear and non-linear **data structures**. It strengthen the ability to the students to identify and apply the suitable **data structure** for the given real world problem.
Course Outcomes

CO1	Student will be able to implement various sorting algorithms
CO2	Learn to apply array, stack and queue concepts to solve real world problems
CO3	Able to use the concepts of link list to solve various problems
CO4	Learn to implement the trees and binary search trees
CO5	Understand tree traversal algorithms

Topic 1:   Sorting – Searching
1.   Write a program to implement Bubble Sort.
2.   Write a program to implement selection sort.
3.   Write a program to implement Quick Sort.
4.   Write a program to implement Insertion Sort.

5.   Write a program to implement Merge Sort.
6.   Write a program to implement Binary Search.

Topic 2:   *Arrays –Stacks-Recursion*
7.   Write and test a function that transposes a square matrix.
8.   Write and test a recursive function that prints all the permutations of the first n characters of a string.
9.   Write and test a recursive function that returns the power x^n
10.   Write a program to implement a stack of strings (illustrate the operations push (), pop(), size(), empty() and top()).
11.   Write a program to show the linked implementation of the *Stack* class.
12.   Write a program to covert infix to postfix.
13.   Write a program to implement Towers of Hanoi using Stack.

Queues-Linked-Lists
14.   Write a program to implement a linear list and perform the operation such as insert(), search() and delete().
15.   Write a program to implement a queue by adding the functions such as
        (i)   Determine the size
        (ii)   input queue
        (iii)   output a queue
        (iv)   split a queue into two queues
16.   Write a program to search a circular linked list with a header node.

Topic 3:   *Binary Trees - Binary Tree Traversal*
17.   Write a program to implement Binary Search Tree.
18.   Priority queue implementation.
19.   Write a program to create a binary tree and find the height of a binary tree.
20.   Write a program to perform the binary tree traversals.
21.   Write a program to perform a deletion from a Binary Tree (using a delete () function).

Topic 4:   *Graphs*
20.   Matrix representation of graphs
21.   DFS traversal
22.   BFS traversal

EVALUATION PATTERN: R14.2

18CSA284   OBJECT ORIENTED PROGRAMMING USING C++ LAB   0 0 2 1

Objectives: The course is designed to provide complete knowledge of Object Oriented Programming through C++ and to enhance the programming skills of the students by giving practical assignments to be done in labs.

Course Outcomes

CO1	Develop programs using OOPS concepts
CO2	Implement the concepts of pointers using c++
CO3	Able to develop application using files.
CO4	Familiarize the students with the concepts of templates
CO5	Learn to implement exception handling in C++

Class and objects- creating class, objects, private, public data members, member functions, object as array, arguments, returning objects

Constructors & destructors- Default Constructors, Parameterized constructors, Copy constructors, friend functions, friend classes.

Polymorphism- function overloading, operator overloading, overloading unary and binary

Pointers -operations on pointers, passing pointers to function, passing an entire array to a function, pointers and two-dimensional arrays, array of pointers, pointers to objects.

Inheritance, Single, multiple, hierarchical, multi-level, hybrid

Function overriding, virtual base class, Creation of pure virtual function

Using new and delete operator, pointer arithmetic

Data files - unformatted and formatted I/O operations, Opening and closing of files, File modes, File pointers and manipulation, Sequential input and output operations, Updating a file, Error handling

Templates - class templates, class templates with multiple parameters, function templates, function templates with multiple parameters

Exception handling- basics of exception handling, throw, catch, rethrow exceptions.

EVALUATION PATTERN: R14.2

18SSK211   **LIFE SKILLS II**   **1 0 2 2**

Objectives: Bridge the gap between a student and a student becoming an employee or an entrepreneur. Aims to provide students with the knowledge and skills to understand and participate in the modern business scenario and the world of economics so as to prepare them to achieve success in their career.

Course outcomes

	Soft Skills:
CO1	At the end of the course, the students would have developed self-confidence and positive attitude necessary to compete and challenge themselves. They would also be able to analyse and manage their emotions to face real life situations.
CO2	At the end of the course, the students shall learn to examine the context of a Group Discussion topic and develop new perspectives and ideas through brainstorming and arrive at a consensus.
CO3	At the end of the course, the students will have the ability to prepare a suitable resume. They would also have acquired the necessary skills, abilities and knowledge to present themselves confidently. They would be sure-footed in introducing themselves and facing interviews.
CO4	At the end of the course the students will have the ability to analyse every question asked by the interviewer, compose correct responses and respond in the right manner to justify and convince the interviewer of one's right candidature through displaying etiquette, positive attitude and courteous communication.
	Aptitude:

CO5	At the end of the course, the student will have acquired the ability to analyse, understand and classify questions under arithmetic, algebra and logical reasoning and solve them employing the most suitable methods. They will be able to analyse, compare and arrive at conclusions for data analysis questions.
CO6	At the end of the course, students will be able to interpret, critically analyse and solve logical reasoning questions. They will have acquired the skills to manage time while applying methods to solve questions on arithmetic, algebra, logical reasoning, statistics and data analysis and arrive at appropriate conclusions.
	Verbal:
CO7	At the end of the course, the students will have the ability to understand the nuances of English grammar and apply them effectively.
CO8	At the end of the course, the students will have the ability to relate, choose, conclude and determine the usage of right vocabulary.
CO9	At the end of the course, the students will have the ability to decide, conclude, identify and choose the right grammatical construction.

Professional Grooming and Practices: Basics of Corporate culture, Key pillars of Business Etiquette. Basics of Etiquette: Etiquette – Socially acceptable ways of behaviour, Personal hygiene, Professional attire, Cultural Adaptability. Introductions and Greetings: Rules of the handshake, Earning respect, Business manners. Telephone Etiquette: activities during the conversation, Conclude the call, To take a message. Body Language: Components, Undesirable body language, Desirable body language. Adapting to Corporate life: Dealing with people.

Group Discussions: Advantages of Group Discussions, Structured GD – Roles, Negative roles to be avoided, Personality traits to do well in a GD, Initiation techniques, How to perform in a group discussion, Summarization techniques.

Listening Comprehension advanced: Exercise on improving listening skills, Grammar basics: Topics like clauses, punctuation, capitalization, number agreement, pronouns, tenses etc.

Reading Comprehension advanced: A course on how to approach middle level reading comprehension passages.

Problem solving – Money Related problems; Mixtures; Symbol Based problems; Clocks and Calendars; Simple, Linear, Quadratic and Polynomial Equations; Special Equations; Inequalities; Functions and Graphs; Sequence and Series; Set Theory; Permutations and Combinations; Probability; Statistics.

Data Sufficiency: Concepts and Problem Solving.

Non-Verbal Reasoning and Simple Engineering Aptitude: Mirror Image; Water Image; Paper Folding; Paper Cutting; Grouping Of Figures; Figure Formation and Analysis; Completion of Incomplete Pattern; Figure Matrix; Miscellaneous.

Special Aptitude: Cloth, Leather, 2D and 3D Objects, Coin, Match Sticks, Stubs, Chalk, Chess Board, Land and geodesic problems etc., Related Problems

TEXTBOOKS:

*1.	A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.*

*2.	Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.*

*3.	Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.*

*4.	The Hard Truth about Soft Skills, by Amazone Publication.*

REFERENCES:

*1.	Quantitative Aptitude, by R S Aggarwal, S Chand Publ.*

*2.	Verbal and Non-verbal Reasoning, R S Aggarwal, S Chand Publ.*

*3.	Quantitative Aptitude by AbjithGuha, Tata McGraw hill Publ.*

*4.	More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.*

*5.	The BBC and British Council online resources*

*6.	Owl Purdue University online teaching resources*

*7.	www.thegrammarbook.com online teaching resources*

*8.	www.englishpage.com online teaching resources and other useful websites.*

EVALUATION PATTERN: R14.1

18CSA214   **COMPUTER NETWORKS**   **3 1 0 4**

Objectives: This course presents an in-depth discussion of the most important networking protocols comprising the TCP/IP protocol suite. Students will be able to understand state of the art in network protocols, architectures, and applications.
Course Outcomes

CO1	Get aware about the architecture of network topology and need for reference model
CO2	Understand the error correction and detection methods used in DLL and goodness of frame structure
CO3	An awareness about routing, IP addresses and subnetting
CO4	Provides information regarding congestion control mechanism at transport layer
CO5	Provides deep knowledge about the working of HTTP and DNS at application layer

Unit 1
Evolution of Computer Networking-Types of Network- networks topologies-Protocols & standards-Network Devices-The OSI reference model- TCP/IP Reference Model.
Physical Layer: transmission media- Analog Transmission- Digital transmission

Unit 2
Data Link Layer Design Issues-Services provided to the Network Layer-Framing-Error Control-Flow Control- Error Detection and Correction- Elementary Data Link Protocols- Sliding Window Protocols- Multiple Access Protocols-An overview of IEEE Standard for LANs, MAC Address.

Unit 3
Introduction to Network Layer – Services - Circuit Switching Vs Packet Switching-Packet Switched Networks-Types of Routing-routing algorithms- congestion control algorithms-Network Protocols-IP- IPV4, IPV6, Subnets, Gateways- Congestion Avoidance in Network Layer.

Unit 4
The Transport Services – Services provided to the upper layers –Elements of transport Protocols –Internet Transport Protocols- Congestion Controls in Transport Layer

Unit 5
Principles of Network Applications-Web and HTTP-Electronic mail-DNS

TEXTBOOK

Computer Networks (Fifth Edition) – Andrew S. Tanenbaum (Prentice Hall of India)

REFERENCES:
1. Computer Networking A Top-Down Approach(Fifth Edition)-James F. Kurose-Keith W. Ross (Pearson)
2. Computer Networks - Protocols, Standards and Interfaces (Second Edition) – UylessBlack(Prentice Hall of India Pvt. Ltd.)
3. Data communication and Networking(Fourth Edition)- Behrouz A Forouzan(Tata Mcgraw Hill)

EVALUATION PATTERN: R14.1

| 18CSA215 | JAVA PROGRAMMING | 3 1 0 4 |

Objectives: *The main objective of this course is to understand the basic concepts and techniques which form the object oriented programming paradigm using Java Language.*

Course Outcomes

CO1	Understand the features of Java and the architecture of JVM
CO2	Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done
CO3	Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance
CO4	The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language
CO5	Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files

Unit 1
Introduction and Features of Java - Byte Code, Program Translation, JVM.
Unit 2
Program Structure, Data types, Java Statements, Type casting in Java programs - Types of Operators.
Unit 3

50

Decision Making statements, Looping statements-Arrays, Strings, Vectors, Wrapper classes - Class, methods, Inheritance, Visibility control, Final Classes, methods and Variables.

Unit 4

Interfaces - Interfaces in Java Library - Packages - System Packages, User defined packages – Multithreading - Threads, Runnable Interface, Thread Priorities - Exception Handling - try, catch, throw, throws, finally.

Unit 5

File handling and I/O in java - Stream Classes, Random access Files. Event handling - GUI Programming - AWT, Windows Fundamentals - Applets - Life cycle of an applet.

TEXTBOOK:

E Balagurusamy, Programming with Java – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.

REFERENCE:

Java 2 - The Complete Reference – McGraw Hill publication.

EVALUATION PATTERN: R14.1

| 18CSA216 | **WEB TECHNOLOGIES** | 3 1 0 4 |

Objectives: This course demonstrates an in-depth understanding of the tools and Web technologies necessary for business application design and development. The course covers client side scripting like HTML, CSS, JavaScript and server side scripting, JSPs and also XML and web servers and database interfacing.

Course Outcomes

CO1	Students are able to develop a dynamic webpage by the use of java script and DHTML.
CO2	Students will be able to write a well formed / valid XML document.
CO3	Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
CO4	Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.
CO5	Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.

Unit -1

HTML5 and CSS3

HTML5- Basic Tags, Tables,Forms.HTML5 Tags,HTML Graphics, HTML media, HTML Graphics,HTML APIs.

CSS - Background, Borders,margin, Box model. Styling text, fonts,list,links,tables. CSS overflow,float,inline blocks, pseudoclasses,pseudoelements.CSS border images,rounded corners

Unit-2

Java Script

Client side scripting using java script, Introduction to java script, internal and external Java script files, variables, control statements, loops, Arrays , string handling , How to write functions in JavaScript, inputting and outputting from form elements to JavaScript. DOM concept, creating html elements using java script. Drawing 2D shapes, handling events. Introduction to AJAX

Unit-3

Building Single page applications with Angular JS

Single page application – introduction , two way data binding, MVC in angular JS, controllers, getting user inputs , loops , Client side routing – accessing URL data , various ways to provide data in angular JS.

Unit -4

Server Side Programming

Server side scripting, Difference between client side and server side scripting languages. Introduction to PHP, variables, control statements, loops, Arrays, string handling, PHP forms, Global variables in PHP, Regular expression and pattern matching, Database programming: inputting and outputting data from MySQL using PHP, insertion , deletion and updating data.

State management in web applications, cookies, Application and session state.

Unit-5

Introduction to Xml, usage of XML, XML tags, elements and attributes, attribute type, XML validation: DTD and XSD, XML DOM

Case study:-Application Development using Laravel framework

Textbook/Reference:

The Complete Reference, HTML and CSS by Thomas A Powell latest edition

XML Bible by Horold, Ellotte Rusty

Web Reference:- W3Schools.com

EVALUATION PATTERN: R14.1

18CSA211   SOFTWARE ENGINEERING   3 0 2 4

Objectives: Software Engineering presents a broad perspective on software systems engineering, concentrating on widely used techniques for developing large-scale software systems. This course covers a wide spectrum of software processes from initial requirements elicitation through design and development to system evolution.

Course Outcomes

CO1	Students get an idea on the software crisis, myths, basics of software engineering, its phases of development etc.

CO2	Students get an overall idea about SRS and differnt Process Models.
CO3	Students are provided with a good idea of ERD, DFD, Design Methods and architectural views
CO4	An overall idea about Testing startegies, differnt methods and Testability concept is provided to the students.
CO5	All maintainance concepts, types of changes, maintainance side effects are given to students along with the idea of software re-engineering.

Unit 1
Introduction – Software - Software Crisis - Software Myths – Process and Product - Software characteristics- SDLC Introduction
Unit 2
Software requirements specification – Approaches – Paradigms – Build and Fix - Waterfall – Prototyping – Spiral – Concurrent – RAD – Incremental – Agile Introduction.

Unit 3
Analysis Modelling - Elements of Analysis Model - Data Modelling - ERD – DFD - Data Dictionary. Introduction to Design concepts - Design Architecture, Design characteristics, Description, Principles. Object oriented diagrams - Class diagrams - Use Case Diagrams – State-transition diagrams – Object diagrams – Interaction diagrams – UML Modelling .
Unit 4
Software Testing Fundamentals - Objectives of Testing - Testing Principles – Testability -Testing Process and Methods – Introduction to Testing Strategies.
Unit 5
Software Maintenance - Reverse Engineering and Reengineering

TEXTBOOK:
Roger S. Pressman, "Software Engineering", Tata McGraw-Hill Publishing Company Pvt. Ltd, Sixth Edition.
REFERENCE:
Shooman, "Software Engineering", Tata McGraw-Hill Publishing Company, Pvt. Ltd, 1987

EVALUATION PATTERN: R14.3

18CSA285   JAVA PROGRAMMING LAB-I   0 0 2 1

Objectives: To build software development skills using java programming for real world applications. Also to implement frontend and backend of an application using concepts of java.

Course Outcomes

CO1	Implement Object Oriented programming concept using basic syntaxes of control Structures
CO2	Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
CO3	Demonstrates how to achieve reusability using inheritance
CO4	Demonstrate understanding and use of interfaces, packages, different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
CO5	Identify and describe common user interface components to design GUI in Java using Applet & AWT along with response to events

Unit 1 Java Fundamentals

1. Write a program to print the following triangle of numbers
    1
    1 2
    1 2 3
    1 2 3 4
    1 2 3 4 5
2. Write a simple java application, to print the message , "Welcome to java"
3. Write a program to display the month of a year. Months of the year should be held in an array.
4. Write a program to assign two integer values to X and Y. Using the 'if' statement the output of the program should display a message whether X is greater than Y.
5. Write a program to find the area of rectangle.
6. Write a program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 4 = 4*3*2*1)

Unit 2 OOPs in Java

7. Write a java program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.
8. Write a program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.
9. Write a program with class variable that is available for all instances of a class .Use static variable declaration. Observe the changes that occur in the object's member variable values.

10. Write a java program
    a. To find the area and circumference of the circle by accepting the radius from the user.
    b. To accept a number and find whether the number is Prime or not
11. Write a java program to create a Student class with following attributes

    Enrollment No:, Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details.
12. In a college first year class are having the following attributes

    Name of the class (BCA, BCom, MHA), Name of the staff

    No of the students in the class, Array of students in the class

    Define a class called first year with above attributes and define a suitable constructor. Also write a method called best Student() which process a first year object and return the student with the highest total mark. In the main method define a first year object and find the best student of this class
13. Write a Java program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of appointment. ie, print them as per their seniority.
14. Create a package 'student.fulltime .BCA' in your current working directory
    a. Create a default class student in the above package with the following attributes: Name, age, sex.
    b. Have methods for storing as well as displaying

Unit 3 Exception Handling
15. Write a program to demonstrate a division by zero exception
16. Write a program to create an user defined exception say Pay Out Of Bounds.
17. Write a small program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.
18. Write a program to handle Null Pointer Exception and use the "finally" method to display a message to the user.

Units 4 and 5   GUI Programming I and II

19. Write a program which create and displays a message on the window
20. Write a program to draw several shapes in the created window
21. Write a program to create an applet and draw grid lines
22. Write a Java program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother also appear.

23. Create a frame which displays your personal details with respect to a button click
24. Create a simple applet which reveals the personal information of yours.
25. Write a program to move different shapes according to the arrow key pressed.
26. Write a java Program to create a window when we press
   M or m the window displays Good Morning
   A or a the window displays Good After Noon
   E or e the window displays Good Evening
   N or n the window displays Good Night
27. Demonstrate the various mouse handling events using suitable example.
28. Write a program to create menu bar and pull down menus.
29. Write a program to explain the multithreading with the use of multiplication table. Three threads must be defined. Each one must create one multiplication table.
30. Write a program to illustrate thread priority.
31. Create a GUI program in java with the following components.
   a. A frame with flow layout.
   b. Add the following components on to the frame.
      i. Two Text Field   ii. A button with the label display
   c. Allow the user to enter data into the textfield
   d. When the button is clicked paint the frame by displaying the data entered in the textfield
   e. Allow the user to properly close the frame

EVALUATION PATTERN: R14.3

| 18CSA286 | WEB TECHNOLOGIES LAB | 0 0 2 1 |

Objectives: The objective of this lab is to develop an ability to design and implement static and dynamic website using tools like HTML, CSS, java script, XML, and nodeJS

Course Outcomes

CO1	**Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.**
CO2	**Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.**
CO3	**Learn to use cookies and session in PHP programs**
CO4	**Learn to imnplement Anjular JS services**
CO5	**Learn to use XML and DTD to store and retrieve data**

1. Create a web page with advanced layouts and positioning with CSS and HTML.
2. Design a website with different methods of embedding CSS in a web page.

56

3. Create a static web page which displays your personal details. (Hint: CSS3 and HTML5)
4. Create a web page through which the user can enter his / her details to become an authenticated user of that page.
5. Create a web site for a Computer Hardware shop. (Hint: CSS3 and HTML5)
6. Create a web site for Amrita School of Arts and Sciences. (Hint: CSS3 and HTML5)
7. Create a web page that shows different methods of embedding JavaScript.
8. Create a web page with rollover menus. Rollover menus should be created using JavaScript.
9. Create a simple calculator, which can perform the basic arithmetic operations.
10. Validate the registration for with the following criteria:
    a. Name and Age should be Mandatory Fields.
    b. Password and Re-enter Password fields should contain same value.
    c. Name field should accept only character values.
11. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.
12. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
13. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
14. Create a registration form using Angular JS.
15. Create a simple **AngularJS** calculator application using Angular Services.
16. Create an application Searching for a character and displaying its position using AngularJS.
17. Create an application using angular JS filters.
18. Create single page web applications using the MVC pattern of *AngularJS.*
19. Design an XML document to store information about a student in an engineering college affiliated to Amrita. The information must include USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
20. Create an XML document with the following sample real estate data
    ● Root element real-estate will contain a sequence of sub-elements agencies, owners, properties and flats, all with an empty content
    ● Ensure well-formedness
21. Create an internal DTD for the previous XML document
    ● Ensure its validity
    ● Then try to break it
22. Move the previous DTD to an external file and validate the XML document again
23. Create an application that loads a text string into an XML DOM object, and extracts the info from it with JavaScript.
24. Create an application which reads data from an XML file into XMLDOM object and retrieves the text value of the first element in the xml file.

EVALUATION PATTERN: R14.2

18SSK301   **LIFE SKILLS III**   **1 0 2 2**

Objectives: Bridge the gap between a student and a student becoming an employee or an entrepreneur. Aims to provide students with the knowledge and skills to understand and participate in the modern business scenario and the world of economics so as to prepare them to achieve success in their career.

Course outcomes

	Soft Skills:
CO1	At the end of the course, the students would have developed self-confidence and positive attitude necessary to compete and challenge themselves. They would also be able to analyse and manage their emotions to face real life situations.
CO2	At the end of the course, the students shall learn to examine the context of a Group Discussion topic and develop new perspectives and ideas through brainstorming and arrive at a consensus.
CO3	At the end of the course, the students will have the ability to prepare a suitable resume. They would also have acquired the necessary skills, abilities and knowledge to present themselves confidently. They would be sure-footed in introducing themselves and facing interviews.
CO4	At the end of the course the students will have the ability to analyse every question asked by the interviewer, compose correct responses and respond in the right manner to justify and convince the interviewer of one's right candidature through displaying etiquette, positive attitude and courteous communication.
	Aptitude:

CO5	At the end of the course, the student will have acquired the ability to analyse, understand and classify questions under arithmetic, algebra and logical reasoning and solve them employing the most suitable methods. They will be able to analyse, compare and arrive at conclusions for data analysis questions.
CO6	At the end of the course, students will be able to interpret, critically analyse and solve logical reasoning questions. They will have acquired the skills to manage time while applying methods to solve questions on arithmetic, algebra, logical reasoning, statistics and data analysis and arrive at appropriate conclusions.
	Verbal:
CO7	At the end of the course, the students will have the ability to understand the nuances of English grammar and apply them effectively.
CO8	At the end of the course, the students will have the ability to relate, choose, conclude and determine the usage of right vocabulary.
CO9	At the end of the course, the students will have the ability to decide, conclude, identify and choose the right grammatical construction.

Team Work: Value of Team work in organisations, Definition of a Team, Why Team, Elements of leadership, Disadvantages of a team, Stages of Team formation. Group Development Activities: Orientation, Internal Problem Solving, Growth and Productivity, Evaluation and Control. Effective Team Building: Basics of Team Building, Teamwork Parameters, Roles, Empowerment, Communication, Effective Team working, Team Effectiveness Criteria, Common characteristics of Effective Teams, Factors affecting Team Effectiveness, Personal characteristics of members, Team Structure, Team Process, Team Outcomes.

Facing an Interview: Foundation in core subject, Industry Orientation/ Knowledge about the company, Professional Personality, Communication Skills, activities before interview, upon

entering interview room, during the interview and at the end. Mock interviews.

Advanced Grammar: Topics like parallel construction, dangling modifiers, active and passive voices, etc.

Syllogisms, Critical reasoning: A course on verbal reasoning. Listening Comprehension advanced: An exercise on improving listening skills.

Reading Comprehension advanced: A course on how to approach advanced level of reading, comprehension passages. Exercises on competitive exam questions.

Specific Training: Solving campus recruitment papers, National level and state level competitive examination papers; Speed mathematics; Tackling aptitude problems asked in interview; Techniques to remember (In Mathematics). Lateral Thinking problems. Quick checking of answers techniques; Techniques on elimination of options, Estimating and predicting correct answer; Time management in aptitude tests; Test taking strategies.

TEXTBOOKS:
1.   A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
2.   Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
3.   Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.
4.   The Hard Truth about Soft Skills, by Amazon Publication.
REFERENCES:
1.   Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2.   The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3.   Vedic Mathematics, by Jagadguru Swami Sri BharatiKrsnaTirthayi Maharaja, MotilalBanarsidass Publ.;
4.   How to Ace the Brainteaser Interview, by John Kador, Mc Graw Hill Publishers.
5.   Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
6.   Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
7.   More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.
8.   The BBC and British Council online resources
9.   Owl Purdue University online teaching resources
10.   www.thegrammarbook.com online teaching resources
11.   www.englishpage.com online teaching resources and other useful websites.

EVALUATION PATTERN: R14.1

18CSA307   C# AND .NET FRAMEWORK   2 0 2 3

Objectives: To gain a thorough understanding of the philosophy and architecture of .NET and acquire a working knowledge about the .NET programming model along with database connectivity to develop application programs.

Course Outcomes

CO1	Learn to use .NET frame work and basic programming concepts in C#
CO2	Students will be able to develop programs to solve real world problems using OOPS concepts in C#
CO3	Understand the Window Programming and event driven programming
CO4	Learn to use ADO.net to store and retrieve data from database
CO5	Learn to use files using C#

Unit 1

.Net Framework Overview- Architecture-.Net Framework class Libraries-CLR-Metadata-Interoperability-Assemblies-the .net Packaging system-CLR-MSIL , Introduction to Visual Studio.Net-C# Programming Concepts-Predefined Types- Value types and reference type, Classes and Objects, Constructors and methods , Conditional statements, loops, arrays , Collection classes: ArrayList , HashTable, Stack ,Queue, indexers and properties.

Unit 2

String class: methods and properties of string class, enumerations, boxing and unboxing, OOPS concepts: Encapsulation, data hiding, inheritance, interfaces, polymorphism, operator overloading, overriding Methods, Static Class members, Delegates and events. Exception Handling, garbage collector, generics and collection

Unit 3

Basics of Windows Programming- Event Driven Programming, Windows Forms, Using common controls-Labels, textboxes, buttons, check boxes, radio button, progress bar, combo box, list box. Components-timer, imagelist, Menus, Modal and Modeless Dialog Boxes, MDI, Mouse and keyboard event handling.

Unit 4

Introduction to ADO.Net-Object Model- System. Data Namespace- Data Bound controls-Connected Mechanism-Disconnected mechanism-.Net Data Providers.

Unit 5:

Files: System.IO, directory and file types, Stream readers and stream writers, working with binary data.

Textbook/Reference:

1. C# 4.0 the Complete Reference by Herbert Schildt
2. Latest version of Andrew Trolsens C# text from Apress(Pro C# 5.0 and the .NET Framework 4.5)
3. Robert Powel, Richard Weeks, C# and the .NET Framework, Techmedia

EVALUATION PATTERN: R14.3

18CSA306   ADVANCED JAVA AND J2EE   3 0 0 3

Objectives:*The main Objective of the course is to enable students to understand the concepts underlying technologies in JAVA Enterprise edition with Swings and multithreading, configuring Apache tomcat server, Java beans and Enterprise Java Beans.*

Course Outcomes

CO1	create a full set of UI widgets using Swing controls and demonstrate socket programming and learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
CO2	understand the concept of Servlets and create dynamic web pages, using Servlets
CO3	understand the concept of JSP and create dynamic web pages, using JSP
CO4	Understand how session tracking is done using cookies
CO5	understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB) and know to work in Hibernate and Spring frameworks

Unit 1
Networking: Classes to be covered Socket, ServerSocket, IPAddress, URL connections – Swing controls – JDBC - Writing JDBC applications using select, insert, delete, update.

Unit 2
SERVLETS: Introduction to Servlets (Life cycle of servlets, Java Servlets Development Kit, creating, Compiling and running servlet). The servlet API: javax. servlet package. Reading the servlet Parameters, Reading Initialization parameter. The javax.servlet.http.

Unit 3
JAVA SERVER PAGES: Configuring Tomcat JSP/Servlet server. Brief Introduction to J2EE Architecture. Advantage of JSP technology. JSP Architecture, JSP Access Model. JSP Syntax Basic (Directions, Declarations, Expression, Scriplets, Comments) JSP Implicit Object (Out, HttpServlet Request, Http Servlet Respose, Exception Handling, Session Management.

Unit 4
Package Handling HTTP Request and Response (GET/ POST Request), Using Cookies, Session Tracking. Exception Handling.

Unit 5
Introduction to EJB – Understanding MVC – Building Controllers, models and views –

Integrating hibernate with spring.

TEXTBOOKS:
1.   *Deitel&Deitel, "Java How to program", Prentice Hall, 4 th Edition, 2000.*
2.   *Gary Cornell and Cay S. Horstmann, "Core Java Vol 1 and Vol 2", Sun Microsystems Press, 1999.*
3.   *Stephen Asbury, Scott R. Weiner, Wiley, "Developing Java Enterprise Applications", 1998.*

EVALUATION PATTERN: R14.1

18CSA389   MOBILE APPLICATION DEVELOPMENT LAB   0 1 2 2

Objectives: Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle.

Course Outcomes

CO1	**Understand the different API levels and working of Dalvik Vitual Machine**
CO2	**Get an idea about different 'views', layouts and resource files**
CO3	**Learn more about UI components - GridView and ListView, Action bar, Adapters, Menus: Option menu, context menu, sub menu, Pickers - Date and Time, Spinners.**
CO4	**Learn about Android Notifications**
CO5	**Provide knowledge for developing SQLite applications**

Introduction: About Android, Pre-requisites to learn Android, Dalvik Virtual Machine & .apk file extension, Android API levels (versions & version names)

Android Java Basics: Getting started with Android development, project folder structure, simple programming, running project, generating build/APK of the app from Android Studio

First application: Creating Android Project, Android Virtual Device Creation, Set up debugging environment, Workspace set up for development, Launching emulator, debugging on mobile devices.

Basic UI design: Basics about Views, Layouts, Drawable Resources, Input controls, Input Events, Toasts.

More UI Components: Layouts - GridView and ListView, Action bar, Adapters, Menus: Option menu, context menu, sub menu, Pickers - Date and Time, Spinners.

Activity and Fragment: Activity, Fragment, Activity Lifecycle and Fragment Lifecycle.

Intents: Implicit Intents, Explicit intents, communicating data among Activities.

Navigation Drawer: Panel that displays the app's main navigation screens on the left edge of the screen

Android Notifications – Toast, Dialogs (TimePicker, DatePicker, Progress, Alert), Notification Manager and Push Notification

Introducing SQLite - SQLiteOpenHelper and creating a database - Opening and closing a database, Working with cursors Inserts, updates, and deletes

As a term project students should implement a mobile app with the following:

• Understand the app idea and design user interface/wireframes of mobile app • Set up the mobile app development environment

TEXTBOOKS/ REFERENCES:
Head first Android Development.Android Programming: Pushing the Limits, Wiley By Erik Hellman. Android Application Development Black Book, Dreamtech Press, Pradeep Kothari, KLSI

EVALUATION PATTERN: R14.2

18CSA388   ADVANCED JAVA AND J2EE LAB   0 0 2 1

Objectives: The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Outcomes

CO1	Identify, Design & develop complex Graphical user interfaces using Java Swing classes and develop Java client/server applications
CO2	understand integrated development environment to create, debug and run Servlets
CO3	understand integrated development environment to create, debug and run JSP
CO4	Design/Develop session tracking programs using Cookies
CO5	create enterprise applications using Enterprise JavaBeans (EJB) and work in frameworks Hibernate and Spring

1.   Program to demonstrate Swing components.
2.   Program to implement Address Book using Swing components.
3.   Program to demonstrate loading of file in an Swing Component.
4.   Multithreading program, one of the threads print a….z and other thread print 1…26.
5.   Example: 1a2b3c…. 26z.

6.   Multithreading program to schedule two jobs.
7.   Client Server Socket Programming.
8.   Server Socket which receives data from a java client program using JSON
9.   Program to fetch a particular Website tags when an URL is specified.
10.   Implement stack, queue, hashmap, hashtable, enumeration, ArrayList.
11.   Create a table from a java program.
12.   Update a table from a java program.
13.   Load a table data in Swing components.
14.   Delete a record from a table, drop table from a java file.
15.   Program which shows use of Statement, Prepared Statement and Callable Statement.
16.   Configure Apache Tomcat and write a hello world jsp page.
17.   Configure Apache Tomcat server to deploy Servlets.
18.   Exceptional handling in a JSP page.
19.   Create a login page and authenticate a user in a JSP page using database.
20.   Write a program to implement a simple servlet which writes a Welcome HTML page in the web browser.
21.   A servlet should receive a parameter from JSP page and process it.
22.   Servlet program to implement parameter handling.
23.   Servlet program to handle GET and POST request.
24.   A website hit counter data which has to be saved in a cookie.
25.   Implement a Java Beans to set and get values.
26.   Program to illustrate the procedure of handling session and print a Hello world using Java Bean.
27. Enterprise Session Beans, deploy, and run a simple Java EE application which does add, subtract, multiply and division using stateless session bean.
28. An application named account using stateful session bean. The purpose of account is to perform transaction operations (deposit and withdraw) for the customer.
29. The account application consists of an enterprise bean, which performs the transactions, and two types of clients: an application client and a web client.

EVALUATION PATTERN: R14.2

18CSA391   COMPREHENSIVE TECHNICAL VIVA-VOCE   2 cr

Course Objectives
This course is aimed at evaluating the knowledge level of students in various courses.

Course Outcomes

CO1	Have a systematic understanding of their field of knowledge, which includes a critical awareness of current problems and/or new insights at the forefront of that field
CO2	Continue to advance their knowledge and understanding, and to develop new skills to a high level
CO3	Improve the verbal defence skills of the scholar
CO4	Test the student's learning and understanding during the course of their programme
CO5	Prepares the students to face interview both in the academic and the industrial sector.

The viva may be done based on every course covered till the sixth semester. The objective of this is to enable the students to attend placements and be better performers in their future.

18CSA392   MINOR PROJECT (OPTIONAL – leading to Paper Publication)3 cr

Course Outcomes

CO1	acquire practical knowledge within the chosen area of technology for project development
CO2	identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach
CO3	contribute as an individual or in a team in development of technical projects
CO4	develop effective communication skills for presentation of project related activities

To expose the student to the industry-standard project practices, under time and deliverable constraints, applying the knowledge acquired through various courses done in the programme.

EVALUATION PATTERN: R14.4

18CSA317   **COMPUTER GRAPHICS**   **3 0 0 3**

Objectives: *The primary objective of this course is to give the basic principles of 2D and 3D computer graphics, to study the elementary mathematical techniques that allow us to position objects in three dimensional spaces and techniques necessary to produce basic 2D/3D dimensional illustrations.*

Course Outcomes

CO1	Get an overview on Graphics applications
CO2	Learn the working of CRT, Flat Panel Displays, Three Dimensional Viewing Devices, Virtual Reality systems, Raster-Scan Systems, Random-Scan Systems.
CO3	Familiarized with Bresenham's Line Algorithm, Midpoint Circle Algorithm; Filled Area Primitives: Boundary-Fill Algorithm, Flood-Fill Algorithm
CO4	Understand the basic two dimensional transformations
CO5	Learn the graphics programming using openGL

Unit 1
Applications of Graphics: CAD, Presentation Graphics, Computer Art, Entertainment, Education and Training, Visualization, Image Processing,

Unit 2
Graphical User Interfaces - Overview of Graphics Systems: CRT, Flat Panel Displays, Three Dimensional Viewing Devices, Virtual Reality systems, Raster-Scan Systems, Random-Scan Systems.
Unit 3
Input Devices: Keyboards, Mouse, Data Glove, Digitizers, Touch Panels; Hard Copy Devices: Printers, Plotters. Output Primitives: Bresenham's Line Algorithm, Midpoint Circle Algorithm; Filled Area Primitives: Boundary-Fill Algorithm, Flood-Fill Algorithm; Character Generation; Homogeneous Coordinates.
Unit 4
Two Dimensional Geometric Transformations; Translation, Rotation, Scaling, Reflection, Shear; Two Dimensional Viewing: Cohen Sutherland Line Clipping Three Dimensional Geometric Transformations; Translation, Rotation, Scaling, Reflection, Shear; Three Dimensional Viewing: Projections, Parallel Projections, Perspective Projections, View Volumes and General Projection Transformations.
Unit 5
Graphics Programming: OpenGL Introduction: Command Syntax, Drawing and filling images,

patterns, Filling regular and irregular shapes, Outputting Text, Justifying Text, Animation. Drawing with mouse, Building mouse cursors, freehand drawing using mouse, menus using mouse.

TEXTBOOKS:
1.   Computer Graphics, C Version, D. Hearn, M.P. Baker, 2nd Edition, Pearson Education
2.   OpenGL Programming Guide, M. Woo, J. Neider, T. Davis, D. Shreiner, 3rd edition, Pearson Education

EVALUATION PATTERN: R14.1

18CSA318   CRYPTOGRAPHY   AND CYBER SECURITY   4 0 0 4

Objectives: *The main objective of this course is to introduce the working of various cryptographic methods and how to apply this knowledge to real-world applications. This course will also present an overview of Cyber Security.*

Course Outcomes

CO1	Introduces the need of security and various encryption techniques
CO2	Understand the use of public key crypto system
CO3	Able to provide authentication and integrity to the messages
CO4	Understand the digital signature standards and its application in real world
CO5	Have an idea about cyber crimes and digital forencics

Unit 1
Introduction to Cyber Security - Types of Attacks, Goals for Security, Security threat and vulnerability, Cyber security models (the CIA triad, the star model).
Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers - Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion. Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations.
Unit 2
Principals of public key crypto systems, RSA algorithm, security of RSA. Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, Introduction to SSL.
Unit 3
Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions,
Unit 4
Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm.
Unit 5

Introduction to Cyber Crime and security: Cyber Crimes, types of Cyber Crime, hacking, attack vectors, Cross Site Scripting (XSS), XSS Consequences. Cyber Space and criminal behaviour, traditional problems associated with Cyber Crime, Introduction to Incident Response, Digital Forensics - Phishing.

TEXTBOOK:
William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education, Sixth Edition.

REFERENCE:

Nina Godbole and SunitBelpure, Cyber Security: Understanding Cyber crimes, ComputerForeinsics and Legal Perspectives, Willey India Pvt.Ltd.

Dr T R Padmanabhan N Harini,"Cryptography and Security Paperback", Wiley India

EVALUATION PATTERN: R14.1

18CSA319   PYTHON PROGRAMMING   2 0 2 3

Objectives: *The main objective of this course is to familiarize the student with general computer programming concepts like conditional execution, loops, Python programming language syntax, semantics, and the runtime environment, as well as with general coding techniques and object-oriented programming.*

Course Outcomes

CO1	Understand python variables, operators and data types
CO2	Get an idea about python control structures
CO3	Understand python complex datatypes
CO4	Work on Python fles and databases
CO5	Get an idea about python packages and GUI programming

Unit 1
Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.
Unit 2
Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.
Unit 3
Python Complex data types: Using string data type and string operations, Defining list and list

slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.

Unit 4

Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations.

Database Programming: Connecting to a database, Creating Tables,INSERT, UPDATE, DELETE and READ operations, Transaction Control,Disconnecting from a database, Exception Handling in Databases.

Unit 5

Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc.

GUI Programming: Tkinter introduction, Tkinter and PythonProgramming, Tk Widgets, Tkinter examples.

Python programming with IDE.

Text Book/References

1. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016
2. Charles Dierbach, "Introduction to Computer Science using Python", Wiley, 2015
3. Jeeva Jose &P.SojanLal, "Introduction to Computing and Problem Solving with PYTHON", Khanna Publishers, New Delhi, 2016
4. Downey, A. et al., "How to think like a Computer Scientist: Learning with Python", John Wiley, 2015
5. Mark Lutz, "Learning Python", 5th edition, Orelly Publication, 2013, ISBN 978-1449355739
6. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
7. Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009
8. David Beazley, Brian Jones., "Python Cookbook", Third Edition, Orelly Publication, 2013, ISBN 978-1449340377

EVALUATION PATTERN: R14.3

18CSA383   COMPUTER GRAPHICS LAB   0 0 2 1

Objectives: *Understand the need of developing graphics application.*
Learn algorithmic development of graphics primitives like: line, circle, polygon etc.
Learn the representation and transformation of graphical images and pictures

Course Outcomes

CO1	Able to draw primitive shapes

CO2	Learn to transform different geometrical shapes
CO3	Able to do rotation with different algorithms
CO4	Develop knowledge about midpoint otation
CO5	Able to do polygon clipping and line clipping

1. Write a program for 2D line drawing as Raster Graphics Display.
2. Write a program for display basic 2D geometric primitives.
3. Write a program to display a filled square.
4. Write a program to display a series of concentric circles of varying radius.
5. Write a program for line drawing as Raster Graphics Display.
6. Write a program for circle drawing as Raster Graphics Display.
7. Write a program to draw a line using Bresenham line drawing algorithm
8. Write a program to draw a circle using Midpoint algorithm. Modify the same for drawing an arc and sector.
9. Write a program to rotate a point about origin.
10. Write a program to rotate a triangle about origin.
11. Write a program to scale the triangle using 2D transformation.
12. Write a program to translate a triangle using 2D transformation.
13. Write a program to reflect a triangle 2D transformation.
14. Write a program for polygon filling as Raster Graphics Display
15. Write a program for line clipping.
16. Write a program for polygon clipping.
17. Write a program for displaying 3D objects as 2D display using perspective transformation.
18. Write a program for rotation of a 3D object about arbitrary axis.
19. Write a program in openGL for building mouse cursors.
20. Write a program in openGL for freehand drawing using mouse.

EVALUATION PATTERN: R14.2

18CSA399   PROJECT   6 cr

Course Outcomes

CO1	Acquire practical knowledge within the chosen area of technology for project development
CO2	Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach
CO3	Contribute as an individual or in a team in development of technical projects

CO4	Develop effective communication skills for presentation of project related activities

To allow students to develop their own ideas and get experienced in industrial and research projects. It provides an opportunity in solving a real life problem by applying the knowledge gained through various courses of study and an exposure on different phases of software /system development life cycle.

EVALUATION PATTERN: R14.4

ELECTIVES

18CSA331   **ARTIFICIAL INTELLIGENCE**   **3 0 0 3**

Objectives: The main objective of this course is to familiarize the students with how to represent knowledge, including incomplete and uncertain knowledge of the real world; how to reason logically with that knowledge using probabilities; how to use these reasoning models and methods to decide what to do, particularly by constructing plans; and how to reason and make decisions in the presence of uncertainty about the world. It includes some state-of-the-art topics, such as the logical representation of different types of knowledge, reasoning under uncertainty

Course Outcomes

CO1	Understand the need of AI and issues in designing search problems
CO2	Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)
CO3	Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving
CO4	Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information
CO5	Ability to apply knowledge representation and reasoning to real-world problems, to deveope expert systems

Unit 1

What is Artificial Intelligence? – The AI Problems – The Underlying Assumption – What is an AI technique – Criteria for Success.
Problems, Problem Spaces and Search – Defining Problem as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in the design of

Search Programs.
Unit 2

Heuristic Search Techniques - Generate – and – Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction - Means - Ends Analysis. Knowledge Representation issues – Representations and Mapping - Approaches to knowledge Representation – Issues in knowledge Representation – The Frame Problem. Using Predicate Logic – Representing simple facts in Logic – Representing Instance and Isa Relationship – Computable Functions and Predicates – Resolution – Natural Deduction.

Unit 3

Representing Knowledge Using Rules – Procedural versus Declarative knowledge – Logic Programming – Forward versus Backward Reasoning – Matching – Control Knowledge.

Symbolic Reasoning under Uncertainty – Introduction to Non-monotonic Reasoning – Augmenting a Problem Solver – Implementation: Depth - First Search.

Statistical Reasoning – Probability and Baye's Theorem – Bayesian Networks – Fuzzy Logic.

Unit 4

Game Playing - The Minimax Search Procedure – Adding Alpha-Beta Cutoffs.

Understanding – What is Understanding? What makes Understanding hard?

Unit 5

Common Sense – Qualitative Physics – Commonsense ontology – Memory Organization - Expert Systems – Representing and Using Domain knowledge – Expert System Shells – knowledge Acquisition - Components of an AI program.

TEXTBOOKS:

1.   *Artificial Intelligence (Second Edition) – Elaine Rich, Kevin knight (Tata McGraw-Hill)*
2.   *A Guide to Expert Systems – Donald A. Waterman (Addison-Wesley)*

REFERENCES:

1.   *Principles of Artificial Intelligence – Nils J. Nilsson (Narosa Publishing House)*
2.   *Introduction to Artificial Intelligence – Eugene Charnaik, Drew McDermott (Pearson Education Asia)*

EVALUATION PATTERN: R14.1

18CSA332   ARCHITECTURE AND DEPLOYMENT OF SECURE AND
**   SCALABLE WAN   3 0 0 3**

Objectives: The main objective of this course is to enable the students to deploy a WAN over any transport (MPLS, Broadband, LTE etc.) and provide management, policy control and application visibility across the enterprise.

Course Outcomes

CO1	Understand what are the design considerations for the enterprise network.
CO2	Learn to configure and troubleshoot WLAN
CO3	Understand the operation and confioguration of WAN technologies
CO4	Learn datalink protocol like PPP, HDLC and and NAT concepts
CO5	Understand VPNs and IPSec ; Students will be able to troubleshoot and monitor the network using various tools

Unit 1
Introduction to Scaling Networks, Implementing a Network Design, LAN Redundancy, Spanning Tree Concepts and protocols.

Unit 2
Link Aggregation Concepts and Configuration, Wireless LAN Concepts, operations and Security, Wireless LAN Configuration, Troubleshoot Single-Area OSPF, Multiarea OSPF

Unit 3
Operation and configuration. Hierarchical Network Design, WAN Technologies, Spanning Tree Configuration, First-Hop Redundancy Protocols, Point-to-Point Connections.

Unit 4
PPP Operation and Configuration, HDLC protocol, Troubleshoot WAN Connectivity, Frame Relay concepts and Configurations, NAT Operation & Configuration, Troubleshooting NAT
.
Unit 5
Tele working, Broadband Solutions, Configuring xDSL Connectivity, Securing Site-to-Site Connectivity, VPNs, Site-to-Site GRE Tunnels, IPsec, Monitoring the Network – Syslog, SNMP, Netflow, Network Troubleshooting with a Systematic Approach.

TEXTBOOKS:
1.   Youlu Zheng and ShakilAkhtar,"Networks for Computer Scientists and Engineers".

2.   Peterson & Davie, "Computer Networks, A Systems Approach", 5th Edition, Morgan Kaufmann, 2011.
REFERENCES:
1.   "Scaling Networks - Course Booklet ", Cisco Press.
2.   "Switched Networks - Course Booklet", Cisco Press.

EVALUATION PATTERN: R14.1

18CSA333   **CLIENT SERVER COMPUTING**   **3 0 0 3**

Objectives: Client Server Computing Model defines the way successful organizations will use technology during the next decade. As a result knowledge of client server architecture has become an essential part of computer science. The main objective is to provide the basic concepts of client server computing and the new technologies involved in it.

Course Outcomes

CO1	**Be familiar with the concepts of client server systems,its architecture,different client server models,types of clients and servers.**
CO2	**To get an idea about the role and services of client and server.**
CO3	**To get an idea abot client server system architecture,types of middleware and ODBC architecture.**
CO4	**To familiarise the concept of server architecture,C/S transaction processing models,datawarehoue and data mining.**
CO5	**To get an idea about client server protocols and CORBA architecture.**

Unit 1
Client Server System Concepts – Introduction – Concepts - Client Server Architecture - Two-Tier Architecture – Three-Tier Architecture - N-Tier Architecture - N-Tier vs 2-Tier Architecture - Case Study of N-Tier Architecture - Client Server Models - Gartner Classification – Middleware - Characteristics and types of Server - File Server - Database Server - Communication Server - Object Server - Groupware Server - Transaction Server - Characteristics and types of Clients - Thin Client - Fat Client.
Unit 2
Components of Client Server Computing – Client - Role of the Client - Client Services - Request for Service - Components of Client Server Computing – Server - Role of the Server - Server Functionality in detail - Components of Client Server Applications – Connectivity – OSI - Communications Interface Technology.
Unit 3
Client Server System Architecture - Client Server Building Blocks – Hardware - Client Hardware - Server Hardware - Client Server Building Blocks – Software - Client Server Systems

Development Methodology - Project Management - Architecture Definition - Systems Development Environment – Middleware - Types of Middleware - DCE, MOM, TP – Monitors – ODBC - Design Overview of ODBC - ODBC Architecture – Components – Applications - Driver Managers - Database Drivers - ODBC Data Sources - Network Operating System - Base Services - External Services.

Unit 4

SQL Database Servers - Server Architecture - Multithread Architecture - Hybrid Architecture - Stored Procedures – Triggers - Client Server Transaction Processing - Rules of Client Server Transaction Processing - Transaction Models - Chained and Nested Transactions - Transaction Management Standards - Data Warehousing - Warehousing Techniques - Data Mining.

Unit 5

Client Server Protocols – RPC – IPC - Recent Trends – Intranet – Extranet – Internet - CORBA.

TEXTBOOK:

Robert Orfali, Dan Harkey and Jerri Edwards: Essential Client/Server Survival Guide, John Wiley &Sons Inc 1996

REFERENCES:

1. Alex Berson: Client Server Architecture

2. Patrick Smith, Steve Guengerich: Client Server Computing, Second Edition, Prentice Hall of India Pvt Ltd.

EVALUATION PATTERN: R14.1

| 18CSA334 | **EMBEDDED SYSTEMS** | 3 0 0 3 |

Objectives: The embedded systems course is aimed at providing high quality training to students. In this course, students can learn practical lessons and techniques used to design, implement, integrate and test software used for advanced embedded systems. The course offers the trainees with detailed description of the life cycle for designing multi-objective and multi-discipline embedded systems.

Course Outcomes

CO1	Provides an overview, categories, challenges and issues of embedded sysems.
CO2	Understand the hardware support and chip level features to develop embedded systems
CO3	To create awareness about the Hardware Design, Software Development & RTOS for the Embedded Systems.
CO4	Design embedded systems using real time operating systems
CO5	Learn to use tools, simulators for embedded systems and security issues

Unit 1

An Overview of Embedded System - What is an Embedded System? – Categories of Embedded Systems – Requirements of Embedded Systems - Challenges and issues in Embedded Software Development – Trends in Embedded Software Development - Applications of Embedded Systems.

Unit 2

Hardware Fundamentals for the Software Engineer - Gates – Timing Diagrams – memory – Microprocessors – Buses – DMA – Interrupts - Other Common Parts – Built-ins on the microprocessor – Interrupts - Microprocessor Architecture – Interrupt Basics – The Shared Data Problem – Interrupt Latency.

Unit 3

Survey of Software Architectures - Round Robin – Round Robin with Interrupts – Function Queue Scheduling Architecture – Use of real time operating system. RTOS, Tasks, Scheduler, Shared data reentrancy - priority inversion, mutex binary semaphore and counting semaphore – Selecting an Architecture - Introduction to Real Time Operating Systems - Tasks and Task states – Tasks and Data – Semaphores and Shared Data – Message Queues mailboxes and pipes – Timer functions – Events – Memory management – interrupt routines in an RTOS environment.

Unit 4

Basic Design Using a Real Time Operating System - Overview – Principles – Encapsulating Semaphores and Queues – Hard Real - Time Scheduling Considerations – Saving memory space – saving power - Embedded Software Development Tools - Host and Target Machines – inker/Locators for Embedded Software – Getting Embedded software into the target systems.

Unit 5

Debugging Techniques - Testing on Host Machine – Instruction Set simulators – The assert Macro – Using Library Tools - Future Trends in Embedded Systems - System on a chip (SOC) – Smart Cards and the cashless society – Security in Embedded System.

TEXTBOOKS:

1.   Dr.K.V.K.K. Prasad &Vikas Gupta – Programming for Embedded Systems – Wiley 1st edition 2002
2.   David E. Simon – An Embedded Software Primer- Pearson Education Asia – 1999
REFERENCES:

1.   Caroline Yao &Quing Li – Real Time Concepts for Embedded Systems
2.   Kirk Zureli - C Programming for Embedded Systems

EVALUATION PATTERN: R14.1

18CSA335   ENTERPRISE RESOURCE PLANNING MANAGEMENT 3 0 0 3

Objective: *To facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders.*

Course Outcomes

CO1	To get an idea about integrated management information,resource management , ERP benefits and the significance and principles of BE
CO2	Be familiar with the Business modelling for ERP and its implementation.
CO3	To famliarise the concept of ERP and the competitive strategy and different ERP domains.
CO4	To get an idea about market dynamics and competitive strategy of ERP using case studies.
CO5	To get an idea about ERP and client server architecture,open source ERP and commercial ERP.

Unit 1
Introduction to ERP
Accommodating Variety – Integrated Management Information – Seamless Integration – Supply Chain Management – Resource Management – Integrated Data Model – Scope – Technology – Benefits of ERP.
Business Engineering and ERP
What is BE? – Significance and Principles of BE – BPR, ERP and IT – BE with IT – ERP and Management Concerns.
Unit 2
Business Modelling for ERP
Building the Business Model.
ERP Implementation
Role of Consultants, Vendors and Users – Customization – Precautions – ERP: Post-implementation Options – ERP Implementation Methodology – Guidelines for ERP Implementation.
Unit 3
ERP and the Competitive Advantage
ERP and the Competitive Strategy.

The ERP Domain
MFG/PRO, IFS/Avalon - Industrial and Financial systems – Baan IV – SAP – SAP R/3 Applications – Example of an Indian ERP Package – The Arrival of ERP III.
Unit 4
Marketing of ERP
Market Dynamics and Competitive Strategy.
Sample Case Studies
Unit 5
Client Server and ERP Architecture
Introduction to Client Server – Advantages and Disadvantages – N tier Architecture – ERP

Architecture.
http://ebuild.imtindia.com/erp_software_architecture.html
Open Technology
Background of Open Technology – Introduction – Proprietary v/s Open source – Need for Open Source Solutions – Open Source ERP.
http://elearning.nic.in/mdp/2-open-technology/opentechnology-mdp.pdf
Commercial ERP
Commercial ERP – Open Source ERP v/s Commercial ERP.
http://www.erpwire.com/erp-articles/commercial-and-open-source-erp.htm

TEXTBOOK:
"Enterprise Resource Planning – Concepts and Practice", Vinod Kumar Garg, N.K. Venkitakrishnan, Second Edition, Eastern Economy Edition, Prentice-Hall of India Pvt., Ltd., 2008.

EVALUATION PATTERN: R14.1

| 18CSA336 | KNOWLEDGE MANAGEMENT | 3 0 0 3 |

Objectives: To know about and to understand - the different types - the importance of knowledge and Knowledge Management (KM) in practice. To benchmark different organizational approaches and technical platforms. Also, to be able to set up a first-step approach to introduce KM in practice.

Course Outcomes

CO1	Define and discuss the key components of information and knowledge management infrastructure
CO2	Understand the use of web warehouse and GIS
CO3	Learn to use different text mining techniques
CO4	Gives an idea of knowledge management principles
CO5	Provides an overview of Intenet and Internet Services.

Unit 1
Introduction – Applied Knowledge Management – Web Warehousing and Knowledge Management – Value Chains and Killer Applications.
Unit 2
Web Warehousing in Action – Traditional Warehousing – Web Based Graphical Geographic Information System.

Unit 3

An Introduction to Text Information Management System – Architecture of Text Information Management System – Text Mining Systems.

Unit 4

Knowledge Management Principles – Knowledge Management at work in Organization.

Unit 5

Technology Foundations – The Internet and Internet Services – Web Components and Communications.

TEXTBOOKS:

Web Warehousing and Knowledge Management: Mattison 1999, Tata McGraw-Hill
Measuring and Managing Knowledge: Tom Housel and Arthur Bell 2001, International Edition,
Tata McGraw-Hill
REFERENCE:
Knowledge Management: Ganesh Natarajan, President & CEO Aptech

EVALUATION PATTERN: R14.1

18CSA337   LAN SWITCHING AND ADVANCED ROUTING   3 0 0 3

Objectives: *To introduce students to a broad range TCP/IP topics including: IP addressing, protocols, ports, sockets, communications, packet fragmentation and sequencing, sub netting, and packet sniffers. Familiarizing the routing protocols and ACL commands.*

Course Outcomes

CO1	understand the use of IPV4 and IPV6 and the working of switched networks and LAN
CO2	Student will be able to configure a VLAN
CO3	Understand the routing and to configure routing protocols in routers
CO4	Able to configure RIP and OSPF routing protocols
CO5	Learn to implement ACL for implementing security accoring to the requirements of an organization

Unit 1

IPv4 4 & IP V6 Network Addresses, IPv6 Network Addresses, Subnetting IP Networks, Network Design & trouble shooting for IPv4 & IPv6. Introduction to Switched Networks, LAN Design.

Unit 2

Basic Switching Concepts and Configuration, Switch Security: Management and Implementation, VLANs.

Unit 3

Routing Concepts & operations, Configuration of a Router, Media Access Control, Inter-VLAN Routing, Layer 3 Switching, Static Routing Implementation, Configure Static and Default Routes, CIDR and VLSM.

Unit 4

Network security, Dynamic Routing Protocols, Distance Vector Routing Protocols, RIP(IPv4) and RIPng(IPv6) Routing, Link-State Dynamic Routing, The Routing Table, Single-Area OSPF, Configuring Single-Area OSPFv2 (IPv4) & v3(IPv6).

Unit 5

Access Control Lists and operations, Configuring and Troubleshooting Standard & extended IPv4 ACLs, IPv6 ACLs, DHCPv4 (IPV4) DHCPv6(IPv6).

TEXTBOOKS:
*1.	James F. Kurose and Keith W. Ross* **"***Computer Networking: A Top-Down Approach", 4th Edition, Addison-Wesley, 2008.*
*2.	Andrew S.Tanenbaum, "Computer Networks", 3rd Edition, PHI, 2004.*
REFERENCES:
*1.	Introduction to Networks-Course Booklet ",Cisco Press*
*2.	Routing and Switching Essentials – Course Booklet", Cisco Press*

EVALUATION PATTERN: R14.1

**18CSA338	MICROPROCESSOR SYSTEM	3 0 0 3**

Objectives: *Students will able to understand basic organization of computer and the architecture of 8086 microprocessor. Conceptualize the basics of organizational and architectural issues of a digital computer. Learn microprocessor architecture and study assembly language programming.*

Course Outcomes

CO1	Learn the basic concepts of combinational and sequential logic circuits
CO2	Identify a detailed h/w structure of the Microprocessor 8086/8088.
CO3	To learn 8086/88 Microprocessor programming
CO4	Understand 8086/88 microprocessor and their memory interfaces
CO5	analyze the data transfer information through serial & parallel ports

Unit 1

Combinational circuit implementations – Introduction – NAND & NOR implementations – Arithmetic circuits – Flip-flops - counters – Ripple counters – Synchronous counters.

Unit 2

Introduction to Microprocessor and microcomputers – General architecture of a micro computer system – 8086/88 microprocessor - Architecture – software model of 8086/88 – Memory address space – Data organization – Data types – Registers in 8086/88 – Addressing modes – instruction formats – I/O Address space.

Unit 3

8086/88 Microprocessor programming – Instruction set – Data transfer instructions – arithmetic – Logic – shift – rotate – Flag control – compare – jump – subroutines – loops – string handling instructions.

Unit 4

8086/88 microprocessor and their memory interfaces – Introduction – system clock – bus cycle – Hardware organization of the memory address space – read/write bus cycles – memory interface circuits.

Unit 5

I/O interfacing with 8086/88 microprocessor – Types of I/O – I/O data transfer – I/OP instructions – bus cycles – 8255 PPI – 8237A DMA controller Interrupt handling – types – Interrupt address pointer table – Interrupt instructions – enabling and disabling interrupts – 8259A Programmable Interrupt Controller.

TEXTBOOK:

The 8086 and 8088 microprocessors – Programming, Interfacing, Software, Hardware and Applications – Walter A tribbel, AvtarShing – PHI

REFERENCE BOOKS:

1.   Digital Logic Design – Langholz, Kandel, Mott - 1988 Wm C. Brown publishers

2.   Microcomputer systems: 8086/88 family architecture, programming and design – Yu-ching Liu, Glenn A Gibson – PHI

3.   The 8086/88 family – John Uffenbeck – PHI

EVALUATION PATTERN: R14.1

| 18CSA339 | **MULTIMEDIA AND GRAPHICS** | 3 0 0 3 |

Objectives: *To Formulate a working definition of interactive multimedia; demonstrate competence in using the authoring programs and demonstrate the use of animation, digitized sound, video control, and scanned images.*

Course outcomes

CO1	Developed understanding of technical aspect of Multimedia Systems.
CO2	Develop various Multimedia Systems applicable in real time.
CO3	Design interactive multimedia software.

CO4	Apply various networking protocols for multimedia applications.
CO5	To evaluate multimedia application for its optimum performance.

Unit 1
Introduction: What is Multimedia? – Introduction to making Multimedia - Media Skills – Macintosh and Windows Platforms – Basic software tools.

Unit 2
Making instant Multimedia – Multimedia Authoring tools.
Unit 3
Multimedia Building Blocks: Text – Sound – Images.
Unit 4
Multimedia Building Blocks: Animation – Video.
Unit 5
Multimedia and the Internet: The Internet and how it works – Tools for World Wide Web – Designing for the World Wide Web.

TEXTBOOK:
Tay Vaughan – Multimedia (Making it work) - Tata McGraw Hill – ISBN-0-07-047276-9
REFERENCES:
Nigel Chapman – Digital Multimedia – Wiley – ISBN – 81-265-0489-7
John F. Koegel Buford – Multimedia Systems – PEARSON – ISBN – 81-78-08-162-8

EVALUATION PATTERN: R14.1

18CSA340   SOCIAL AND PROFESSIONAL ISSUES IN COMPUTING   3 0 0 3

Objectives: *This course is designed to explore the nature and principles of ethics-- including personal, professional, and corporate ethics - in a computing context. Address the interplay between ethics on the one hand; and law, society, politics, economy, justice, responsibility, honesty on the other. Explore specific ethical issues raised by the ubiquity of computer and information technology in today's society.*

Course outcomes

CO1	**Able to identifiy social and ethical issues that arise in the development and application of computing technology in modern society**
CO2	**Understand the responsibilities of computer professionals as defined by the Software Engineering Code of Ethics and Professional Practice**
CO3	**Understand risks and security operations in an organization**
CO4	**Able to formulate viewpoints concerning the current legal and ethical status of intellectual property rights – specifically trade secrets, trademarks, copyrights,**

	patents, and licensing – as they relate to computer software
CO5	Able to handle some legal issues related to computer crime and hacking

Unit 1
Social Context: Introduction to the social implications of computing, Social implications of networked communication, Growth of, Control of, and access to the Internet, Gender – Related issues, Cultural issues, International Issues, Accessibility Issues (e.g. underrepresentation of minorities, Women and disabled in the computing profession), Public policy issues (e.g. electronic voting).

Unit 2
Analytical Tools: Making and evaluating ethical arguments, Identifying and evaluating ethical choices, Understanding the social context of design, Identifying assumptions and values.

Professional Ethics: Community values and the laws by which we live, The nature of professionalism (Including care, attention and discipline, fiduciary responsibility, and mentoring).

Keeping up-to-date as a professional (in terms of knowledge, tools, skills, legal and professional framework as well as the ability to self-assess and computer fluency), Various forms of professional credentialing and the advantages and disadvantages, The role of the professional in public policy, Maintaining awareness of consequences, Ethical dissent and whistle-blowing.

Codes of ethics, conduct, and practice(IEEE, ACM, SE, AITP, and so forth), Dealing with harassment and discrimination, "Acceptable use" policies for computing in the work place.

Healthy Computing environment (ergonomics)

Unit 3
Risks: Historical examples of software risks (such as the Therac-25 case), Implications of software complexity, Risk assessment and Risk Management; Risk removal, risk reduction and risk control.

Security Operations: Physical security, Physical access controls, Personnel access controls, Operational security, Security polices for systems/networks, Recovery and Response, Dealing with problems (both technical and human)

Unit 4
Intellectual Property: Foundations of Intellectual Property, Copyrights, patents, and trade secrets, Software Piracy, Software Patents, Transactional issues concerning Intellectual Property.

Privacy and Civil Liberties: Ethical and legal basis for privacy protection, Ethical and legal framework for freedom of information, Privacy implications of database systems (e.g. Data gathering, storage and sharing, massive data collecting, computer surveillance systems)

Technological strategies for privacy protection, Freedom of expression in cyberspace, International and intercultural implications.

Unit 5
Computer Crime: History and examples of computer crime, "Cracking" ("Hacking") and its effects, Viruses, Worms, and Trojan Horses, Identity Theft, Crime Prevention strategies.

TEXTBOOK:
Ethics for Information Age, 3rd Edition, Michael J. Quinn, Pearson/Addison Wesley, 2009

EVALUATION PATTERN: R14.1

18CSA341   **SOFT COMPUTING**   **3 0 0 3**

Objectives: Students will able to understand the principle components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence. Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies.

Course outcomes

CO1	Understand the concepts of neural networks
CO2	To have an understanding of the concepts of fuzzy sets, knowledge representation using fuzzy rules, and applications
CO3	Basic understanding of supervised learning algorithms
CO4	Comprehend the concept of hybrid systems
CO5	Understand the basics of Evolutionary Computation

Unit 1
Basic Concepts - Single Layer Perception - Multilayer Perception - Supervised and Unsupervised Learning - Back Propagation networks - Kohnen's self-organizing networks - Hop field networks - Distance measures.
Unit 2
FUZZY sets, properties, Membership functions Fuzzy operations, Applications.
Unit 3
Classification and Regression Trees - Data Clustering Algorithms - Rule based Structure identification.
Unit 4
Neuro-Fuzzy Systems.
Unit 5
Evolutionary Computation - Survival of the Fittest - Fitness Computation – Crossover – Mutation – Reproduction - Rank space Method. Case Studies: Applications of soft computing.
TEXTBOOK/ REFERENCES:
1.   Laurence Fausett,"Fundamentals of Neural Networks", Seventh Edition, Dorling Kindersley (India) P. Ltd 2006.
2.   Satish Kumar - "Neural Networks – A Classroom Approach", Tata McGraw-Hill, 2004.
3.   Timothy J.Rose, "Fuzzy Logic with Engineering Applications", Third Edition, John Wiley, 2010.
4.   J.S.R Jang,C.T Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Second Edition, Prentice Hall of India, 2002.
5.   D.E.Goldberg "Genetic Algorithms in search, optimization and Machine learning", Second Edition, Addison Wesley, 2007.

EVALUATION PATTERN: R14.1

18CSA342   **SYSTEMS AND NETWORK ADMINISTRATION**   **3 0 0 3**

Objectives: The main objective of this course is to discover the essentials of PC management, maintenance and networking. Learn to use and administer a network environment, plan a network installation or upgrade, as well as monitor, optimize and maintain computer networks.

Course outcomes

CO1	Understand the need of system and network administration
CO2	Learn about Diskquotas
CO3	Students get an idea about network topologies, network devices, TCP/IP configuration..etc.
CO4	Learn to configure a SAMBA SERVER
CO5	Understand Active Directory concepts, network monitoring using Wire Shark, and importance of port numbers

Unit 1
Understanding System Administration – Network Operating System - Network File System – Admin User - Administration Tools – Commands - Configuration Files – Log Files - Backup and Restore Files.
Unit 2
User Management - Issues - Registration – Account Policy – Login environment – Setting up and Supporting Users – Disk Quotas.
Unit 3
Network Administration – Topologies – Network Devices - Understanding TCP/IP – Administering TCP/IP - Network Configuration – Static and Dynamic.
Unit 4
Introduction to File Server – Setting Up a File Server – Network File Systems - SAMBA – Web Server.
Unit 5
Understanding Directory Services – Active Directory – Network Security – Importance of Port Number – Tracking Services – Monitoring your System – Network Security Tools.

TEXTBOOKS:
1.   Red Hat Linux - System Administration
2.   Introducing Microsoft Windows Server 2003 – Jerry Homeycutt – PHI
REFERENCE:
Mark Burgess – Principles of Network and System Administration - Second Edition - John Wiley & Sons
EVALUATION PATTERN: R14.1

SEMESTER VII

18CA301 ADVANCED COMPUTER NETWORKING AND INTERNET   **3-0-1-4**

Objectives: This course is aims to provide a broad coverage of some new advanced topics in the field of computer networks (Routing Protocols, Various types o delays, Real Time protocols, DNS etc.)

Course Outcomes

CO1	Student will be able to calculate the delays occured to transfer packet through network
CO2	Understand the working of various application protocols
CO3	Learn how TCP provides reliable services to application services
CO4	Understand routing and routing protocols
CO5	Learn the protocols for multimedia and real time interactive applications

Overview – OSI & TCP/IP reference Model- The Network Edge- The Network Core– Delay– Loss and Throughput in Packet Switched Networks - Application layer protocols – HTTP- DNS – PPP file sharing Introduction to Transport Layer Services - Connectionless Transport- UDP - Principles of Reliable Data Transfer- Connection Oriented Transport- TCP Traffic Control: Packet Scheduling, TCP Congestion Control, - Leaky Bucket, Token Bucket-Internet protocol – Internet Layer-Class full Addressing – Class less addressing – Private Addresses – Subnets – Subnet masks –ARP – ICMP-Routing & Forwarding - Global Internet– RIP – OSPF – BGP – Broadcast & Multicast routing-Multimedia Networking – Multimedia networking applications – Streaming stored video and audio – Protocols for real time interactive applications

TEXT BOOKS/ REFERENCES:

1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th Edition, Addison Wesley, 2008.
2. Larry Peterson and Bruce Davie, "Computer Networks: A Systems Approach", Fourth Edition, Morgan Kaufmann, 2007.
3. Richard Stevens, Bill Fenner and Andrew M. Rudoff, "UNIX Network Programming", Volume 1: "The Sockets Networking API", Third Edition, Addison Wesley, 2004.
4. Andrew S.Tanenbaum, "Computer Networks", Fourth Edition, Prentice Hall of India, 2002.

EVALUATION PATTERN: R14.3

18CA305   DESIGN AND ANALYSIS OF ALGORITHMS   3-1-0-4

Objectives: The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naive techniques.

Course Outcomes

CO1	Students are given a detailed idea of how to write an algorithm and do the time and space complexity analysis.
CO2	Students are provided with a clear idea of asymptotic notations, function comparisons and statement counts.
CO3	All the sorting algorithms and their anlaysis is done in detail
CO4	Be familiar with the dynamic programming concepts and its different methods.
CO5	Provided with a detailed idea about different types of grapg traversal and shortest path finding alogorithms.

Introduction– Asymptotic Notations- Monotonicity vs. Nonmonotonicity - Examples.Analysis of iterative programs, Analysis of recursive programs: Recurrence Relation: Recursion Tree Methods, Master Method. Sorting: Bubble – Insertion Sort- Selection Sort. Divide and Conquer: Quick Sort- Merge Sort- Bucket Sort-Lower Bounds- Heap Sort – Comparisons of Sorting. Introdution to KMP, BMP Searching, Greedy Algorithm: Fractional Knap-sack Problem- Task Scheduling Problem.
Dynamic Programming: Matrix Multiplication Problem- 0/1 Knap-sack Problem.
Graph Algorithms: Graph Traversals (DFS, BFS with Analysis) - Shortest Path Algorithms (with Analysis) – Dijkstra - Bellman Ford- Floyd Warshall's all Pair shortest path Algorithm- Minimum spanning Tree (with Analysis) – Kruskal– Prims.
NP Problems: Definition: P-NP-NP Complete-NP Hard. Examples:P-NP.
TEXT BOOKS/ REFERENCES:

1. CormenT.H ,Leiserson C.E, Rivest R.L and Stein C, "*Introduction to Algorithms*",Third Edition, Prentice Hall of India, 2009.
2. Baase.S and Gelder A.V., *"Computer Algorithms- Introduction to Design andAnalysis"*, Third edition, Pearson Education Asia, 2003.
3. Ellis Horowitz ,SartajSahni.S and Rajasekaran.S, "*Fundamentals of ComputerAlgorithms*", Silicon Press, 2008.
4. Goodrich M.T and Tamassia.R, "*Algorithm Design Foundations, Analysis, andInternet Examples*", Fourth Edition, John Wiley and Sons, 2002.

5. Dasgupta.S, Papadimitriou.C. andVazirani.U, "*Algorithms*", Eighth edition, TataMcGraw-Hill, 2009.

EVALUATION PATTERN: R14.1

18CA303   ADVANCED SOFTWARE ENGINEERING   3-0-1-4

Objectives: The objective of the course is to develop the students' ability to analyze, design, verify, validate, implement, apply, and maintain software systems.

Course Outcomes

CO1	To get an idea about software engineering layered technology,UML,usecases and design engineering.
CO2	Be familiar with software testing strategies for conventional and object oriented software and testing techniques
CO3	To get an idea about quality management and review techniques.
CO4	To get an idea about Web Engineering and its applications
CO5	Be familiar with opensource SE tools-Github and TDD methodology.

Software Engineering – Introduction - Software Classification - Layered Technology –Software Process –Practice - Generic Process Model , Process Assessment and Improvement– CMMI framework - Perspective Models - Specialized Models - Agile Process ModelsRequirements Engineering – SRS - Requirement Analysis- Unified Modeling Language –Approaches - Scenario based Modelling - UML Models that supplement Use Cases –Activity and Swim lane Diagrams - Design Engineering - Architectural Design – ModelingComponent level design - Performing User Interface Design.

Software Testing - Strategic Approach to Software Testing - , Test Strategies forconventional and Object Oriented Software - Validation Testing - System Testing – Art ofDebugging - Testing Techniques - White Box Testing – Basis Path Testing,- ControlStructure Testing - Black Box Testing

Quality Management – Overview – Quality Concepts - McCall's Quality Factors – ReviewTechniques – Defect Removal Efficiency – Formal Technical Reviews – Product MetricsOverview.

Web Engineering – Application – Attributes – Category – WebE Process Framework – WebEBest Practices – Overview on Analysis, Design and Testing of WebApp projects - Requirements Modeling for WebApps, Web App Design, Testing Web Applications.

Introduction to open source SE tools – Github, Introduction to TDD methodology, Overview of popular software components

TEXT BOOKS/ REFERENCES:
1. Roger S. Pressman, "*Software Engineering-A Practitioner's Approach*", SeventhEdition, Tata McGraw-Hill, 2010.

2. Ian Sommerville "*Software Engineering*", Sixth Edition.
3. Richard Fairley , "*Software Engineering concepts*", Tata McGraw-Hill PublishingCompany Pvt. Ltd., Seventh Edition

EVALUATION PATTERN: R14.3

18MA304BASICS OF OPERATIONS RESEARCH   **3-1-0-4**

Objectives: This module aims to introduce students to use quantitative methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.
Course Outcomes

CO1	Understand the basic concepts of linear programming, duality and methods for solving linear programming problem.
CO2	Understand the mathematical formulation of transportation and assignment problems and solution methods.
CO3	Understand the network representation of project works and computation of PERT and CPM.
CO4	Understand the basic concepts of sequencing problem, integer programing algorithms and solution methods.

Linear Programming: Introduction - Mathematical Formulations - Solutions – GraphicalMethod- Simplex Method - Artificial Variables- Big M - Two Phase Methods - Variants inSimplex Method - Duality Theory and Problems- Dual Simplex Method.Transportation and its Variants: Definition - Transportation Algorithms and Solutions -Assignment Model - Hungarian Method- Traveling Salesman Problem – TransshipmentModel.
Simulation: Definition - Types of Simulations - Monte Carlo Simulation. Queuing Theory:Characteristic of Queuing System - Steady State M/M/I Model Finite and Infinite Populationand M/M/C Infinite Population Model.
Game Theory: Competitive Games - Rectangular Game - Saddle point - Minmax (Maxmin)Method of Optimal Strategies - Value of the Game. Solution of Games with Saddle Points -Dominance Principle. Rectangular Games without Saddle Point – Mixed Strategy for 2 X 2Games.
PERT and CPM: Network Representation - Critical Path Method. PERT-time Estimates-Various Types of Floats- Critical Path Computation. Inventory Theory: Cost Involved inInventory Problems - Single Item Deterministic Models - Economic Size Model with andwithout Shortages having Production Rate Infinite and Finite.
TEXT BOOKS/ REFERENCES:
1. Hamdy A. Taha, "*Operations Research – An Introduction*", Seventh Edition,Macmillan Publishing Company, 2004.
2. Kantiswarup, P. K. Gupta and Manmohan, "*Operations Research*", Seventh EditionSultan Chand, 1991.

3. F. Hiller and G. J. Lieberman, "*Introduction to Operations Research*", Eighth Edition, Tata McGraw-Hill, 2006.
4. S. D. Sharma, "*Operations Research*", Eighth Edition, KedarNath, Ram Nath andCompany, 1997.

EVALUATION PATTERN: R14.1

18CA302ADVANCED DATABASES   3-0-0-3

Objectives: *Students will be able to analyze database requirements and determine the entities involved in the system and their relationship to one another. Develop the logical design of the database using data modelling concepts such as entity-relationship diagrams. Also exemplify recovery and commit protocols.*

Course Outcomes

CO1	Familiarize the students to OPPS Database concepts and its features
CO2	Exemplify the complex data types , all level inheritance, and DBS architecture
CO3	Be Familiar with Client server and parallel Databases, Exlain Interquery and Intraquery Parallelism
CO4	Make out Transaction Management and Concurrency Control and lock based control
CO5	Exemplify recovery and commit protocols. Finaly more explanatation about memeroy and storage of Databases.

Introduction to Object Oriented Database: Abstraction, encapsulation, and information hiding, Classes, Inheritance Overloading Polymorphism and dynamic binding - Object-Oriented Data Model.
Complex Data Types – Structured Types and Inheritance in SQL – Table Inheritance – Array and Multiset Types in SQL – Object-Identity and Reference Types in SQL – Implementing OR Features – Persistent Programming Languages – Object – Relational Mapping.
Introduction to Database Implementation and Distributed Database Architectures: Distributed Databases -Transparency, performance and reliability–Introduction to distributed architectures–Distributed and parallel databases concepts – autonomy, distribution, and heterogeneity–Client/server, parallel and distributed architectures –Design strategies:Horizontal, vertical and hybrid fragmentation- Resource allocation.
Parallel Databases: I/O Parallelism – Interquery Parallelism – Intraquery Parallelism – Intraoperation Parallelism – Interoperation Parallelism.
Introduction to Transaction Management and Concurrency Control: Transaction model and properties–Transaction structure–Transaction serialization and recovery–Lock based concurrency control–Multi-phase locking protocols–Time stamp ordering–Serialization.
Concurrency Control: Optimistic concurrency control–Deadlock management – detection,

avoidance, and resolution – Distributed deadlock – Structured (top actions, distributed nested) transactions.Distributed Query Processing

Recovery and Commit Protocols: Failure analysis– Reliability and availability– Sources of failure–Recovery techniques: shadow paging and write-ahead logging–Memory and storage management (Undo/redo and steal/force) –Two Phase Commit, Three phase commit.

Spatial and Temporal Data and Mobility: Time in Databases – Spatial and Geographic Data – Multimedia Databases – Mobility and Personal Databases.

Concepts of NoSQL Databases

TEXT BOOKS/ REFERENCES:

1. Database Systems Concepts; Silberschatz, Abraham, Henry F. Korth, and S.Sudarshan.

2. Principles of Distributed Database Systems; Ozsu, M. Tamer and Patrick Valduriez.

3. C. S. R. Prabhu, "Object Oriented Database Systems : Approaches and Architectures", Third Edition, PHI Learning Pvt. Ltd.

4. RamezElmasri and ShamkantNavathe, "*Fundamentals of Database Systems*", Sixth Edition, Addison Wesley, 2010

5. Hector Garcia-Molina, Jeffrey Ullman and Jennifer Widom, "*Database Systems: The Complete Book*", Second Edition, Prentice Hall, 2008.

EVALUATION PATTERN: R14.1

SEMESTER VIII

18CA313WEB SERVICES AND CLOUD   3 0 1 4

Objectives: Students will be able to define a web service, deploy a web service within WSDL, understand the SOAP protocol, read and understand SOAP messages passed between server and client.

Course Outcomes

CO1	**To get an idea about web services,Architecture, WSDL**
CO2	**Understand WS-co-ordination,Policies,UDDI and SOAP messages**
CO3	**Get an idea about various cloud models,cloud virtulization and migration**
CO4	**Understand cloud storage and security,Distributed storage systems**
CO5	**Get an idea about cloud services like Amazon webservice, Amazon cloud, Microsoft azure, Google App Engine etc**

Introduction to Web Services, Web service Architecture XML, XSD, DTD, XSLT, Parsers. WSDL- Purpose of WSDL, Types of WSDL, Message Exchange Patterns, Message Exchange Formats.

WS- standard, WS- Co-ordination, WS- Reliable messaging, WS- policy, JAX-WS, Web

Services in .Net , UDDI, SOAP.

Introduction to Cloud Computing- Architecture, types of Cloud- Public cloud, private cloud, Community Cloud and hybrid clouds, Cloud service models- IAAS, SAAS, PAAS, and XAAS. Cloud an organization perspective- Cloud Migration and Virtualization, Cloud OS.

Cloud Computing Platforms, Cloud service Platforms- storage service, database service, analytical service and application service, Cloud Data center management, Distributed Storage Systems, Cloud usage scenarios, Cloud Security

Amazon Web Services (AWS), Amazon Elastic Cloud, AWS Architecture, Microsoft Azure, Google App Engine, DevOps Services, Open Stack and Open Nebula Private Cloud setup and usage.

TEXT BOOKS/ REFERENCES:

1. Thomas Erl, "Service Oriented Architecture", Concepts, Technology and Design", Prentice Hall of India, 2005.
2. Thomas Erl, "Service oriented Architecture: A field guide to integrating XML and web services.
3. Toby Velte, Anthony Velte and Robert Elsenpeter,"Cloud Computing A Practical Approach", Tata McGraw hills,2009
4. Thomas Erl, Cloud Computing: Concepts, Technology & Architecture and Cloud Computing Design Patterns., Prentice Hall of service technology series.
5. Arshdeep Bahga and Vijay Madisetti, Cloud Computing: A Hands-On Approach, AWS Basics: Beginners Guide, by Gordon Wong.

EVALUATION PATTERN: R14.3

18CA312DATA MINING AND APPLICATIONS   3-0-1-4

Objectives: *Students will be able to develop an understanding of the strengths and limitations of popular data mining techniques and to be able to identify promising business applications of data mining. Students will be able to actively manage and participate in data mining projects executed by consultants or specialists in data mining. A useful take away from the course will be the ability to perform powerful data analysis in Excel.*

Course Outcomes

CO1	To understand and implement classical models and algorithms in data warehousing and data mining
CO2	Understand and apply a wide range of clustering, estimation, prediction, and classification algorithms, including k-means clustering, BIRCH clustering, Kohonen clustering, classification and regression trees, the C4.5 algorithm, logistic Regression, k-nearest neighbor, multiple regression, and neural networks.
CO3	Understand and apply the most current data mining techniques and applications, such as text mining, mining genomics data, and other current issues.

CO4	Understand the mathematical statistics foundations of the algorithms outlined above.
CO5	To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.

Introduction: Evolution and Importance of Data Mining-Types of Data and Patterns Mined-Technologies-Applications-Major Issues in Data Mining. Knowing about Data-Data Preprocessing: Cleaning– Integration–Reduction–PCA, Data Transformation and Discretization.
Mining Frequent Patterns: Basic Concept – Frequent Item Set Mining Methods – Mining Association Rules – Association to Correlation Analysis.
Classification and Prediction: Issues - Decision Tree Induction - Bayesian Classification – Rule Based Classification – k-Nearest-Neighbor Classification - Linear SVM - Regression – Linear, Logistic - Accuracy and Error measures –Introduction to Ensemble methods
Clustering: Overview of Clustering – Types of Data in Cluster Analysis – Major Clustering Methods-Partitioning Methods- k-Means, k-Medoids. Hierarchical Methods-Agglomerative and Divisive hierarchical clustering. Density-Based Methods-DBSCAN, Graph-based clustering (CHAMELEON), Evaluation in Clustering
Mining Data Streams- Mining Time-Series Data- Mining Sequence Patterns in Biological Data-Graph Mining – Social network Analysis - Text Mining – Mining the World Wide Web, Applications and Trends in Data Mining

Tools :Implementation of Data mining algorithms using Latest Open Source Data mining Tools.
TEXT BOOKS/ REFERENCES:
1. Jiawei Han, Micheline Kamber and Jian Pei, "Data mining concepts and Techniques", Third Edition, Elsevier Publisher, 2006.
2. K.P.Soman, Shyam Diwakar and V.Ajay, "Insight into data mining Theory and Practice", Prentice Hall of India, 2006.

EVALUATION PATTERN: R14.3

18CA311   COMPUTER LANGUAGE ENGINEERING   3 1 0 4

Objectives: Upon completion of this course, the student will be able to use automata theory and theory of computation. Familiarize with different optimization techniques.

Course Outcomes

CO1	Understand concepts in automata theory and theory of computation
CO2	Understand the structure of compilers and the corresponding steps in the compilation process and explain scanning and lexical analysis in the context of the compilation process.
CO3	Define the various categories of languages and grammars

CO4	Gives an idea of various optimization techniques

Automata and Language: Chomsky hierarchy of languages, Introduction to Finite Automata – Non-Deterministic Finite Automata- equivalence of NFAs and DFAs- minimization of DFA-Regular Expressions. Context-free Grammar - Parse tree derivations (Top-down, Bottom-up), Context-free languages – Chomsky normal form, GNF.

Introduction to Compilers: Compiler structure – Overview of Translation. Lexical Analysis: From regular expression to Scanner. Implementation of scanner: Lex - Parsers: Expressing syntax – Top-down parsing: Recursive descent parsing, Non-recursive predictive parsing. Bottom-up parsing: LR(0), LR(1) and LALR(1) – Implementation of Parser - YACC

Context-Sensitive Analysis: Type Systems – Attribute – Grammar – Syntax Directed Translation. Intermediate Representations: Graphical and Linear Intermediate Representations – Symbol tables. Procedure Abstraction: Procedure calls – Name Spaces – Communicating Values between Procedures.

Iterative Data Flow Analysis – Instruction selection via Tree Pattern Matching – Register allocation: Local and Global – Introduction to Optimization.

TEXT BOOKS/ REFERENCES:
1. *Peter Linz*, "*An Introduction to Formal Languages and Automata*", Third Edition, 2002.
2. *Keith Cooper and Linda Torczon*, "*Engineering a Compiler*", Second Edition, Morgan Kauffmann, 2011.
3. *Alfred V.Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman*, "*Compilers: Principles, Techniques and Tools*", Prentice Hall, Second Edition, 2006.
4. *Andrew W. Appel and Jens Palsberg*, "*Modern Compiler Implementation in Java*", Cambridge University Press, Second Edition, 2002.

EVALUATION PATTERN: R14.1

18EN600   TECHNICAL WRITING   0 0 1 P/F

Objectives: Learns to write technical documents and provides training to write research papers.

Course Outcomes

CO1	Students will understand and know how to follow the stages of the writing process (prewriting/writing/rewriting) and apply them to technical and workplace writing tasks.
CO2	Students will be able to produce a set of documents related to technology and writing in the workplace and will have improved their ability to write clearly and accurately.
CO3	Students will be familiar with basic sources and methods of research and documentation on topics in technology, including on-line research.

CO4	They will be able to synthesize and integrate material from primary and secondary sources with their own ideas in research papers.
CO5	Students will understand the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.

Introduction to the Course – What is technical writing and how is it different from writing in general? Error detection – Technical Vocabulary. Mechanics of writing: Grammar rules – punctuation - spelling rules - tone and style- graphical Representation.

Different kinds of written documents: Definitions- descriptions- instructions - recommendations- manuals - reports – proposals, Instructions manual, job applications with Resume Introduction to Writing dissertations, papers, and technical proposals

Technical paper writing: Library research skills- documentation style - document editing – proof reading - formatting

Practice in oral communication: Group Discussion, Interviews, and Technical presentations

TEXT BOOKS/ REFERENCES:

1. Hirsh, Herbert. L "Esential Communication Strategies for Scientists, Engineers and Technology Professionals". II Edition. New York: IEEE press, 2002

2. Anderson, Paul. V. "Technical Communication: A Reader-Centred Approach". V Edition. Harcourt Brace College Publication, 2003

3. Strunk, William Jr. and White. EB. "The Elements of Style" New York. Alliyan& Bacon, 1999.

4. Riordan, G. Daniel and Pauley E. Steven. "Technical Report Writing Today" VIII Edition (Indian Adaptation). New Delhi: Biztantra, 2004.

18CA391   RESEARCH LEARNING AND PROBLEMFORMULATION   0 0 2 1

Objectives: The main objective of this course is to help the students to identify their research problem area and conduct literature review.

Course Outcomes

CO1	Identify and utilize relevant previous work that supports their research and Articulate a timely and important research question or creative objective
CO2	Identify and utilize appropriate methodologies to address the research question or creative objective
CO3	Meet the relevant field's standards for the responsible conduct of research, and effectively navigate challenges that arise in the research process
CO4	Work collaboratively with other researchers, demonstrating effective communication and problem-solving skills

CO5	Present the research effectively in a conference setting and a written publication

This is a case study which is a prerequisite for dissertation phase 1 in 5th semester. The students must read papers on the topic selected by them for the project and present a seminar in this regard.

EVALUATION PATTERN: R14.2

SEMESTER IX

18CA401DESIGN PATTERNS   3104

Objectives: Students will be able to develop design patterns to solve object oriented design problems.

Course Outcomes

CO1	Identify the appropriate design patterns to solve object oriented design problems..
CO2	Develop design solutions using creational patterns.
CO3	Apply structural patterns to solve design problems.
CO4	Construct design solutions by using behavioral patterns.

Introduction to Design Patterns **-** Observer Pattern - Decorator Pattern - Factory Pattern- Singleton Pattern - Command Pattern- Adapter and Facade Patterns - Template Method Pattern - Iterator and Composite Patterns - The State Pattern- The Proxy Pattern - Compound Patterns – MVC-Overview of other patterns – GRASP and Anti-Patterns: Case study: Use of patterns in the Design of a Modern Web Framework.

TEXT BOOKS / REFERENCES:
1. Erich Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra "Head First Design Patterns",
O'Reilly Media Inc., October 2004.
2. Erich Gamma, Richard Helm, Ralph Johnson and John M. Vlissides, "Design Patterns:
Elements of Reusable Object Oriented Software", Second Edition, Addison Wesley, 2000.
3. James W. Cooper, "Java Design Patterns: A Tutorial", Second Edition, Pearson Education,
2003.
4. Mark Grand, "*Patterns in Java – A Catalog of Reusable Patterns Illustrated with UML*",
Wiley – Dream tech India, 2002.
EVALUATION PATTERN: R14.1

18CA402SYSTEM SECURITY   3 1 0 4

Objectives: The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.

Course Outcomes

CO1	**Understand various attacks on the system and the need for security**
CO2	**Understand various malicious and non malicious program errors and learn to develop secure programs**
CO3	**Learn various protection mechanism provided by operating system and to manage it**
CO4	**Review the security services provided by the database systems.**
CO5	**Gives the students an idea about the threats in computer networks, ethical issues, privacy and copyright laws**

Physical Security - Overview of Information Security:Confidentiality – Integrity – Access Control – Availability– Malicious Software (Viruses, Trojans, Rootkits, Worms, Botnets)
Program Security: Secure Program -Non Malicious Program Errors -Malicious Code -Program Controls.
Operating System Security: Memory Protection -Access Control -File ProtectionMechanisms - User Authentication -Trusted Operating System – Lock Down Mechanism
Database Security: Security Requirements -Reliability and Integrity-Sensitive Data –Inference - Multilevel Security
Network Security: Threats in Networks -Security Controls – Firewalls-Intrusion DetectionSystems
Ethical Issues: Protecting Programs and Data -Information and the Law -Rights of Employersand Employees -Redress for Software Failures -Computer Crime -Ethical Issues. Case Study:Privacy Rights, Fraud, Accuracy of Information, Denial Of Service.
TEXT BOOKS/ REFERENCES:
1. Charles P. Pfleeger and Shari Lawrence Pfleeger, "*Security in Computing*", Fourth
Edition, Prentice Hall, 2007.
2. Ross J. Anderson and Ross Anderson, "*Security Engineering: A Guide to Building
Dependable Distributed Systems*", Wiley India Pvt Ltd, 2001.
3. C.K Shyamala, N. Harini and T.R.Padmanabhan, "*Cryptography and Security*", First
Edition, Wiley India Pvt Ltd, 2011.
4. Matthew Bishop, "*Computer Security: Art and Science*", Addison-Wesley, 2003.
5. William Stallings, "*Cryptography and Network Security: Principles and Practice*",
Fifth Edition, Pearson Education, 2011.

EVALUATION PATTERN: R14.1

18CA496   **DISSERTATION Phase I**   **0-0-0-5**

Objectives: To help students to identify and formulate their research problem and hoe to solve the problems and studying various tools needed for solving the problems.

Course Outcomes

CO1	Identify/define problems and Generate questions and/or hypotheses
CO2	Review and summarize the literature and apply appropriate research methods
CO3	Collect data systematically and conduct research responsibly and ethically
CO4	Evaluate, interpret, and analyze a body of empirical data and evidence and discuss findings in the broader context of the field
CO5	Develop and sustain an evidence-based argument and produce publishable results

The objective of Dissertation – Phase 1 is to gear up students for preparation of Dissertation-Phase 2 in Semester X. Dissertation provides an opportunity to the students to demonstrate independence and originality in thought and application. Students will select topics from the field of computer application and based on a thorough review of literature on that topic, they will identify the problems and decide on plans of research for dissertation. Under the supervision of faculty members, they will execute their plans involving theoretical and/or experimental work. Students will have to prepare proper documentation consisting of SRS,Modelling Techniques, Development Strategies and Implementation and Testing Strategies.Student may use any Design Methodologies such as SSAD, OOAD and UML etc. This isdone during phase 1. Regular reviews will be conducted.
EVALUATION PATTERN: R15.1

SEMESTER X

18CA497   **DISSERTATION Phase II**   **0-0-0-12**

Objectives: To help students to publish their research paper in a Scopus indexed journal.

Course Outcomes

CO1	Identify/define problems and Generate questions and/or hypotheses
CO2	Review and summarize the literature and apply appropriate research methods
CO3	Collect data systematically and conduct research responsibly and ethically
CO4	Evaluate, interpret, and analyze a body of empirical data and evidence and discuss findings in the broader context of the field
CO5	Develop and sustain an evidence-based argument and produce publishable results

The results obtained in phase 1 will be analysed to arrive at a conclusion which will lead to some novelty in the field of computer application. Dissertation will be prepared as per the prescribed format/ guidelines and will be presented in the form of regular reviews. The Dissertation work will be evaluated continuously over the span of the semester as per the approved procedure. For the final review, the department may appoint external expert from industry or academics. Also, a technical paper based on the work done has to be submitted and published at a reputed conference which indexes the publications in SCOPUS. The formalities insisted by the department in this regard has to be strictly adhered to.

EVALUATION PATTERN: R15.1

ELECTIVES

18CA435   **NETWORK SECURITY**   **3-0-0-3**

Objectives: To provide an understanding of the principle concepts and protocols used to provide authentication, email and web security.

Course outcomes

CO1	Able to apply cryptographic protocols in various applications to provide confidentiality, integrity and Availability
CO2	Understand the working of authentication applications
CO3	Learn to protect the email services using PGP and SMIME
CO4	Gives knowledge about providing security in network at packet level using IPSec
CO5	Able to develop secure web application and ecommerce site using SSL/TLS and SET

Cryptographic Protocols and their Integration into Distributed Systems and otherApplications - Authentication: Overview – Requirements - Functions-Protocols –Applications –Kerberos – X.509 Directory Services.
Electronic Mail Security: Email Architecture – Security –Pretty Good Policy Variations – Operational Descriptions – PGP Session Keys Key Rings – Key management – MessageExchange formats – Trust Model
IP Security:Introduction to IP - IP security Overview- Pros and Cons – IP Sec Applications – IP SecurityArchitecture – IPSec Services - Authentication Header -Encapsulating Security Payload –IPSec Modes - Combining Security Associations - Key Management.
Web Security: Web Security Requirements- Secure Sockets Layer Objectives – Versions – Certificates – Protocols – Transport Level Security - Secure Electronic Transaction Entities – Certificates – DS Verification.
TEXT BOOKS/ REFERENCES:
1. C K Shyamala, N Harini and T R Padmanabhan, "*Cryptography and Security*", FirstEdition,

Wiley India Pvt. Ltd, 2011.

2. Stallings W, "*Cryptography and Network Security*", Third Edition, PearsonEducation Asia. Prentice Hall, 2000.

3. Forouzan B A, "*Cryptography and Network Security*", Special Indian Edition, TataMcGraw Hill, 2007.

EVALUATION PATTERN: R14.1

18CA439 STRUCTURE AND INTERPRETATION OF COMPUTER PROGRAMS   3-0-0-3

Objectives: Students are given understanding of basic methods from programming languages to analyse computational systems, and to generate computational solutions to abstract problems.

Course Outcomes

CO1	Gives an overview of elements and types of various programming languages
CO2	Understand the elements of programming procedures and formulating abstractions
CO3	Learn to bulid abstaction with data
CO4	Be able to design and implement programs in Scheme that demonstrate the concepts
CO5	Learn to program with PROLOG

Introduction to the Elements of Programming Languages: Different Types of ProgrammingLanguages - Modeling Programming Languages, Computability versus Complexity,Computer Science for Computation.

Introduction to LISP and Scheme - Building Abstractions with Procedures - The Elements ofProgramming Procedures and the Process they Generate – Formulating Abstractions withHigher-Order Procedures.

Building Abstractions with Data: Introduction to Data Abstraction- Hierarchical Data and theClosure Property – Symbolic Data – Multiple Representations for Abstract Data – Systemswith Generic Operations.

Modularity, Objects, and State: Assignment and Local state – The Environment Model ofEvaluation – Modeling with Mutable Data – Concurrency- Streams.

Metalinguistic Abstraction: The Metacircular Evaluator – Lazy Evaluation - Variation on aScheme- Nondeterministic Computing – Logic Programming – Introduction to PROLOG.

TEXT BOOKS/ REFERENCES:

1. Abelson H and Sussman G J, "*Structure and Interpretation of Computer Programs*",Second Edition, MIT Press, 2005.

2. Sebesta R W, "*Concepts of Programming Languages*", Ninth Edition, AddisonWesley, 2009.

3. Pierce B C, "*Types and Programming Languages*", MIT Press, 2002.

4. Sethi R, "*Programming Languages Concepts and Constructs*", Second Edition,Addison Wesley, 1996.

5. T W Pratt and Marvin V Z, "*Programming Languages: Design and Implementation*",Third Edition, Prentice Hall, 1995.

EVALUATION PATTERN: R14.1

18CA438   **SOFTWARE QUALITY ASSURANCE**   **3-0-0-3**

Objectives: To convey quality management processes, various activities of quality assurance, quality planning and quality control. Students understand the importance of standards in the quality management process and their impact on the final product.

Course Outcomes

CO1	To get familiarize with Quality challenges, factors and its activities in the project life cycle
CO2	Students get a full idea on the testing strategies and bilding a testing process.
CO3	Gets a clear idea on software qulaity in management and business context . Also reagarding Process and Product Quality.
CO4	Understands the ISO origins , different audit methods and qulaity assessment procedures.
CO5	Acquires a clear cut idea on CMM and Process improvement models, Coniguration Management and processes along with experience gaining through various case studeis.

Introduction: The Software Quality Challenge - Software Quality Factors-The Components ofSoftware Quality System-Integrating Quality Activities in the Project Life Cycle.
Software Testing: Strategies and Implementation-Building the Software Testing Process-Software Quality Management Components: Metrics and Costs-Software Quality in the Business Context- Product Quality and Process Quality - ISO 9001:The Origins of ISO 9001- need for ISO 9001-Assessment and Audit Preparation-TheAssessment Process
Software CMM and other Process Improvement Models-Software ConfigurationManagement-Introduction to Six Sigma - Case Studies: Indian Software Industry in Perspective.
TEXT BOOKS/ REFERENCES:
1. Daniel Galin, *"Software Quality Assurance: From theory to Implementation"*, PearsonEducation, 2008
3. Nina Godbole, "*Software Quality Assurance, Principles and Practice*", NarosaPublications, 2011.
4. William Perry, "*Effective Methods of Software Testing*", Third Edition, Wiley, 2006.

EVALUATION PATTERN: R14.1

18CA334   **COMPUTATIONAL INTELLIGENCE**   **3-0-0-3**

Objectives: This course provides basic knowledge representation, problem solving, and learning methods of Artificial Intelligence. Assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular particular engineering problems.

Course Outcomes

CO1	Able to understand the need and importance of Computational intelligence
CO2	Understand the concepts of neural networks and backpropagation learning
CO3	Learn to implement associative memory using neural networks
CO4	Gives an idea of fuzzy logic in real world problems
CO5	Lear hybrid approaches to solve real world problems

Artificial Intelligence – a Brief Review – Pitfalls of Traditional AI – Need for ComputationalIntelligence – Importance of Tolerance of Imprecision and Uncertainty – ConstituentTechniques – Overview of Artificial Neural Networks - Fuzzy Logic – EvolutionaryComputation.

Neural Network: Biological and Artificial Neuron, Neural Networks, Supervised andUnsupervised Learning. Single Layer Perceptron - Multilayer Perceptron – BackpropagationLearning.

Neural Networks as Associative Memories - Hopfield Networks, Bidirectional AssociativeMemory. Topologically Organized Neural Networks – Competitive Learning, KohonenMaps.

Fuzzy Logic: Fuzzy Sets – Properties – Membership Functions - Fuzzy Operations. FuzzyLogic and Fuzzy Inference - Applications. Evolutionary Computation – ConstituentAlgorithms. SwarmIntelligence Algorithms - Overview of other Bio-inspired Algorithms - Hybrid Approaches(Neural Networks, Fuzzy Logic, Genetic Algorithms etc.).

TEXT BOOKS/ REFERENCES:

1. LaureneFausett, Fundamentals of Neural Networks, 2ndedition,Pearson, 1993
2. Ross T J, "*Fuzzy Logic with Engineering Applications*", McGraw Hill, 1997.
3. Eiben A E and Smith J E, "*Introduction to Evolutionary Computing*", SecondEdition, Springer, Natural Computing Series, 2007.
4. Kumar S, "*Neural Networks - A Classroom Approach*", Tata McGraw Hill, 2004.
5. Engelbrecht, A.P, "*Fundamentals of Computational Swarm Intelligence*", John Wiley& Sons, 2006.
6. Konar. A, "*Computational Intelligence: Principles, Techniques and Applications*",Springer Verlag, 2005.

EVALUATION PATTERN: R14.1

18CA332   **BIO INFORMATICS**   **3-0-0-3**

Objectives: Provide an introduction to what bioinformatics is and why it is important Also provides an overview of the application areas of bioinformatics, with a focus on the topics that will be taught in the course Explain what type of knowledge will be gained from the course.

Course Outcomes

CO1	Explain fundamental concepts of biology and bioinformatics
CO2	Understand the sequence/structure analysis of genomics and proteomics.
CO3	Analyze protein and gene sequence/structures of databases.
CO4	Use data mining techniques to analyse similarity between sequences and apply database search for primary/secondary sequences and search protocol
CO5	Understand machine learning methods used for bioinformatics.

Introduction to Bioinformatics**:** Definition - Importance and Uses of Bioinformatics-Information Technology - Systems Biology.

Introduction to Nucleic Acids**:** DNA and RNA as Genetic Materials - Structure of NucleicAcids - Nucleosides and Nucleotides - DNA Double Helix. Central Dogma of MolecularBiology - Nature of Genetic Code - Deciphering Genetic Code - Wobble Hypothesis -Universalities and Exceptions.

Applications of Data Mining to Bioinformatics Problems - Biological Data – Databases -Protein Sequencing - Nucleic Acid Sequencing - Sequence to Structure Relationship.

Bioinformatics Software**:** Clustal V - Clustal W 1.7 - RasMol – Oligo – Molscript – Treeview– Alscript - Genetic Analysis Software- Phylip.

Biocomputing**:** Introduction to String Matching Algorithms - Database Search Techniques - Sequence Comparison and Alignment Techniques - Use of Biochemical Scoring Matrices – Introduction to Graph Matching Algorithms - Automated Genome Comparison and itsImplication - Automated Gene Prediction - Automated Identification of Bacterial Operonsand Pathways - Introduction to Signaling Pathways and Pathway Regulation. Gene Arrays -Analysis of Gene Arrays - Machine Learning Methods in Bioinformatics - Hidden Markovmodels - Applications of HMM in gene identification and Profiles HMMs - Neural Networksand Support Vector machines.

TEXT BOOKS/ REFERENCES:

1. Claverie J.M and Notredame C, "*Bioinformatics for Dummies*", SecondEdition,Wiley, 2003.

2. Pierre Baldi and Soren Brunak, "*Bioinformatics - The Machine Learning Approach*",Second Edition,A Bradford Book, 2001.

3. RastogiS.C, Mendiratt N. and Rastogi P "*Bioinformatics: Concepts, Skills &Applications*", CBS Publishers & Distributors, 2004.

4. Fogel G.B. and Corne D.W, "*Evolutionary Computation in Bioinformatics*", MorganKaufmann, 2003.

EVALUATION PATTERN: R14.1

18CA431   **INFORMATION RETRIEVAL**   **3-0-0-3**

Objectives: The main objective of this course is to present the scientific support in the field of information search and retrieval.

Course Outcomes

CO1	**Understand the concepts of indexing, vocabulary, normalization and dictionary in Information Retrieval**
CO2	**Define a boolean model and a vector space model, and explain the differences between them**
CO3	**Evaluate information retrieval algorithms, and give an account of the difficulties of evaluation**
CO4	**To understand various methods of text classification**
CO5	**Understand the basics of XML and Web search.**

Boolean Expression Based Retrieval: Vocabulary and Postings – Lists – Dictionaries andTolerant Retrieval – Index Construction and Compression - Scoring and Vector Space Model– Score Computation – Evaluating Information Retrieval Systems – Relevance Feedback andQuery Expansion – XML Based Retrieval– Probabilistic Models – Language Models –Text Classification – Vector Space Classification – SVM Based Document Classification –Latent Semantic Indexing – Web Search – Web Crawlers – Link Analysis – UnstructuredData Retrieval Semantic Web – Ontology - Implementations using Natural Language Toolkit.

TEXT BOOKS/ REFERENCES:

1. C. Manning, P. Raghavan and H. Schütze, "*Introduction to Information Retrieval*",Cambridge University Press, 2008.
2. R. Baeza-Yates and B. Ribeiro Neto, "*Modern Information Retrieval: The Conceptsand Technology Behind Search*", Second Edition, Addison Wesley, 2011.
3. David A. Grossman and Ophir Frieder "*Information Retrieval: Algorithms andHeuristics*", Second Edition, Springer 2004.

EVALUATION PATTERN: R14.1

18CA436   **OPEN SOURCE SYSTEMS**   **3 0 0 3**

Objectives: To expose students to Open source system environment and introduce them to use and develop open source packages in open source platform.

Course outcomes

CO1	Explain common open source licenses and the impact of choosing a license
CO2	Explain open source project structure and how to successfully setup a project

CO3	Learn to derive a frame work for analysing OSS
CO4	Introduces the students with the open source server applications
CO5	Gives an idea on the working of open source desktop applications

Overview of Free/Open Source Software: Definition - Examples of OSD – CompliantLicenses - Example Product - Development Process – History – BSD - The Free SoftwareFoundation – Linux - Apache – Mozilla.Open Source Software Qualification: Specific Characteristics of Open Source Software

Transformation -Development Process - Taboos and Norms in OSS Development – LifeCycle.

Deriving a Framework for Analyzing OSS :Zachman's Framework for IS Architecture - CATWOE and Soft System Method. Deriving the Analytical Framework for OSSEnvironment.

World View: Classifying OSS Motivations - Technological Micro-levelMotivation - Economic Micro level and Macro-level Motivation - Socio-Political Micro-leveland Macro-level Motivation.

Open Source Server Applications: Infrastructure Services - Web Servers - Database Servers - Mail Servers - Systems Management.

Open Source Desktop Applications: Graphical Desktops - Web Browsers - The Office Suite - Mail and Calendar Clients - Personal Software - Cost of OSS – Licensing. FOSSProgramming: Python.

TEXT BOOKS/ REFERENCES:

Joseph Feller, Brian Fitzgerald and Eric S. Raymond, "*Understanding Open Source SoftwareDevelopment*", Addison Wesley Professional, 2000.

EVALUATION PATTERN: R14.1

18CA337DEEP LEARNING FOR NATURAL LANGUAGE PROCESSING   3 0 0 3

Objectives: Provides an overview of neural network based methods applied to text. The focus is on models particularly suited to the properties of human language, such as categorical, unbounded, and structured representations, and very large input and output vocabularies.

Course Outcomes

CO1	Provides an overview of Natural Language Processing
CO2	Understand gloabal vectors for word representations
CO3	Will be able to recognize named entity using neural networks
CO4	Able to model languages and perform sentimental analysis
CO5	Understand dynamic memeory networks for NLP

Intro to NLP and Deep Learning,Simple Word Vector representations: word2vec-GloVe: Global Vectors for Word Representation

Advanced word vector representations: language models, softmax, single layer networks-Neural Networks and backpropagation -- for named entity recognition

Introduction to Tensorflow-Recurrent neural networks -- for language modeling and other tasks-RUs and LSTMs -- for machine translation-Recursive neural networks -- for parsing-Parsing with Compositional Vector Grammars-Recursive neural networks -- for different tasks (e.g. sentiment analysis)

Convolutional neural networks -- for sentence classification-The future of Deep Learning for NLP: Dynamic Memory Networks

TEXT BOOKS/ REFERENCES:

1. Jurafsky and James H. Martin. Speech and Language Processing (3rd ed. draft)
2. Yoav Goldberg. A Primer on Neural Network Models for Natural Language Processing
3. Ian Goodfellow, Yoshua Bengio, and Aaron Courville. Deep Learning. MIT Press.

EVALUATION PATTERN: R14.1

18CA340   ADVANCED OPERATING SYSTEM AND DISTRIBUTED COMPUTING3 0 0 3

Objectives: The aim of this module is to study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems); Hardware and software features that support these systems.

Course Outcomes

CO1	Understand the concepts ,design issues and limitations of distributed operating systems.
CO2	To Understand about token based algorithms,deadlock handling strategies and classification of agreement problems.
CO3	Understand the concept of distributed file system,shared memory and distributed scheduling
CO4	To understand about fault tolerance and fault recovery techniques and different types of protection and security measures
CO5	To give a detailed idea about multiprocessor OS and database OS.

Unit 1
Introduction:
Review of core Operating systems, network Operating systems, Real-time Operating systems, Mobile Operating system.
Distributed Operating System- Introduction, design issues, Communication primitives, Limitations of distributed system.lamp ports logical clocks - vector clocks - casual ordering of

107

messages - global state - cuts of a distributed computation - termination detection.

Unit 2
Distributed Mutual Exclusion:
Token based Algorithms, non-taken based algorithms, comparative analysis, Deadlock handling Strategies, Classification of agreement Problems.

Unit 3
Distributed File system, shared Memory and Distributed scheduling:
Distributed File system-Mechanisms, design issues, Distributed Shared Memory: Architecture, Algorithms for implementing DSM, Memory coherence, coherence protocols, Design issues. Distributed Scheduling- Issues, Components, Load distributing algorithms, Performance comparison.

Unit 4
Failure Recovery, Fault Tolerance, Protection and Security:
Failure Recovery and Fault Tolerance -Basic concepts, Classification of failures, Backward and forward recovery, Basic approaches, recovery in concurrent systems, Fault tolerance issues, Atomic actions & protocols, Commit, non-blocking, voting-static, dynamic protocols.
Protection & Security: Preliminaries, Access matrix model, Implementation and safety, Data security- model, conventional, modern, private-public key Cryptography, multiple encryptions, Authentication.

Unit 5
Multiprocessor Operating Systems and Database Operating system:
Multiprocessor Operating System: Introduction, Architecture, Interconnection networks for Multiprocessing, Caching, Structure of multiprocessing Operating System, Threads. Various types of Threads, processor synchronization.
Database operating systems: Introduction, requirements of Database OS, database systems, Concurrency control-model, problem, distributed database systems Concurrency control algorithms – synchronization primitives, lock based, timestamp based and data replication algorithms.

Text Books:

1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", Tata McGraw-Hill Publishing Company Limited.
2. Silberschatz-Galvin, "Operating System Concepts" 6th edition. Addison Willey Publications. (only for first unit: review of OS)

Reference Books:

1. Andrew S.Tanenbaum, "Modern operating system", PHI
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson Education

4. Relevant Research Papers from the Journals/Conferences.

EVALUATION PATTERN: R14.1

18CA440   WIRELESS COMMUNICATIONS AND NETWORKS   3 0 0 3

Objectives: To provide an overview of Wireless Communication network protocols, application areas and also to simulate these protocols.

Course Outcomes

CO1	**Demonstrate knowledge of Wireless Network (WLAN) systems and their impact on the information technology industry.**
CO2	**Give knowledge about various modulation and multi access control protocols**
CO3	**Provides knowledge about various wireless standards**
CO4	**Able to know the working of various mobile routing protocols**
CO5	**Lean to simulate the wireless networks with NS3**

Introduction to Wireless Systems: Brief History of Wireless Communication. TransmissionFundamentals: Time Domain, Frequency Domain, Bandwidth vs. Data Rate – ChannelCapacity - Transmission Media –Protocols and TCP/IP Suite: TCP/IP Protocol Architecture - OSI Model. Antennas and WavePropagation: Antennas, Propagation Modes, Fading in the Mobile Environment - Free SpacePropagation.

Modulation Techniques: Signal Encoding, Digital Data - Analog Signal, Analog Data -Analog Signal, Analog Data - Digital Signal, Frequency Hopping Spread Spectrum (FHSS),Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access (CDMA).

Wireless Networking: Satellite Communications- Capacity Allocation – Frequency Division,Time Division, WiMax and IEEE 802.16 Broadband Wireless Access Standards. WirelessLAN Technology: Infrared, Spread Spectrum, Narrowband LANS- Wi-Fi and IEEE 802.11Standard, Bluetooth and IEEE 802.15 Standard.

Wireless Routing Protocols: Infrastructure, AdHoc Networks, ProActive vs.ReActive,Dynamic Source Routing(DSR), AdHoc On Demand Distance Vector(AODV),Temporarily Ordered Routing Algorithm(TORA), Destination Sequenced DistanceVector(DSDV). Case Study using NS2 / NS3.

TEXTBOOK / REFERENCES:

1. William Stallings,"*Wireless Communication and Networks*", Pearson Education, ThirdEdition, 2002.
2. Jochen Schiller, "*Mobile Communications*", Pearson Education, Second Edition, 2003.

EVALUATION PATTERN: R14.1

18CA335   COMPUTER GRAPHICS AND VISUALIZATION 3 0 0 3

Objectives: To introduce the use of a graphics system and become familiar with building

approach of graphics system components and algorithms related with them. Also covers the basic principles of 2D & 3D graphics. and an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.

Course Outcomes

CO1	Understand various types of video displays and colour models.
CO2	Understand and implement various drawing primitives using opengl
CO3	Learn fundamental concepts within computer graphics such as geometrical transformations,
CO4	Understand various 3D object representation techniques
CO5	Understand the concept of illumination models, removal of hidden surfaces and rendering

Computer Graphics Fundamentals**:** Overview of CG - Video Displays -Color Models-OutputPrimitives.

Introduction to OPENGL- Points, Lines – Specifying a 2D World Coordinate ReferenceFrame in OpenGL- OpenGL Point Functions, Line Functions Polygon Fill Area Functions,Vertex Arrays - Line Drawing Algorithms - Circle Generation Algorithm Filled AreaPrimitives OpenGL fill Area Functions - Scan Line Polygon Filling Algorithms – BoundaryFill - Flood Fill Algorithms Attributes of Output Primitives. Geometric Transformations**:** Basic 2Dtransformations-Other Transformations- Reflection and Shearing. OpenGL Geometric Transformation Functions.

3D Object Representation: Fractals - Geometrical Transformation for - 3D Objects - Viewing and Clipping 2D Viewing Functions Clipping Operations. Three Dimensional Viewing: Viewing Pipeline, Viewing Coordinates. Projections: Parallel Projections, Perspective

23

Projections. OpenGL Two-Dimensional and Three-Dimensional Viewing Functions-OpenGL Animation.

Visible Surface Detection and Illumination Models: Visible SurfaceDetection Methods – Illumination Methods and Surface Rendering – Polygon. Rendering Methods: Constant Intensity Shading, Gouraud Shading, Phong Shading. OpenGL Illumination and Surface Rendering Functions, GUI – OpenGL Interactive Input Device Functions. The User Dialog – Interactive Picture Construction Techniques – Color Models - Computer Animation.

TEXT BOOKS / REFERENCES:

1. Donald Hearn and Pauline Baker, "*Computer Graphics with OpenGL* ", Third Edition, Prentice Hall of India, 2009.
2. Roy A. Plastock and Gordon Kalley, "*Schaum's Outline Series - Theory and Problems of Computer Graphics*", Second Edition, Tata McGraw-Hill, 2000.
3. Foley J.D, Van Dam A, Eiener S.K. and Hughes J.F., "*Computer Graphics Principles and Practice*", Second Edition, Pearson Education, 1996.

EVALUATION PATTERN: R14.1

18CA437   **SEMANTIC WEB TECHNOLOGIES**   **3-0-0-3**

Objectives: Gives an introduction to the Semantic Web vision, as well as, the languages and tools useful in Semantic Web programming. They will understand how this technology revolutionizes the World Wide Web and its uses. Ontology languages (RDF, RDF-S and OWL) and technologies (explicit metadata, ontologies, logic, and inference) will be covered. In addition, students will be exposed to; ontology engineering, application scenarios, Semantic Web Query Languages, Description Logic and state of the art Semantic Web applications, such as linked data development.

Course Outcomes

CO1	Provides an overview of semantic web technologies and services
CO2	Understand the resource description framework and its features
CO3	Learn Ontology and OWL
CO4	Gives students the idea of OWL structure, syntax and sematics
CO5	Design and reasoning Ontology using various tools

Introduction to Semantic Web: Semantic Web Concepts- Need for the Semantic Web- Information Overload - Stovepipe Systems - Poor Content Aggregation - XML and the Semantic Web - Web Services and the Semantic Web -Current Applications of the Semantic Web - Business Case for the Semantic Web Decision Support
Business Development - Information Sharing and Knowledge. Understanding the Resource Description Framework: What Is RDF - Capturing Knowledge with RDF - Other RDF
24
Features - RDF Schema – Non-Contextual Modelling. Web Ontology Language: Motivation and Overview –
The OWL Language- Defining the Ontology Spectrum - Thesaurus, Logical Theory - Ontology - Topic Maps Standards and Concepts – Occurrence – Association - Subject Descriptor – Scope.
Ontologies: Overview of Ontologies - Ontology Example – Definitions – Syntax – Structure – Semantics - and Pragmatics - Expressing Ontologies Logically - Ontology and Semantic Mapping Problem.
Knowledge Representation: Languages - Formalisms, Logics - Description Logics - Ontology Design and Management using the Protege Editor - Ontology Reasoning with Pellet/FACT++, Ontology Querying with SPARQL.
TEXT BOOKS / REFERENCES:
1. Michael C. Daconta, Leo J. Obrst and Kevin T. Smith, "*The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management*", Fourth Edition, Wiley Publishing, June 2003.
2. Jeffrey T. Pollock, "*Semantic Web FOR DUMMIES*", Wiley Publishing, 2009.
3. John Davies, Rudi Studer and Paul Warren John, "*Semantic Web Technologies: Trends*

and Research in Ontology-based Systems", John Wiley and Sons, 2006.
4. John Davies, Dieter Fensel and Frank Van Harmelen, "*Towards the Semantic Web: Ontology-Driven Knowledge Management*", John Wiley and Sons, 2003.
EVALUATION PATTERN: R14.1

| 18CA336 | DATABASE ADMINISTRATION | 3-0-0-3 |

Objectives: Learn to administer a DBMS including creation, management, maintenance, and operation of a database management system.

Course Outcomes

CO1	Knowledge of DBMS, both in terms of use and implementation/design
CO2	Experience with SQL
CO3	Experience with analysis and design of (DB)
CO4	Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit.
CO5	Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.

Introduction: DBMS Architecture and Data Independence - DBA Roles and Responsibilities.
SQL * PLUS Overview: SQL plus Fundamentals, Producing more readable outputs, Accepting Values at Runtime, Using iSQL *Plus.
Modifying Data**:** Using DML, TCL- Managing Constraints -Managing Views. User Access and Security**:** Creating and Modifying User Accounts, Managing User Groups with Profiles.
Oracle Overview and Architecture**:** Overview of Logical and Physical Storage Structures. Managing Oracle Instances.
Control and Redo Log Files: Managing the Control Files. Managing Tables, Indexes and Constraints. Managing Users and Security.
Introduction to Network Administration: Network Design Considerations, Network Responsibilities for the DBA, Network Configuration, Overview of Oracle Net Features, Oracle Net Stack Architecture.
Backup and Recovery Overview: Defining a Backup and Recovery Strategy, Testing- The Backup and Recovery Plan. Introduction to Performance Tuning**:** Brief Overview of Tuning methodology, General Tuning Concepts
TEXT BOOKS/REFERENCES:
1. Craig S. Mullins, "*Database Administration: The Complete Guide to DBA Practices and Procedures*", Second Edition, Addison Wesley, 2012.
2. C.J. Date, "*Introduction to Database Systems*", Eighth Edition, Addison Wesley, 2003.
3. Chip Dawes, Biju Thomas, "*Introduction to Oracle 9i SQL*", BPB, 2002.
4. Bob Bryla, Biju Thomas, "*Oracle 9i DBA Fundamental I*", BPB, 2002.
5. Joseph C. Johnson, "*Oracle 9i Performance Tuning*", BPB, 2002.

EVALUATION PATTERN: R14.1

18CA338 DIGITAL IMAGE PROCESSING   3-0-0-3

Objectives: To study the image fundamentals and mathematical transforms necessary for image processing, image enhancement techniques, image restoration procedures and image compression procedures.

Course Outcomes

CO1	Understanding of the fundamental concepts of a digital image processing system.
CO2	Analyze images in the spatial and frequency domain using various transforms.
CO3	To understand various filters used for image enhancement and smooting
CO4	Evaluate the techniques for image enhancement and image restoration.
CO5	Interpret image segmentation and representation techniques.

Introduction and Fundamentals of Image Processing: Origins of Digital Image Processing – Examples - Fundamental Steps in Digital Image Processing - Elements of Visual Perception - A Simple Image Formation Model - Basic Concepts in Sampling and Quantization- Representing Digital Images- Zooming and Shrinking Digital Images - Some Basic Relationships between Pixels - Linear and Nonlinear Operations - Connectivity and Relations between Pixels.
Simple Operations- Arithmetic, Logical, Geometric Operations. Image Enhancement in the Spatial Domain and Frequency Domain: Some Basic Gray Level Transformations - Histogram Processing – Basics of Spatial Filtering - Smoothing Filters-Mean, Median, Mode Filters - Edge Enhancement Filters – Sobel, Laplacian, Robert, Prewitt filter, Contrast Based Edge Enhancement Techniques.
Design of Low Pass Filters - High Pass Filters- Edge Enhancement - Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters in Frequency Domain. Comparative Study of Filters in Frequency Domain and Spatial Domain.
Image Restoration - Segmentation and Morphology: A Model of the Image Degradation/Restoration Process - Noise Models - Restoration in the Presence Of Noise Only – Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering.
Edge Detection - Line Detection - Curve Detection - Edge Linking and Boundary Extraction - Thresholding Algorithms- Region Based Segmentation - Region Growing - Connected
26
Components Labeling - Region Growing and Region Adjacency Graph (RAG), Split and Merge Algorithms - Morphology - Dilation, Erosion, Opening and Closing.
TEXTBOOKS/ REFERENCES:
1. Rafael C. Gonzalez and Richard E. Woods,”*Digital Image Processing*”,Third Edition, Addison Wesley, 2007.
2. Arthur R.Weeks, Jr., “*Fundamentals of Electronic Image Processing*”,First Edition, PHI,1996.

3. Milan Sonka, Vaclav Hlavac and Roger Boyle,"*Image processing, Analysis, and Machine Vision*",ThirdEdition,Vikas Publishing House, 2007.
EVALUATION PATTERN: R14.1

18CA333   **BUSINESS INTELLIGENCE**   **3-0-0-3**

Objectives: to provide an in-depth knowledge of Business Intelligence (BI) principles and techniques by introducing the relationship between managerial and technological perspectives. This course is also designed to expose students to the frontiers of BI-intensive BIG data computing and information systems, while providing a sufficiently strong foundation to encourage further research.

Course Outcomes

CO1	Define the basic concepts of Business Intelligence and Data Warehouses
CO2	Employ the basic ETL procedures for data integration
CO3	Learn the operation of basic OLAP technologies
CO4	Employ basic BI tools
CO5	Understanding Bussiness metrics and KPIs

Introduction to Business Intelligence: Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, 3-tier data warehouse architecture, Data Marts
Data integration: Basics of Data Integration (Extraction Transformation Loading)- Concepts of data integration need and advantages of using data integration. Introduction to common data integration approaches, Introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications.
Introduction to Multi-Dimensional Data Modeling-Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi-dimensional modeling, OLAP operations, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, OLAP Servers – MOLAP, ROLAP, OLAP query model and query processing, indexing OLAP Data, Data Warehouse Implementation
Introduction to business metrics and KPIs, creating cubes using SSAS. Basics of Enterprise Reporting- Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, introduction to SSRS Architecture, enterprise reporting using SSRS.
TEXT BOOKS/ REFERENCES:
1. Loshin D, "Business Intelligence", First Edition, Elsevier Science (USA), 2003.
2. Jiawei Han, Micheline Kamber and Jian Pei, "Data mining concepts and Techniques",

Third Edition, Elsevier Publisher, 2006.

3. Biere M, " Business intelligence for the enterprise" , Second Edition, IBM Press, 2003.

4. Moss L T, Atre S, "Business intelligence roadmap", First Edition, Addison-Wesley Longman Publishing Co., Inc. , 2003.

EVALUATION PATTERN: R14.1

18CA434   NETWORK MANAGEMENT AND SYSTEM ADMINISTRATION   **3-0-0-3**

Objectives: To teach the principles, theory and practice of system management, including network and system design, analysis, efficiency and security. The programme places emphasis on practical skills based on Unix, Windows. Courses include general system administration, core networking with extensive lab work, routing, security analysis and implementation,

Course Outcomes

CO1	Understand the components of PC and basic networking
CO2	Able to provide security to a small network using Authentication and authurization protocols
CO3	Learn to manage and configure different roles in Windows Server
CO4	Able to configure and use Linux system efficiently
CO5	Students will be able to configure and manage network in windows and Linux

Basic Hardware**:** Network Fundamentals: Local Area Networking - Defining Networks with the OSI Model - Wired and Wireless Networks - Internet Protocol - Implementing TCP/IP in the Command Line- Working with Networking Services - Understanding Wide Area Networks - Defining Network Infrastructures and Network Security.
27
Security Fundamentals**:** Security Layers – Authentication – Authorization - Accounting - Security Policies - Network Security - Server and Client Protection.
Windows Server Fundamentals**:** Server Overview - Managing Windows Server 2008 R2 - Managing Storage - Monitoring and Troubleshooting Servers - Essential Services - File and Print Services - Popular Windows Network Services and Applications.
Linux Fundamentals**:** System Architecture-Determine and Configure Hardware Settings-Boot the System - Change Run Levels and Shut Down or Reboot System **-**Linux Installation and Package Management - File Systems**-** Create Partitions and File systems - Maintain the Integrity of File Systems - Control Mounting and Unmounting of File Systems.
Manage Disk Quotas - File Permissions and Ownership - Create and Change Hard and Symbolic Links. Network Management Lab: Windows Network Configurations and Linux Network Configurations.
TEXT BOOKS / REFERENCES:
1. 98-366*: "Networking Fundamentals, Microsoft Official Academic Course* (Microsoft

Corporation)", Wiley, 2011.
2. 98-367: "*MTA Security Fundamentals, Microsoft Official Academic Course*(Microsoft Corporation)", Wiley, 2011.
3. 98-365: "*Windows Server Administration Fundamentals, Microsoft Official Academic Course* (Microsoft Corporation)", Wiley, 2011.
4. Adam Header, Stephen Addison Schneiter, James Stanger and Bruno Gomes Pessanha, LPI "*Linux certification in Nut shell*", Third edition, O'Reilly, 2010.
EVALUATION PATTERN: R14.1

18CA331   **BIG DATA ANALYTICS AND VISUALIZATION**   **3-0-0-3**

Objectives: The basics of Analytics – Concepts , Data preparation – merging, managing missing numbers sampling , Data visualisation, Basic statistics, basics of Hadoop , Mapreduce are given.
Course Outcomes

CO1	Understand the concepts, characteristics and features of big data.
CO2	Student will be able to choose an efficient data model for big data applications
CO3	Use appropriate models of analysis, assess the quality of input, derive insight from results, and investigate potential issues.
CO4	Design visualisations that represent the relationships contained in complex data sets and adapt them to highlight the ideas you want to communicate
CO5	Learn to use big data procesisng frameworks like Hadoop and Apache Mahout

Introduction of big data – Big data characteristics - Volume, Veracity, Velocity, and Variety – Data Appliance Challenges and Issues, Case for Big data, Big data sources, Features of data. - Evolution of Big data – Best Practices for Big data Analytics - and Integration tools Introduction to Data Modeling, Data Models Used in Practice: Conceptual data models, Logical data models, Physical data models, Common Data Modeling Notations , How to Model Data : Identify entity types, Identify attributes, Apply naming conventions, Identify relationships, Apply data model patterns, Assign keys, Normalize to reduce data redundancy, Introduction to elementary data analysis: Measures of center: Mean, Median, Mode, Variance, Standard deviation, Range. Normal Distribution: Center, Spread, Skewed Left, Skewed Right, outlier. Correlations: Correlation Patterns: Direction relationship, Magnitude Relationship. Introduction to Bayesian Modeling: Bayes Rule, Probabilistic Modeling Introduction to Predictive Analytics: Simple Linear regression, Multiple Linear regression, Logistic Linear Regression. History of Visualization, Goals of Visualization, Types of Data Visualization: Scientific Visualization, Information Visualization, Visual Analytics, Impact of visualization
Introduction to Data Processing , Map Reduce Framework , Hadoop ,HDFS , S3 Hadoop Distributed file systems, Apache Mahout, Hive,Sharding, Hbase , Impala , Case studies : Analyzing big data with twitter ,Big data for Ecommerce , Big data for blogs.
TEXT BOOKS/ REFERENCES:

1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Businessm.Series, 2012.
28
2. The Data Modeling Handbook: A Best-Practice Approach to Building Quality Data Models 1st Edition by Michael C. Reingruber (Author), William W. Gregory (Author) A Wiley QED publications
3. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis",Elsevier, 2007
4. Correlation and Regression: Applications for Industrial Organizational Psychology and Management (Organizational Research Methods) 1st Edition, by Philip Bobko (Author)
   4. Multiple Regression and Beyond 1st Edition by Timothy Z. Keith (Author)
EVALUATION PATTERN: R14.1

18CA433 MODERN WEB APPLICATION DEVELOPMENT USING MEANSTACK   3-0-0-3

Objectives: The MEAN stack leverages the power of Mongo, Express, Angular and Node (MEAN) to build interactive, testable and scalable web and mobile applications. Each of these technologies is enormously powerful on its own and together they form a very powerful stack. The course teaches developers to use all parts of the MEAN stack together to create functional full-stack applications.

Course Outcomes

CO1	Learn to develop a web site with dynamic pages using HTML, CSS, java script and JSON
CO2	Understnding the concepts of NodeJS
CO3	Student will be able to implement REST services in developing dynamic web site
CO4	Installing and use MongoDB and communicating with Node JS
CO5	Learn to develop single page applications with Angular JS

1. Basics of HTML, CSS, and Javascript
HTML, CSS, Bootstrap, Javascript basics – Variables, functions, and scopes, Logic flow and loops, Events and Document object model, Handling JSON data, Understanding Json callbacks.
2. Introduction to Node JS
Installation, Callbacks, Installing dependencies with npm, Concurrency and event loop fundamentals, Node JS callbacks, Building HTTP server, Importing and exporting modules, Building chat application using web socket.
3. Building REST services using Node JS
REST services, Installing Express JS, Express Node project structure, Building REST services with Express framework, Routes, filters, template engines - Jade, ejs.
4. MongoDB Basics and Communication with Node JS
Installation, CRUD operations, Sorting, Projection, Aggregation framework, MongoDB

indexes, Connecting to MongoDB with Node JS, Introduction to Mongoose, Connecting to MongoDB using mongoose, Defining mongoose schemas, CRUD operations using mongoose.

5. Building Single Page Applications with AngularJS

Single Page Application – Introduction, Two-way data binding(Dependency Injection), MVC in Angular JS, Controllers, Getting user input, Loops, Client side routing – Accessing URL data, Various ways to provide data in Angular JS – Services and Factories, Working with filters, Directives and Cookies, The digest loop and use of $apply.

EVALUATION PATTERN: R14.1

**18CA432   INTRODUCTION TO INTELLIGENT SYSTEMS AND MACHINE
            LEARNING   3 0 0 3**

Objectives: Provides students to state-of-the-art methods and modern programming tools for data analysis. Introduces students to the field of Artificial Intelligence (AI) with emphasis on its use to solve real world problems for which solutions are difficult to express using the traditional algorithmic approach.

Course Outcomes

CO1	Gives an overview of AI and production systems
CO2	Student will be able to choose efficient searching algorithms required by the applications
CO3	Understand various knowledge representation methods
CO4	Able to perform knowledge reasoning using different methods
CO5	Study machine learning techniques

Introduction to AI and Production Systems: Introduction to AI-Problem formulation, Problem Definition - Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing - Depth first and Breath first, Constraints satisfaction - related algorithms, Measure of performance and analysis of search algorithms.

Representation of Knowledge: Game playing- The min-max search procedure, adding alpha-beta cutoffs - Knowledge representation, Knowledge representation using Predicate logic -Production based system, Frame based system. Knowledge Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

Introduction to Machine Learning - Types of machine learning, Supervised learning, unsupervised learning, basic concepts of machine learning, Review of probability, Computational learning theory. Dimensionality reduction using principal component analysis,

Generative models of discrete data- Classifying documents using bag of words, Linear regression, Logistic regression, classification using Neural networks.

Text / Reference Books:
1. Elaine Rich, Kevin Knight, Artificial Intelligence, 2nd edition- (Tata McGraw-Hill)
2. Donald A. Waterman, A Guide to expert systems- (Addison-Wesley).
3. Kevin P. Murphey, "Machine learning, a probabilistic perspective", The MIT Press Cambridge, Massachusetts, 2012.
4. Alex Smola and SVN. Viswanathan, "Introduction to machine learning", Cambridge university press, 2008.
    EVALUATION PATTERN: R14.1

18HU433   PRINCIPLES OF ECONOMICS AND MANAGEMENT 3-0-0-3

Objectives: Provides an introduction to a broad range of economic concepts, theories and analytical techniques. The use of a market, supply and demand, model will be the fundamental model in which trade-offs and choices will be considered through comparison of costs and benefits of actions.

Course Outcomes

CO1	This course provides an introduction to a broad range of economic concepts, theories and analytical techniques.
CO2	It considers both microeconomics - the analysis of choices made by individual decision-making units (households and firms) - and macroeconomics - the analysis of the economy as a whole.
CO3	The use of a market, supply and demand, model will be the fundamental model in which trade-offs and choices will be considered through comparison of costs and benefits of actions.
CO4	Observe and evaluate the influence of historical forces on the current practice of management.

Introduction to Management**:** Managers and Management - History Module - The Historical Roots of Contemporary Management Practices, The Management Environment. Planning: Foundations of Planning - Foundations of Decision Making - Quantitative Module Quantitative Decision-Making Aids. Organizing: Basic Organization Designs - Staffing and Human Resource Management - Career Module Building Your Career - Managing Change, Stress, and Innovation .Leading-
Foundations of Individual and Group Behavior - Understanding Work Teams - Motivating and Rewarding Employees - Leadership and Trust - Communication and Interpersonal Skills. Introduction to Economics**:** The Firm and Its Goals - Review of Mathematical Concepts used in Managerial Economics, Supply and Demand - The Mathematics of Supply and Demand, Demand Elasticity - Applications of Supply and Demand, Demand Estimation and Forecasting, The Theory and Estimation of Production - The Multiple-Input Case -

Expressing the Production Function with the Use of Calculus, The Theory and Estimation of Cost - A Mathematical Restatement of the Short-Run Cost Function - The Estimation of Cost. 29

Pricing and Output Decisions: Perfect Competition and Monopoly - The Use of Calculus in Pricing and Output Decisions - Break-Even Analysis (Volume-Cost-Profit), Monopolistic Competition and Oligopoly - Special Pricing Practices.

TEXTBOOKS/REFERENCES:

1. Stephen P, Robbins David A. De Cenzo**, "***Fundamentals of Management***"**, Prentice Hall, Sixth Edition, 2008.

2. Philip K. Y. Young, Steve Erfle and Paul G. Keat, "*Managerial Economics: Economic Tools for Today's Decision Makers*", Pearson, Seventh Edition, 2013.

EVALUATION PATTERN: R14.1

18HU434   SOFTWARE PROJECT MANAGEMENT   3-0-0-3

Objectives: Provides concepts of initiation, planning, execution, regulation and closure as well as the guidance of the project team's operations towards achieving all the agreed upon goals within the set scope, time, quality and budget standards.

Course Outcomes

CO1	Getting Basic Ideas about different types of software projects, and know about program evaluation & Project Management
CO2	Be familiar with step by step project planning, cost benefit analyis and risk evaluation techniques.
CO3	Making out differnt software effor stimation techniques takling function point analysis & COCOMO models as examples
CO4	Scheduling the projects with activity plaaning using PERT & CPM
CO5	Monitorig & Controlling the projetcs, ensure the software qulaity.

Introduction to Software Project Management: Software Projects-Other Types of Projects - Problems with Software Projects. Project Evaluation and Programme Management: Evaluation of Individual Projects – Cost Benefit Evaluation Techniques – Risk Evaluation. Step Wise: An Overview of Project Planning. Selection of an Appropriate Project Approach: Build or Buy? - Waterfall Model – Spiral Model – Prototyping – Incremental Delivery – RAD – Agile Methods – XP - Scrum.
Software Effort Estimation**:** Bottom up Estimating – Top down Estimating – FP Analysis – COCOMO II – Cost Estimation**.** Activity Planning**:** Project Schedules - Sequencing and Scheduling Projects - Network Planning Models – AOA – AON - CPM - Shortening Project Duration – Crashing - Identifying Critical Activities.
Risk Management: A Framework for Dealing with Risk – Risk Management – PERT.
Resource Allocation**:** Identifying Resource Requirements – Scheduling Resources –

Publishing Resource Schedule – Cost Schedule.

Monitoring and Control: Visualizing Progress - Earned Value Analysis. Managing People in SW Environments: Organizational Behavior – Motivation. Working in Teams: Organizing Teams.

Software Quality Management: Defining Software Quality – Metrics – Process Capability Models – Software Reliability.CaseStudy: PMBOK - MS Project.

TEXTBOOK / REFERENCES:

1. Mike Cotterell and Bob Hughes, "*Software Project Management*", Fifth Edition, Tata McGraw-Hill, 2010.
2. Roger S. Pressman, "*Software Engineering a Practitioner's Approach*", Seventh Edition, Tata McGraw-Hill, 2010.
3.Jalote P, "*Software Project Management in Practice"*, Addison Wesley, 2002.

EVALUATION PATTERN: R14.1

LAB COURSES

18CA383   DATA STRUCTURES AND ALGORITHMS LAB-II   0-0-3-1

Objectives: The **course** is designed to develop skills to design and analyse simple linear and non-linear **data structures**. It strengthen the ability to the students to identify and apply the suitable **data structure** for the given real world problem.

Course Outcomes

CO1	Learn to Implement the link list and its applications
CO2	Able to apply data structures stack and queues to solve real world problems
CO3	Learn to implement binary tree, heap using arrays and heap sort algorithm
CO4	Learn to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures
CO5	Understand BFS and DFS and its implementation

Posteriori analysis of iterative and recursive algorithms, plotting of growth rate.
Implementation of singly linked list, doubly linked list, circular linked list. Stack and Queue implementation using array and SLL, comparison of efficiencies, Applications of Stack and Queue –Infix to postfix, postfix expression evaluation, Implementation of Polynomial ADT using SLL.
Binary search tree implementation. Heap implementation using array, Heap sort, Implementation of sorting algorithms – Bubble sort, Insertion Sort, Selection Sort, Quick
30
Sort- Merge Sort, performance comparison of sorting algorithms for various classes of inputs like nearly sorted, unsorted etc.
O(V2) and O(E log V) implementations of Dijkstra algorithm, BFS and DFS implementation,

122

graph cycle detection using BFS. Topological sort using DFS, Prims and Kruskals MST. Dynamic Programming based solution for 0-1 Knapsack problem, Recursive matrix chain multiplication.

EVALUATION PATTERN: R14.2

18CA384   JAVA PROGRAMMING-II   0-0-3-1

Objectives: To build software development skills using java programming for real world applications. Also to implement frontend and backend of an application using concepts of java.

Course Outcomes

CO1	Develop Swing-based GUI
CO2	Develop client/server applications and TCP/IP socket programming
CO3	Update and retrieve the data from the databases using SQL
CO4	Develop distributed applications using RMI
CO5	Develop component-based Java software using JavaBeans Develop server side programs in the form of servlets

Overview of the Language: Compiling and Interpreting Java Applications. JDK Objects and Classes: Defining Class- Creating Object– Constructors- Access Modifiers - Encapsulation. Input / Output Streams: Overview of Streams - Bytes vs. Characters - File Object- Binary Input and Output - Reading and Writing Objects. Inheritance in Java: Casting - Method Overriding - Polymorphism - Super - Interfaces and Abstract Classes. Packages: The Import Statement - Static Imports. Package Scope Multithreading**:** Introduction to Threads - Creating Threads - Thread States - Runnable Threads - Coordinating Threads - Interrupting Threads. Runnable Interface Applets: Applet Architecture- Parameters to Applet - Embedding Applets in Web page. Designing Graphical User Interfaces in Java: Components and Containers - Layout Managers - AWT Components- Adding a Menu to Window- Extending GUI Features using Swing Components.

TEXT BOOKS/ REFERENCES:
1. Naughton P. and Schildt H., "*Java: The Complete Reference*", 9th Edition, Oracle Press, 2014.
2. Eckel.B, "*Thinking in Java", Fourth Edition,* Prentice Hall, 2006.
3. Arnold, Gosling and Holmes, "*The Java Programming Language*", Fourth Edition, Addison-Wesley, 2005.
EVALUATION PATTERN: R14.2

18CA385   GUI PROGRAMMING USING VB.NET   0-0-3-1

Objectives: VB.NET programming course provides an introduction to programming using the VB.NET language. Students are introduced to the application development cycle, structure of

programs, and specific language syntax.

Course Outcomes

CO1	To make the students to use Visual Basic.Net to build Windows applications using structured and object-based programming techniques.
CO2	Students will be able to design/develop programs with GUI interfaces
CO3	Assemble multiple forms, modules, and menus into working VB.NET solutions
CO4	Build integrated VB.NET solutions using files and structures with printing capabilities
CO5	Translate general requirements into data-related solutions using database concepts

Introduction to .NET, .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. The environment: Editor tab, format tab, general tab, docking tab. visual development & event drive Programming -Methods and events.
The VB.NET Language- Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Collections, Subroutines, Functions, Passing variable Number of Argument Optional Argument, Returning value from function.
Control flow statements: conditional statement, loop statement. Msgbox&Inputbox. Working with Forms : Loading, showing and hiding forms, GUI Programming with Windows Form: Common Controls, scroll bar, Timer, ListView, TreeView, toolbar, StatusBar. Properties, Methods and events. OpenFileDilog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog. Link Label. Designing menu. Object oriented Programming: Classes & objects, fields Properties, Methods & Events, constructor, inheritance. Access Specifiers: Public Private, Projected
Database programming with ADO.NET – Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid.
31
TEXT BOOKS/ REFERENCES:
1. Vb.net programming black book by Steven Holzner –Dreamtech publications
2. Mastering vb.net by EvangelosPetroutsos- bpb publications Introduction to .net framework-Worx publication
EVALUATION PATTERN: R14.2

18CA386   ANDROID APPLICATION DEVELOPMENT   0-0-3-1

Objectives: Android Application Development course is designed to quickly get you up to

speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle.

Course Outcomes

CO1	**Students will be able to design/develop programs with GUI interfaces , Menus and Dialogue boxes**
CO2	**Able to develop SQLite - CRUD applications**
CO3	**Learn to develop Location Based mobile apps with API**
CO4	**Experiment with multimedia mobile applications**

Menu, Dialog, List and Adapters
What is Menu?-Custom Vs. System Menus-Creating and Using Handset menu Button (Hardware)-What are Android Themes. What is Dialog? How to create an Alter Dialog?
List & Adapters
Database SQLite
IntroducingSQLite-SQLiteOpenHelper and creating a database-Opening and closing a database
Working with cursors Inserts, updates and deletes
Location Based Services and Google Maps
Using Location Based Services -Working with Google Maps
Multimedia Programming using Android
Multimedia audio formats-Creating and Playing -Multimedia audio formats-Kill / Releasing (Memory Management)-How to associate audio in any application-How to associate video playback with an event
WebView
How to develop your own custom made Web browser -How to use WebView object in XML
Permission for using the Internet-Methods for associated with 'Go', 'Back', 'Forward' etc
TEXT BOOKS/ REFERENCES:
1. Head first Android Development

EVALUATION PATTERN: R14.2

18CA387   WEB DEVELOPMENT USING ASP.NET   0-0-3-1

Objectives: The ASP.NET training course teaches the students how to create a simple Active Server Page ASP.NET application that delivers dynamic content to the Web. It covers Web Forms and handling events, Web Controls and input validation, using the new web application architecture and Web Services, and debugging in the new integrated development environment.

Course Outcomes

CO1	Understand the role and working of web server and web browser
CO2	Permission for using the Internet-Methods for associated with 'Go', 'Back', 'Forward' etc
CO3	Familiarize with the concepts of ASP.Net Life Cycle, Validation, State Management and Cookies in detail.
CO4	Detail on Http Applications, Web configuration and Global.asax is provided with.
CO5	Students become proficient about Controls along with publishing web application.

Understanding role of Web Server and Web Browser - Form Tag and comparison between Get and Post methods - Understanding HTML Form Tag and elements within it –
ASP.NET Introduction - First ASP.NET Application - Auto Postback Property - Event Handler Parameters - Comparison between HtmlControls and WebControls - ASP.NET Architecture
Life Cycle of ASP.NET Page - Master Pages - Validation Controls - ASP.NET State Management - Cookies-HttpCookie - Sessions-HttpSessionState
Application-HttpApplicationState -WebConfiguration File and Global.asax - Data Bound Controls - Publishing Web Application
Creating web application in IIS - Using Virtual Directory - Publishing ASP.NET Website.

EVALUATION PATTERN: R14.2

18CA389DATABASE MANAGEMENT SYSTEMS LAB -II   0-0-3-1

Objectives: Imparting the knowledge about the database and SQL concepts to design databases for various applications.

Course Outcomes

CO1	Understand and implement DDL commands, setting up constraints etc
CO2	Understand the creatation of index, views, synonyms and sequences
CO3	Implement DML, DCL and TCL commands, joins and subqueries

CO4	Implement PL/SQL basic programs
CO5	Implement PL/SQL procedures, functions and triggers

Table Design- Data Definition Language (DDL) commands - Table creation and alter(include integrity constraints such as primary key, referential integrity constraints, check, unique and null constraints both column and table level, Drop - Other database objects such as view, index, cluster, sequence, synonym etc. - Practice SQL Data Manipulation Language (DML) commands - Row insertion, deletion and updating - Retrieval of data - Simple select query - Select with where options (include all relational and logical operators) - Functions: Numeric, Data, Character, Conversion and Group functions with having clause - Set operators - Sorting data - Sub query (returning single row, multiple rows, more than one column, correlated sub query) - Joining tables(single join, self-join, outer join) - Data manipulations using date functions - User defined functions in a query- Transaction Control Language (TCL) commands (Grant, revoke, commit and save point options) - Usage of triggers, functions and procedures using PL/SQL constructs.
EVALUATION PATTERN: R14.2

18CA388   OPERATING SYSTEMS LAB   0 0 3 1

Objectives: To familiarize students with the architecture of Unix OS and implementation of various algorithms in Operating Systems. Provides necessary skills for developing and debugging programs in UNIX environment.

Course outcomes

CO1	Experiment with basic Linux commands and shell programming.
CO2	Build programs for process and file systems management using system calls.
CO3	Choose the best CPU scheduling algorithm for a given problem instance.
CO4	Implementation of banker's algorithm for a given problem instance.
CO5	Identify the performance of various page replacement algorithms.

Basic Linux commands – System calls – fork, exec, getpid, exit, wait, close, stat, open, read, write etc- IPC – pipes, Signals, Message Queues, Shared memory – Threads – Proceess synchronisation using semaphore, monitor – implementation of scheduling algorithms – FCFS, SJF, Priority – implementation of banker's algorithm – implementation of page replacement algorithms.

 EVALUATION PATTERN: R14.2

18CA481   WEB AND XML PROGRAMMING USING JAVA AND J2EE 0 0 3 1

Objectives: The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Outcomes

CO1	Develop Server side applications using Servlets and JSP
CO2	Develop component-based Java software using EJB
CO3	Be able to write the schema for the given XML documents in both DTD and XML Schema languages
CO4	Be able to parse XML documents by using DOM and SAX
CO5	Develop programs using Hibernate and Spring

Web server and Application Server - Client vs server-side programming – Servlets.
Session tracking - JSP –scriptlets, declarations, expressions and declaratives – JSP
Tag Libraries – EnterpriseJava Beans –Session Bean – Entity Bean – Message Driven Bean
XML Programming - DTDs & Schemas - XML parsers – DOM parsers - SAX parsers –Writing
XML with Java   Introduction to Frameworks – Hibernate – Spring

EVALUATION PATTERN: R14.2

18CA482   ANGULAR AND NODE JS LAB   0 0 3 1

Objectives: Angular JS is widely popular for creating dynamic apps and its data binding and dependency injection features significantly reduce the amount of code that needs to be written. This course is designed to provide concepts of Angular JA and NodeJS to develop web, desktop and mobile applications.

Course Outcomes

CO1	Create single page web applications using the MVC pattern of Angular
CO2	to set up a Node.js project using npm
CO3	to use Express to set up a web server
CO4	Understand how write and organize Angular code
CO5	Program Angular View Components and Services

Angular JS

1. AngularJS Expressions
2. AngularJS Modules
3. AngularJS Tables
4. AngularJS HTML DOM

Node JS

5. Node JS introduction
6. My first JS program, Initiate the Node.js File
7. Modules -Include Modules, creating Modules.
8. HTTP modules-Add an HTTP Header
9. Read the Query String and Split the Query String
10. Node JS as web server
11. Node JS as File server.
12. Read File, Create Files, Update Files, Rename Files
13. js URL Module
14. js NPM. Using a Package
15. js MySQL Create Database
16. js MySQL Create Table
17. js MySQL CRUD operations.

EVALUATION PATTERN: R14.2

18CA483   NETWORK AND GRID SIMULATION LAB   0 0 3 1.

Objectives: To impart knowledge about various network simulation tools to design and understand the working of different protocols and network models.

Course Outcomes

CO1	Learn to simulate network concepts using NS3
CO2	Demostrate the working of TCP and UDP
CO3	Able to set up a small LAN and WLAN
CO4	simulate the Cloud computing concets using SimGrid
CO5	Have an idea of load balancing in cloud

1.   Introduction to NS3
2.   Simulation of a simple wired network topology and working with netanim
3.   Working with UDP and TCP Sockets
4.   Simulation of a wireless network topology
5.   Simulation of a heterogeneous topology
6.   Working with routing protocols
7.   Debugging using gdb tool
8.   Introduction and installing SimGrid tool
9.   Formation of cluster environment
10. SimGrid as a Grid Simulator
11. SimGrid as a P2P Simulator
12. SimGrid as a Cloud Simulator
13. A simple demonstration on scheduling and load balancing using SimGrid.

EVALUATION PATTERN: R14.2

18CA484 BIO - INFORMATICS LAB   0 0 3 1

Objectives: To provide students with a practical and hands-on experience with common bioinformatics tools and databases.

Course Outcomes

CO1	To provide students with a practical and hands-on experience with common bioinformatics tools and databases. Students will be trained in the basic theory and application of programs used for database searching, protein and DNA sequence analysis, prediction of protein function, and building phylogenetic trees..

CO2	Through practical exercises, the course aims to give students a basic competences in the use of bioinformatical tools. The course emphasizes the the learning of bioinformatical tools in light of the student's knowledge of molecular biology..
CO3	Communicate about essential and modern biology and how it relates to Informatics
CO4	Describe basic biotechnology in the context of its underlying theoretical basis with an emphasis on the technologies routinely used in modern biological sciences.
CO5	Implement a suite of core bioinformatics services and describe their application.

1. Biological Databases with Reference to Expasy and NCBI
2. Queries based on Biological databases
3. Sequence databases and string matching
4. Sequence similarity searching using BLAST
5. RNA secondary structure
6. Sequence Alignment
7. Choosing the best-fit substitution model
8. Phylogenetics - the least-squares method.

EVALUATION PATTERN: R14.2

18CA485   COMPUTER ORGANIZATION AND ARCHITECTURE LAB

0 0 3 1

Objectives: Provides an understanding of the hardware organization of a PC by assembling/disassembling, Digital logic circuits and installation of operating systems.
Course Outcomes

CO1	Learn to assemble a PC
CO2	Learn assembly language programming.
CO3	Understand the representation of data, addressing modes, instructions sets.
CO4	Learn the basic knowledge of the design of digital logic circuits and apply to computer organization.

Basic Organization and Hardware Components of a Personal computer-Assembling of Personal Computer: Formatting- Partitioning the Hard Disk-Installation of Windows and Linux Operating System- Digital Circuits: Realisation of Logic Gates- Realization of logic functions with the help of universal gates-NAND Gate- Half/Full Adder & Half/Full Subtractor - Code Conversion.
EVALUATION PATTERN: R14.2