Program

Integrated Master of Computer Applications

(Revised with effect from 2018-2019 AY onwards)

Faculty of Sciences

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<td>Program Outcomes</td>
<td></td>
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<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td><strong>P01</strong> Computational Knowledge -</td>
<td>Acquire knowledge of Computing Fundamentals, Basic Mathematics, Computing Specialization, and Domain Knowledge of proper computing models from defined problems.</td>
</tr>
<tr>
<td><strong>P02</strong> Problem Analysis -</td>
<td>Identify, invent, research activities to provide solutions for complex computing problems using fundamental concepts of Mathematics, Computing Science and Relevant Domains.</td>
</tr>
<tr>
<td><strong>P03</strong> Design and Development -</td>
<td>Design and develop a solution for complex problems in domains like Banking, Insurance, Healthcare Systems and Multimedia and Mass Communications.</td>
</tr>
<tr>
<td><strong>P04</strong> Research Activity -</td>
<td>Apply Research based knowledge and methodologies to design, analyse and interpretation of data and find the solutions for complex problems by applying right tools.</td>
</tr>
<tr>
<td><strong>P05</strong> Continuous learning -</td>
<td>Confidence for self and continuous learning to improve knowledge and competence as a computing professional.</td>
</tr>
<tr>
<td><strong>P06</strong> Modern tool usage -</td>
<td>Adapt and apply modern computing tools to analyse and resolve problems.</td>
</tr>
<tr>
<td><strong>P07</strong> Professional ethics -</td>
<td>Understand professional ethics and Cyber regulations and develop the youth with social commitments.</td>
</tr>
<tr>
<td><strong>P08</strong> Personality development -</td>
<td>Understand Management Principles and apply these to develop software as a team member and manage projects efficiently for multidisciplinary environments.</td>
</tr>
<tr>
<td><strong>P09</strong> Communication Efficacy -</td>
<td>Communicate effectively with computing society in both verbal and written form</td>
</tr>
<tr>
<td><strong>P010</strong> Social Responsibility -</td>
<td>Find and access Social and Environmental issues for local and global needs and give relevant solutions for them.</td>
</tr>
<tr>
<td><strong>P011</strong> Creativity and Entrepreneurship -</td>
<td>Find out right opportunity for entrepreneurship and create and add value for the betterment of an individual and society at large.</td>
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</table>
Program Specific Outcomes

| PSO1 | Understanding the concepts and applications 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:

<table>
<thead>
<tr>
<th>Assignment/Quiz/Viva-voce</th>
<th>Periodical Test</th>
<th>Total CA (Max.Marks)</th>
<th>End-Semester Examination (Max.Marks)</th>
<th>Grand Total (Max.Marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I I II</td>
<td>I II</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

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
day-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
day-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:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Grade Points</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10.00</td>
<td>Outstanding</td>
</tr>
<tr>
<td>A+</td>
<td>9.50</td>
<td>Excellent</td>
</tr>
<tr>
<td>A</td>
<td>9.00</td>
<td>Very Good</td>
</tr>
<tr>
<td>B+</td>
<td>8.00</td>
<td>Good</td>
</tr>
<tr>
<td>B</td>
<td>7.00</td>
<td>Above Average</td>
</tr>
<tr>
<td>C</td>
<td>6.00</td>
<td>Average</td>
</tr>
<tr>
<td>P</td>
<td>5.00</td>
<td>Pass</td>
</tr>
<tr>
<td>F</td>
<td>0.00</td>
<td>Fail</td>
</tr>
<tr>
<td>FA</td>
<td>0.00</td>
<td>Failed due to insufficient attendance</td>
</tr>
<tr>
<td>I</td>
<td>0.00</td>
<td>Incomplete (awarded only for Lab. courses/ Project / Seminar)</td>
</tr>
<tr>
<td>W</td>
<td>Withheld</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
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</tbody>
</table>

**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.

\[
SGPA = \frac{\sum_{i} C_i G_p_i}{\sum_{i} C_i}
\]

where \( C_i \) is the credit for \( i \)th course in that semester and \( G_p_i \) 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.

\[
CGPA = \frac{\sum_{i} C_i G_p_i}{\sum_{i} C_i}
\]

where \( C_i \) is the credit for \( i \)th course in any semester and \( G_p_i \) 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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Cr</th>
<th>ES</th>
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<td>18CUL101</td>
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<td>18ENG101</td>
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<td>3</td>
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<td>18MAT102</td>
<td>Mathematical Foundation</td>
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<td>18ENV300</td>
<td>Environmental Science and Sustainability</td>
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<td>18CSA103</td>
<td>Computer Essentials</td>
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<td>18CSA101</td>
<td>Computational Thinking and Problem Solving</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
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<td>18CSA182</td>
<td>Computational Thinking and Problem Solving Lab</td>
<td>0</td>
<td>0</td>
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**SEMESTER 2**

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<td>18CUL111</td>
<td>Cultural Education II</td>
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<td>18ENG121</td>
<td>Professional Communication</td>
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<td></td>
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<td>1</td>
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<td>18CSA114</td>
<td>Database Management System</td>
<td>3</td>
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<td>Computer Organization</td>
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<td>18CSA183</td>
<td>Database Management System Lab-I</td>
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<td>0</td>
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<td>Programming in C Lab</td>
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**SEMESTER 3**

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<td>18AVP201</td>
<td>Amrita Value Programme I</td>
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<tr>
<td>18SSK201</td>
<td>Life Skills I</td>
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<td>18MAT208</td>
<td>Statistical and Numerical Methods</td>
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<td>18CSA209</td>
<td>Data Structures and Algorithms</td>
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<td>18CSA206</td>
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<td>18CSA283</td>
<td>Data Structures and Algorithms Lab-I</td>
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**SEMESTER 4**

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<td>18CSA211</td>
<td>Software Engineering</td>
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<td></td>
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**SEMESTER 5**

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<td>Life skills III</td>
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**SEMESTER 6**

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<td>18CSA319</td>
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<td>18CSA390</td>
<td>Live in Labs / Open Elective B</td>
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**SEMESTER 7**

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<td>Design and Analysis of Algorithms</td>
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<td>Advanced Software Engineering</td>
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**SEMESTER 8**

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<td>Elective - III</td>
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**SEMESTER 9**

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**SEMESTER 10**

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**LANGUAGES**

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<td>18HIN101</td>
<td>Hindi I</td>
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<td>18KAN101</td>
<td>Kannada I</td>
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<td>18MAL101</td>
<td>Malayalam I</td>
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<td>18SAN101</td>
<td>Sanskrit I</td>
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<td>18TAM101</td>
<td>Tamil I</td>
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**Elective A, B**

**Elective I, II, III**
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<td>18CSA331</td>
<td>Artificial Intelligence</td>
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<td>Big Data Analytics and Visualization</td>
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<td>18CSA332</td>
<td>Architecture and Deployment of Secure and Scalable WAN</td>
<td>3</td>
<td>E</td>
<td>18CA332</td>
<td>Bioinformatics</td>
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<td>18CSA333</td>
<td>Client Server Computing</td>
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<td>E</td>
<td>18CA333</td>
<td>Business Intelligence</td>
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<td>18CSA337</td>
<td>LAN Switching and Advanced Routing</td>
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<td>18CA337</td>
<td>Deep Learning for Natural Language Processing</td>
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<td>18CA338</td>
<td>Digital Image Processing</td>
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<td>18CSA339</td>
<td>Multimedia and Graphics</td>
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<td>Distributed Computing</td>
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<td>18CSA341</td>
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<td>18CSA342</td>
<td>Systems and Network Administration</td>
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<td>18CA432</td>
<td>Introduction To Intelligent Systems and Machine Learning</td>
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<td>Modern Web Application Development using Mean Stack</td>
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<td>18CSA346</td>
<td>Open-Source Systems</td>
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<td>E</td>
<td>18CA437</td>
<td>Semantic Web Technologies</td>
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<td>18HU433</td>
<td>Principles of Economics and Management</td>
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<td>E</td>
<td>18CA438</td>
<td>Software Quality Assurance</td>
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<td>18HU434</td>
<td>Software Project Management</td>
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<td>E</td>
<td>18CA439</td>
<td>Structure and Interpretation of Computer Programs</td>
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<td>18CA383</td>
<td>Data Structures and Algorithms Lab-II</td>
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<td>18CA440</td>
<td>Wireless Communications and Networks</td>
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Management Electives (Any One)

Lab
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<tr>
<td>18CA384</td>
<td>Java Programming -II</td>
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<tr>
<td>18CA385</td>
<td>GUI Programming using VB.Net</td>
<td>003</td>
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<tr>
<td>18CA386</td>
<td>Android Application Development</td>
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<tr>
<td>18CA387</td>
<td>Web Development using ASP.NET</td>
<td>003</td>
<td>1</td>
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<tr>
<td>18CA388</td>
<td>Operating Systems Lab</td>
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<td>18CA389</td>
<td>Database Management Systems Lab-II</td>
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<td>18CA481</td>
<td>Web and XML Programming using Java and J2EE</td>
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<td>18CA482</td>
<td>Angular and Node JS Lab</td>
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<td>18CA483</td>
<td>Network and Grid Simulation Lab</td>
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<td>18CA484</td>
<td>Bioinformatics Lab</td>
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<tr>
<td>18CA485</td>
<td>Computer Organization and Architecture Lab</td>
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</table>
COURSE OBJECTIVES, COURSE OUTCOMES, SYLLABUS
SEMESTER I

18CUL101 CULTURAL EDUCATION I 2002

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 spirit 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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Helps the students to imbibe values into their inner spirit and put it into real life practice.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Help the students towards achieving the best through the process of transformation of their inner self</td>
</tr>
<tr>
<td>CO3</td>
<td>Provides the students an insight into the vision of optimistic future.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Students will heighten their awareness of correct usage of English grammar in writing and speaking</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening</td>
</tr>
<tr>
<td>CO3</td>
<td>Students will improve their reading fluency skills through extensive reading</td>
</tr>
</tbody>
</table>

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]
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
5. Online sources

References:
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
<table>
<thead>
<tr>
<th>CO1</th>
<th>Study and solve problems related to connectives, predicates and quantifiers under different situations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Develop basic knowledge of matrices and to solve equations using Cramer’s rule.</td>
</tr>
<tr>
<td>CO3</td>
<td>Know the concept of eigen values.</td>
</tr>
<tr>
<td>CO4</td>
<td>To develop the knowledge about derivatives and know various applications of differentiation.</td>
</tr>
<tr>
<td>CO5</td>
<td>Understand the basic concepts of Mathematical reasoning, set and functions</td>
</tr>
</tbody>
</table>

**Unit 1**


**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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understanding sustainable developments, need for environmental education, Contribution of famous personalities in Environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Make out the abiotic and boitic factors of environment, Understanding the importance of different types of ecosystems</td>
</tr>
<tr>
<td>CO3</td>
<td>Study of bio diversity, different types of diversity in nature giving importance to India as a mega diversity nation.</td>
</tr>
<tr>
<td>CO4</td>
<td>Understanding linear and cyclic resource management with more emphasis to air, water, soil resources.</td>
</tr>
<tr>
<td>CO5</td>
<td>Be familiar with Environment Impact Assessment &amp; Environment Management Plan</td>
</tr>
</tbody>
</table>

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**

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:**
Objectives: The 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, update, 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
Lab Component- PC Assembly,

Unit-2
Operating System Fundamentals
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**


**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**

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

**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:**
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**

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

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

**EVALUATION PATTERN: 14.2**

**SEMESTER II**
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 spirit 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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Helps the students to imbibe values into their inner spirit and put it into real life practice.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Help the students towards achieving the best through the process of transformation of their inner self</td>
</tr>
<tr>
<td>CO3</td>
<td>Provides the students an insight into the vision of optimistic future.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understand the role of communication in personal &amp; professional success.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Develop awareness of appropriate communication strategies.</td>
</tr>
<tr>
<td>CO3</td>
<td>Build and maintain healthy and effective relationships.</td>
</tr>
<tr>
<td>CO4</td>
<td>Identify and apply strategies to improve communication especially in meetings</td>
</tr>
<tr>
<td>CO5</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

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

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

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 Exclusion principles and their Applications.

Unit 5
Introduction to Graph Theory: Graphs, Bipartite Graphs, Eulerian and Hamiltonian Graphs, Graph Connectivity.

TEXTBOOK:

REFERENCES

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

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

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

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:
   International Edition

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

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 learn programming constructs develop logic and create programs and applications in C.
Course Outcomes

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

Unit 1
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:
REFERENCES:
1. “Test your C skills”, Yashavant Kanetkar,
2. “Exploring C”, Yashavant Kanetkar,

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 |

Unit 1
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


**TEXTBOOKS:**

**REFERENCES:**

**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

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

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**
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

<table>
<thead>
<tr>
<th>Course Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Develop C programs that uses conditional and iterative statements.</td>
</tr>
<tr>
<td>CO2</td>
<td>Inscribe C programs that handles various types of arrays and strings.</td>
</tr>
<tr>
<td>CO3</td>
<td>Develop C programs that used pointers to access arrays.</td>
</tr>
<tr>
<td>CO4</td>
<td>Create user defined functions to solve the real time problems.</td>
</tr>
<tr>
<td>CO5</td>
<td>Develop C programs to execute file handling and to create user defined data types in C,</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>18AVP201</td>
<td>AMRITA VALUES PROGRAMME I</td>
<td>1 0 0 1</td>
</tr>
<tr>
<td>18AVP211</td>
<td>AMRITA VALUES PROGRAMME II</td>
<td>1 0 0 1</td>
</tr>
</tbody>
</table>
**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:

<table>
<thead>
<tr>
<th>CO1</th>
<th>To make students familiar with the rich tapestry of Indian life, culture, arts, science and heritage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>To give exposure to students about richness and beauty of Indian way of life.</td>
</tr>
</tbody>
</table>
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**

**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**

<table>
<thead>
<tr>
<th>Soft Skills:</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>CO1</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>CO2</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>CO3</strong></td>
</tr>
<tr>
<td><strong>CO4</strong></td>
</tr>
<tr>
<td><strong>Aptitude:</strong></td>
</tr>
<tr>
<td><strong>CO5</strong></td>
</tr>
<tr>
<td><strong>CO6</strong></td>
</tr>
<tr>
<td><strong>Verbal:</strong></td>
</tr>
<tr>
<td><strong>CO7</strong></td>
</tr>
</tbody>
</table>
At the end of the course, the students will have the ability to relate, choose, conclude and determine the usage of right vocabulary.

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:**

REFERENCES:
1. Quantitative Aptitude, by 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.
7. The BBC and British Council online resources
8. Owl Purdue University online teaching resources
9. www.grammarbook.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

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

Unit 1

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:**

**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:**  

**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:
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

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Understand the basic concepts of OS with different types of OS, different services along with the various system calls</td>
</tr>
<tr>
<td>CO2</td>
<td>Get the knowledge of process management, various operations on process and Inter process communication</td>
</tr>
<tr>
<td>CO3</td>
<td>Understand the various process scheduling algorithms</td>
</tr>
<tr>
<td>CO4</td>
<td>Learn about deadlocks, methods of handling deadlocks, preventing deadlocks etc</td>
</tr>
<tr>
<td>CO5</td>
<td>Get a knowledge of memory management - paging and segmentation etc</td>
</tr>
</tbody>
</table>

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.

UNIT 3
Deadlocks: System Model-Deadlock Characterization-Methods for handling Deadlocks-
Deadlock Prevention-Deadlock Avoidance-Deadlock detection-Recovery from deadlock.

UNIT 4

UNIT 5
I/O Systems: Overview, I/O Hardware
Mass storage structure- Disk structure, disk scheduling, disk management.
Case Study:- Unix System

TEXT BOOK:

REFERENCES:

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

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Observe and evaluate the influence of historical forces on the current practice of management.</td>
</tr>
<tr>
<td>CO2</td>
<td>Explain how organizations adapt to an uncertain environment and identify techniques managers use to influence and control the internal environment.</td>
</tr>
<tr>
<td>CO3</td>
<td>Practice the process of management's four functions: planning, organizing, leading, and controlling.</td>
</tr>
<tr>
<td>CO4</td>
<td>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.</td>
</tr>
<tr>
<td>CO5</td>
<td>Evaluate leadership styles to anticipate the consequences of each leadership style.</td>
</tr>
</tbody>
</table>

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. Dinkar Pagare – Principles of Management, Sultan Chand and Sons
2. Vineeth, Shabu – Principles of Management and 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 strengthens 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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Develop programs using OOPS concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Implement the concepts of pointers using c++</td>
</tr>
<tr>
<td>CO3</td>
<td>Able to develop application using files.</td>
</tr>
<tr>
<td>CO4</td>
<td>Familiarize the students with the concepts of templates</td>
</tr>
<tr>
<td>CO5</td>
<td>Learn to implement exception handling in C++</td>
</tr>
</tbody>
</table>

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**
**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**

<table>
<thead>
<tr>
<th>CO1</th>
<th>Soft Skills:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CO2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CO3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CO4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

**Aptitude:**
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.

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.

At the end of the course, the students will have the ability to understand the nuances of English grammar and apply them effectively.

At the end of the course, the students will have the ability to relate, choose, conclude and determine the usage of right vocabulary.

At the end of the course, the students will have the ability to decide, conclude, identify and choose the right grammatical construction.


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:

REFERENCES:
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
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

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

Unit 1
Physical Layer: transmission media- Analog Transmission- Digital transmission

Unit 2

Unit 3

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
Objective: 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

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

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
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**

**TEXTBOOK:**

**REFERENCE:**

**EVALUATION PATTERN:** R14.1

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**18CSA216 WEB TECHNOLOGIES**

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**

<table>
<thead>
<tr>
<th>CO1</th>
<th>Students are able to develop a dynamic webpage by the use of java script and DHTML.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Students will be able to write a well formed / valid XML document.</td>
</tr>
<tr>
<td>CO3</td>
<td>Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.</td>
</tr>
<tr>
<td>CO4</td>
<td>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.</td>
</tr>
<tr>
<td>CO5</td>
<td>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.</td>
</tr>
</tbody>
</table>

---

**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 JavaScript 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

<p>| CO1 | Students get an idea on the software crisis, myths, basics of software engineering, its phases of development etc. |</p>
<table>
<thead>
<tr>
<th>CO2</th>
<th>Students get an overall idea about SRS and different Process Models.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO3</td>
<td>Students are provided with a good idea of ERD, DFD, Design Methods and architectural views</td>
</tr>
<tr>
<td>CO4</td>
<td>An overall idea about Testing strategies, different methods and Testability concept is provided to the students.</td>
</tr>
<tr>
<td>CO5</td>
<td>All maintenance concepts, types of changes, maintenance side effects are given to students along with the idea of software re-engineering.</td>
</tr>
</tbody>
</table>

Unit 1
Unit 2

Unit 3
Unit 4
Unit 5
Software Maintenance - Reverse Engineering and Reengineering

TEXTBOOK:
REFERENCE:

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

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

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.

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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

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

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.
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 website for a Computer Hardware shop. (Hint: CSS3 and HTML5)
6. Create a website 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
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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Soft Skills: 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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>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.</td>
</tr>
<tr>
<td>CO3</td>
<td>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.</td>
</tr>
<tr>
<td>CO4</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.


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:
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;
5. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
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

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Learn to use .NET framework and basic programming concepts in C#</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Students will be able to develop programs to solve real world problems using OOPS concepts in C#</td>
</tr>
<tr>
<td>CO3</td>
<td>Understand the Window Programming and event driven programming</td>
</tr>
<tr>
<td>CO4</td>
<td>Learn to use ADO.net to store and retrieve data from database</td>
</tr>
<tr>
<td>CO5</td>
<td>Learn to use files using C#</td>
</tr>
</tbody>
</table>

Unit 1

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

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

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>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)</td>
</tr>
<tr>
<td>CO2</td>
<td>understand the concept of Servlets and create dynamic web pages, using Servlets</td>
</tr>
<tr>
<td>CO3</td>
<td>understand the concept of JSP and create dynamic web pages, using JSP</td>
</tr>
<tr>
<td>CO4</td>
<td>Understand how session tracking is done using cookies</td>
</tr>
<tr>
<td>CO5</td>
<td>understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB) and know to work in Hibernate and Spring frameworks</td>
</tr>
</tbody>
</table>

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

Unit 3

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:**

**EVALUATION PATTERN:** R14.1

**18CSA389 MOBILE APPLICATION DEVELOPMENT LAB** 0122

**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**

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

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:

EVALUATION PATTERN: R14.2

18CSA388 ADVANCED JAVA AND J2EE LAB 0021

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

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

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.
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

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>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</td>
</tr>
<tr>
<td>CO2</td>
<td>Continue to advance their knowledge and understanding, and to develop new skills to a high level</td>
</tr>
<tr>
<td>CO3</td>
<td>Improve the verbal defence skills of the scholar</td>
</tr>
<tr>
<td>CO4</td>
<td>Test the student’s learning and understanding during the course of their programme</td>
</tr>
<tr>
<td>CO5</td>
<td>Prepares the students to face interview both in the academic and the industrial sector</td>
</tr>
</tbody>
</table>

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

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

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
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

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

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

Unit 2

Unit 3

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,

TEXTBOOKS:

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Introduces the need of security and various encryption techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Understand the use of public key crypto system</td>
</tr>
<tr>
<td>CO3</td>
<td>Able to provide authentication and integrity to the messages</td>
</tr>
<tr>
<td>CO4</td>
<td>Understand the digital signature standards and its application in real world</td>
</tr>
<tr>
<td>CO5</td>
<td>Have an idea about cyber crimes and digital forencies</td>
</tr>
</tbody>
</table>

Unit 1

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

Unit 5

**TEXTBOOK:**  

**REFERENCE:**  
Nina Godbole and Sunit Belpure, Cyber Security: Understanding Cyber crimes, Computer Forensics 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 2023

**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**

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understand python variables, operators and data types</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Get an idea about python control structures</td>
</tr>
<tr>
<td>CO3</td>
<td>Understand python complex datatypes</td>
</tr>
<tr>
<td>CO4</td>
<td>Work on Python files and databases</td>
</tr>
<tr>
<td>CO5</td>
<td>Get an idea about python packages and GUI programming</td>
</tr>
</tbody>
</table>

**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

**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 Python Programming, Tk Widgets, Tkinter examples.
Python programming with IDE.

**Text Book/References**

**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**

<p>| CO1 | Able to draw primitive shapes |</p>
<table>
<thead>
<tr>
<th>CO2</th>
<th>Learn to transform different geometrical shapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO3</td>
<td>Able to do rotation with different algorithms</td>
</tr>
<tr>
<td>CO4</td>
<td>Develop knowledge about midpoint rotation</td>
</tr>
<tr>
<td>CO5</td>
<td>Able to do polygon clipping and line clipping</td>
</tr>
</tbody>
</table>

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**

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

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

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

Unit 1
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

Unit 3

Unit 4
Game Playing - The Minimax Search Procedure – Adding Alpha-Beta Cutoffs. Understanding – What is Understanding? What makes Understanding hard?

Unit 5

TEXTBOOKS:

REFERENCES:
2. Introduction to Artificial Intelligence – Eugene Charnaik, Drew McDermott (Pearson Education Asia)

EVALUATION PATTERN: R14.1
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 configuration of WAN technologies |
| CO4 | Learn datalink protocol like PPP, HDLC 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

Unit 3

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 Shakil Akhtar, "Networks for Computer Scientists and Engineers".

REFERENCES:
1. “Scaling Networks - Course Booklet “, Cisco Press.
2. ”Switched Networks - Course Booklet”, Cisco Press.

EVALUATION PATTERN: R14.1

18CSA333 CLIENT SERVER COMPUTING 3003

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Be familiar with the concepts of client server systems, its architecture, different client server models, types of clients and servers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>To get an idea about the role and services of client and server.</td>
</tr>
<tr>
<td>CO3</td>
<td>To get an idea about client server system architecture, types of middleware and ODBC architecture.</td>
</tr>
<tr>
<td>CO4</td>
<td>To familiarise the concept of server architecture, C/S transaction processing models, data warehouse and data mining.</td>
</tr>
<tr>
<td>CO5</td>
<td>To get an idea about client server protocols and CORBA architecture.</td>
</tr>
</tbody>
</table>

Unit 1

Unit 2

Unit 3
Client Server System Architecture - Client Server Building Blocks – Hardware - Client Hardware - Server Hardware - Client Server Building Blocks – Software - Client Server Systems

**Unit 4**


**Unit 5**


**TEXTBOOK:**


**REFERENCES:**

1. Alex Berson: Client Server Architecture

**EVALUATION PATTERN:** R14.1

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**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 systems. |
| 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**

**Unit 2**


**Unit 3**


**Unit 4**


**Unit 5**


**TEXTBOOKS:**

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 familiarise 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

Business Engineering and ERP

Unit 2

Business Modelling for ERP
Building the Business Model.

ERP Implementation

Unit 3

ERP and the Competitive Advantage
ERP and the Competitive Strategy.

The ERP Domain

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.

**TEXTBOOK:**

**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**

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Define and discuss the key components of information and knowledge management infrastructure</td>
</tr>
<tr>
<td>CO2</td>
<td>Understand the use of web warehouse and GIS</td>
</tr>
<tr>
<td>CO3</td>
<td>Learn to use different text mining techniques</td>
</tr>
<tr>
<td>CO4</td>
<td>Gives an idea of knowledge management principles</td>
</tr>
<tr>
<td>CO5</td>
<td>Provides an overview of Internet and Internet Services.</td>
</tr>
</tbody>
</table>

**Unit 1**

**Unit 2**

79
Unit 3

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

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 sniffs. Familiarizing the routing protocols and ACL commands.

Course Outcomes

<table>
<thead>
<tr>
<th>CO1</th>
<th>understand the use of IPV4 and IPV6 and the working of switched networks and LAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Student will be able to configure a VLAN</td>
</tr>
<tr>
<td>CO3</td>
<td>Understand the routing and to configure routing protocols in routers</td>
</tr>
<tr>
<td>CO4</td>
<td>Able to configure RIP and OSPF routing protocols</td>
</tr>
<tr>
<td>CO5</td>
<td>Learn to implement ACL for implementing security according to the requirements of an organization</td>
</tr>
</tbody>
</table>

Unit 1

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

Unit 5
Access Control Lists and operations, Configuring and Troubleshooting Standard & extended IPv4 ACLs, IPv6 ACLs, DHCPv4 (IPV4) DHCPv6(IPv6).

TEXTBOOKS:

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

Unit 2

Unit 3

Unit 4

Unit 5

TEXTBOOK:

REFERENCE BOOKS:
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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Developed understanding of technical aspect of Multimedia Systems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Develop various Multimedia Systems applicable in real time.</td>
</tr>
<tr>
<td>CO3</td>
<td>Design interactive multimedia software.</td>
</tr>
</tbody>
</table>
CO4 | Apply various networking protocols for multimedia applications.
CO5 | To evaluate multimedia application for its optimum performance.

**Unit 1**

**Unit 2**
Making instant Multimedia – Multimedia Authoring tools.

**Unit 3**

**Unit 4**
Multimedia Building Blocks: Animation – Video.

**Unit 5**

**TEXTBOOK:**

**REFERENCES:**

**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**

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


Unit 4
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

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

EVALUATION PATTERN: R14.1
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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understand the concepts of neural networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>To have an understanding of the concepts of fuzzy sets, knowledge representation using fuzzy rules, and applications</td>
</tr>
<tr>
<td>CO3</td>
<td>Basic understanding of supervised learning algorithms</td>
</tr>
<tr>
<td>CO4</td>
<td>Comprehend the concept of hybrid systems</td>
</tr>
<tr>
<td>CO5</td>
<td>Understand the basics of Evolutionary Computation</td>
</tr>
</tbody>
</table>

Unit 1

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

TEXTBOOK/REFERENCES:

EVALUATION PATTERN: R14.1
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

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

Unit 1

Unit 2

Unit 3

Unit 4

Unit 5

TEXTBOOKS:
1. Red Hat Linux - System Administration

REFERENCE:

EVALUATION PATTERN: R14.1

SEMESTER VII
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 of delays, Real Time protocols, DNS etc.)

Course Outcomes

| CO1 | Student will be able to calculate the delays occurred 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 |


TEXT BOOKS/REFERENCES:
EVALUATION PATTERN: R14.3

18CA305 DESIGN AND ANALYSIS OF ALGORITHMS

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 algorithms. |


TEXT BOOKS/ REFERENCES:

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

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


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

TEXT BOOKS/ REFERENCES:
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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understand the basic concepts of linear programming, duality and methods for solving linear programming problem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Understand the mathematical formulation of transportation and assignment problems and solution methods.</td>
</tr>
<tr>
<td>CO3</td>
<td>Understand the network representation of project works and computation of PERT and CPM.</td>
</tr>
<tr>
<td>CO4</td>
<td>Understand the basic concepts of sequencing problem, integer programming algorithms and solution methods.</td>
</tr>
</tbody>
</table>


TEXT BOOKS/ REFERENCES:

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Familiarize the students to OPPS Database concepts and its features</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Exemplify the complex data types, all level inheritance, and DBS architecture</td>
</tr>
<tr>
<td>CO3</td>
<td>Be Familiar with Client server and parallel Databases, Explain Interquery and Intraquery Parallelism</td>
</tr>
<tr>
<td>CO4</td>
<td>Make out Transaction Management and Concurrency Control and lock based control</td>
</tr>
<tr>
<td>CO5</td>
<td>Exemplify recovery and commit protocols. Finally more explanation about memory and storage of databases.</td>
</tr>
</tbody>
</table>

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.
Concurrency Control: Optimistic concurrency control–Deadlock management – detection,
avoidance, and resolution – Distributed deadlock – Structured (top actions, distributed nested) transactions. Distributed Query Processing


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:

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>To get an idea about web services, Architecture, WSDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Understand WS-co-ordination, Policies, UDDI and SOAP messages</td>
</tr>
<tr>
<td>CO3</td>
<td>Get an idea about various cloud models, cloud virtualization and migration</td>
</tr>
<tr>
<td>CO4</td>
<td>Understand cloud storage and security, Distributed storage systems</td>
</tr>
<tr>
<td>CO5</td>
<td>Get an idea about cloud services like Amazon webservice, Amazon cloud, Microsoft azure, Google App Engine etc</td>
</tr>
</tbody>
</table>

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.
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:

Evaluation Pattern: R14.3

18CA312 Data Mining and Applications

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>To understand and implement classical models and algorithms in data warehousing and data mining</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>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.</td>
</tr>
<tr>
<td>CO3</td>
<td>Understand and apply the most current data mining techniques and applications, such as text mining, mining genomics data, and other current issues.</td>
</tr>
</tbody>
</table>

**TEXT BOOKS/ REFERENCES:**
1. Jiawei Han, Micheline Kamber and Jian Pei, “Data mining concepts and Techniques”, Third Edition, Elsevier Publisher, 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**

<table>
<thead>
<tr>
<th>CO4</th>
<th>Understand the mathematical statistics foundations of the algorithms outlined above.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO5</td>
<td>To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.</td>
</tr>
</tbody>
</table>
**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  
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:**

   Kauffmann, 2011.  
3. Alfred V.Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers: Principles,  
4. Andrew W. Appel and Jens Palsberg, “Modern Compiler Implementation in Java”,  

**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**

<table>
<thead>
<tr>
<th>CO1</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>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.</td>
</tr>
<tr>
<td>CO3</td>
<td>Students will be familiar with basic sources and methods of research and documentation on topics in technology, including on-line research.</td>
</tr>
<tr>
<td>CO4</td>
<td>They will be able to synthesize and integrate material from primary and secondary sources with their own ideas in research papers.</td>
</tr>
<tr>
<td>CO5</td>
<td>Students will understand the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.</td>
</tr>
</tbody>
</table>

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:**

**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 |
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**

**18CA401 DESIGN PATTERNS 3104**

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

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Identify the appropriate design patterns to solve object oriented design problems.</td>
</tr>
<tr>
<td>CO2</td>
<td>Develop design solutions using creational patterns.</td>
</tr>
<tr>
<td>CO3</td>
<td>Apply structural patterns to solve design problems.</td>
</tr>
<tr>
<td>CO4</td>
<td>Construct design solutions by using behavioral patterns.</td>
</tr>
</tbody>
</table>


**TEXT BOOKS / REFERENCES:**

**EVALUATION PATTERN: R14.1**

**18CA402 SYSTEM SECURITY 3104**
Objectives: The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.

Course Outcomes

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

Database Security: Security Requirements -Reliability and Integrity-Sensitive Data –Inference -Multilevel Security 

TEXT BOOKS/ REFERENCES:

EVALUATION PATTERN: R14.1

18CA496 DISsertation Phase I 0-0-0-5
Objectives: To help students to identify and formulate their research problem and how 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 is done 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>18CA435</td>
<td>NETWORK SECURITY</td>
<td>3-0-0-3</td>
</tr>
</tbody>
</table>

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

Course outcomes

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


TEXT BOOKS/ REFERENCES:
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**

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Gives an overview of elements and types of various programming languages</td>
</tr>
<tr>
<td>CO2</td>
<td>Understand the elements of programming procedures and formulating abstractions</td>
</tr>
<tr>
<td>CO3</td>
<td>Learn to build abstraction with data</td>
</tr>
<tr>
<td>CO4</td>
<td>Be able to design and implement programs in Scheme that demonstrate the concepts</td>
</tr>
<tr>
<td>CO5</td>
<td>Learn to program with PROLOG</td>
</tr>
</tbody>
</table>

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

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


**TEXT BOOKS/REFERENCES:**


**EVALUATION PATTERN:** R14.1
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

<table>
<thead>
<tr>
<th>CO1</th>
<th>To get familiarize with Quality challenges, factors and its activities in the project life cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Students get a full idea on the testing strategies and building a testing process.</td>
</tr>
<tr>
<td>CO3</td>
<td>Gets a clear idea on software quality in management and business context. Also regarding Process and Product Quality.</td>
</tr>
<tr>
<td>CO4</td>
<td>Understands the ISO origins, different audit methods and quality assessment procedures.</td>
</tr>
<tr>
<td>CO5</td>
<td>Acquires a clear cut idea on CMM and Process improvement models, Configuration Management and processes along with experience gaining through various case studies.</td>
</tr>
</tbody>
</table>


TEXT BOOKS/REFERENCES:

EVALUATION PATTERN: R14.1

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 engineering problems.
Course Outcomes

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

Artificial Intelligence – a Brief Review – Pitfalls of Traditional AI – Need for Computational Intelligence – Importance of Tolerance of Imprecision and Uncertainty – Constituent Techniques – Overview of Artificial Neural Networks - Fuzzy Logic – Evolutionary Computation.


Neural Networks as Associative Memories - Hopfield Networks, Bidirectional Associative Memory. Topologically Organized Neural Networks – Competitive Learning, Kohonen Maps.


Swarm Intelligence Algorithms - Overview of other Bio-inspired Algorithms - Hybrid Approaches (Neural Networks, Fuzzy Logic, Genetic Algorithms etc.).

TEXT BOOKS/REFERENCES:


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

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

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


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


**TEXT BOOKS/ REFERENCES:**

**EVALUATION PATTERN:** R14.1
Objectives: The main objective of this course is to present the scientific support in the field of information search and retrieval.

Course Outcomes

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


Semantic Web – Ontology - Implementations using Natural Language Toolkit.

TEXT BOOKS/ REFERENCES:


EVALUATION PATTERN: R14.1

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Explain common open source licenses and the impact of choosing a license</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Explain open source project structure and how to successfully setup a project</td>
</tr>
</tbody>
</table>
CO3  Learn to derive a framework 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


TEXT BOOKS/ REFERENCES:


EVALUATION PATTERN: R14.1

18CA337DEEP LEARNING FOR NATURAL LANGUAGE PROCESSING 3 0 0

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 global 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 memory 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

EVALUATION PATTERN: R14.1

18CA340  ADVANCED OPERATING SYSTEM AND DISTRIBUTED COMPUTING

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

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

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
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:**  

**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.  

**Unit 5**  
**Multiprocessor Operating Systems and Database Operating system:**  
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:**


**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

<table>
<thead>
<tr>
<th>CO</th>
<th>Demonstration knowledge of Wireless Network (WLAN) systems and their impact on the information technology industry.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Give knowledge about various modulation and multi access control protocols</td>
</tr>
<tr>
<td>CO3</td>
<td>Provides knowledge about various wireless standards</td>
</tr>
<tr>
<td>CO4</td>
<td>Able to know the working of various mobile routing protocols</td>
</tr>
<tr>
<td>CO5</td>
<td>Lean to simulate the wireless networks with NS3</td>
</tr>
</tbody>
</table>


TEXTBOOK / REFERENCES:

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

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


TEXT BOOKS / REFERENCES:

EVALUATION PATTERN: R14.1
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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Provides an overview of semantic web technologies and services</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Understand the resource description framework and its features</td>
</tr>
<tr>
<td>CO3</td>
<td>Learn Ontology and OWL</td>
</tr>
<tr>
<td>CO4</td>
<td>Gives students the idea of OWL structure, syntax and semantics</td>
</tr>
<tr>
<td>CO5</td>
<td>Design and reasoning Ontology using various tools</td>
</tr>
</tbody>
</table>

Introduction to Semantic Web:

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

Course Outcomes

<table>
<thead>
<tr>
<th>CO1</th>
<th>Knowledge of DBMS, both in terms of use and implementation/design</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Experience with SQL</td>
</tr>
<tr>
<td>CO3</td>
<td>Experience with analysis and design of (DB)</td>
</tr>
<tr>
<td>CO4</td>
<td>Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit.</td>
</tr>
<tr>
<td>CO5</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.
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:
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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understanding of the fundamental concepts of a digital image processing system.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Analyze images in the spatial and frequency domain using various transforms.</td>
</tr>
<tr>
<td>CO3</td>
<td>To understand various filters used for image enhancement and smoothing.</td>
</tr>
<tr>
<td>CO4</td>
<td>Evaluate the techniques for image enhancement and image restoration.</td>
</tr>
<tr>
<td>CO5</td>
<td>Interpret image segmentation and representation techniques.</td>
</tr>
</tbody>
</table>


TEXTBOOKS/ REFERENCES:

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Define the basic concepts of Business Intelligence and Data Warehouses</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Employ the basic ETL procedures for data integration</td>
</tr>
<tr>
<td>CO3</td>
<td>Learn the operation of basic OLAP technologies</td>
</tr>
<tr>
<td>CO4</td>
<td>Employ basic BI tools</td>
</tr>
<tr>
<td>CO5</td>
<td>Understanding Business metrics and KPIs</td>
</tr>
</tbody>
</table>

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
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:
2. Jiawei Han, Micheline Kamber and Jian Pei, “Data mining concepts and Techniques”,

115
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**

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understand the components of PC and basic networking</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Able to provide security to a small network using Authentication and authoriziation protocols</td>
</tr>
<tr>
<td>CO3</td>
<td>Learn to manage and configure different roles in Windows Server</td>
</tr>
<tr>
<td>CO4</td>
<td>Able to configure and use Linux system efficiently</td>
</tr>
<tr>
<td>CO5</td>
<td>Students will be able to configure and manage network in windows and Linux</td>
</tr>
</tbody>
</table>


**TEXT BOOKS / REFERENCES:**

1. 98-366: “Networking Fundamentals, Microsoft Official Academic Course” (Microsoft
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 processing frameworks like Hadoop and Apache Mahout |


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:
28

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 | Understanding 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

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,

Text / Reference Books:

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>This course provides an introduction to a broad range of economic concepts, theories and analytical techniques.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>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.</td>
</tr>
<tr>
<td>CO3</td>
<td>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.</td>
</tr>
<tr>
<td>CO4</td>
<td>Observe and evaluate the influence of historical forces on the current practice of management.</td>
</tr>
</tbody>
</table>


TEXTBOOKS/REFERENCES:

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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Getting Basic Ideas about different types of software projects, and know about program evaluation &amp; Project Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Be familiar with step by step project planning, cost benefit analysis and risk evaluation techniques.</td>
</tr>
<tr>
<td>CO3</td>
<td>Making out different software effort estimation techniques taking function point analysis &amp; COCOMO models as examples</td>
</tr>
<tr>
<td>CO4</td>
<td>Scheduling the projects with activity planning using PERT &amp; CPM</td>
</tr>
<tr>
<td>CO5</td>
<td>Monitoring &amp; Controlling the projects, ensure the software quality.</td>
</tr>
</tbody>
</table>

Introduction to Software Project Management: Software Projects-Other Types of Projects - Problems with Software Projects. Project Evaluation and Programme Management:
Resource Allocation: Identifying Resource Requirements – Scheduling Resources –
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

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

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 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,
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

<table>
<thead>
<tr>
<th>CO</th>
<th>Develop Swing-based GUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Develop client/server applications and TCP/IP socket programming</td>
</tr>
<tr>
<td>CO3</td>
<td>Update and retrieve the data from the databases using SQL</td>
</tr>
<tr>
<td>CO4</td>
<td>Develop distributed applications using RMI</td>
</tr>
<tr>
<td>CO5</td>
<td>Develop component-based Java software using JavaBeans</td>
</tr>
<tr>
<td></td>
<td>Develop server side programs in the form of servlets</td>
</tr>
</tbody>
</table>


TEXT BOOKS/ REFERENCES:

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

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

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.


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.

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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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Students will be able to design/develop programs with GUI interfaces, Menus and Dialogue boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Able to develop SQLite - CRUD applications</td>
</tr>
<tr>
<td>CO3</td>
<td>Learn to develop Location Based mobile apps with API</td>
</tr>
<tr>
<td>CO4</td>
<td>Experiment with multimedia mobile applications</td>
</tr>
</tbody>
</table>

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
Introducing SQLite-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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understand the role and working of web server and web browser</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Permission for using the Internet-Methods for associated with ‘Go’, ‘Back’, ‘Forward’ etc</td>
</tr>
<tr>
<td>CO3</td>
<td>Familiarize with the concepts of ASP.Net Life Cycle, Validation, State Management and Cookies in detail.</td>
</tr>
<tr>
<td>CO4</td>
<td>Detail on Http Applications, Web configuration and Global.asax is provided with.</td>
</tr>
<tr>
<td>CO5</td>
<td>Students become proficient about Controls along with publishing web application.</td>
</tr>
</tbody>
</table>


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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Understand and implement DDL commands, setting up constraints etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Understand the creation of index, views, synonyms and sequences</td>
</tr>
<tr>
<td>CO3</td>
<td>Implement DML, DCL and TCL commands, joins and subqueries</td>
</tr>
</tbody>
</table>
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. |


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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Develop Server side applications using Servlets and JSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Develop component-based Java software using EJB</td>
</tr>
<tr>
<td>CO3</td>
<td>Be able to write the schema for the given XML documents in both DTD and XML Schema languages</td>
</tr>
<tr>
<td>CO4</td>
<td>Be able to parse XML documents by using DOM and SAX</td>
</tr>
<tr>
<td>CO5</td>
<td>Develop programs using Hibernate and Spring</td>
</tr>
</tbody>
</table>


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

<table>
<thead>
<tr>
<th>CO1</th>
<th>Create single page web applications using the MVC pattern of Angular</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>to set up a Node.js project using npm</td>
</tr>
<tr>
<td>CO3</td>
<td>to use Express to set up a web server</td>
</tr>
<tr>
<td>CO4</td>
<td>Understand how write and organize Angular code</td>
</tr>
<tr>
<td>CO5</td>
<td>Program Angular View Components and Services</td>
</tr>
</tbody>
</table>

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
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

Objectives: To impart knowledge about various network simulation tools to design and understand the working of different protocols and network models.

Course Outcomes

<table>
<thead>
<tr>
<th>CO1</th>
<th>Learn to simulate network concepts using NS3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Demostrate the working of TCP and UDP</td>
</tr>
<tr>
<td>CO3</td>
<td>Able to set up a small LAN and WLAN</td>
</tr>
<tr>
<td>CO4</td>
<td>simulate the Cloud computing concets using SimGrid</td>
</tr>
<tr>
<td>CO5</td>
<td>Have an idea of load balancing in cloud</td>
</tr>
</tbody>
</table>

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

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. |

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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.

Communicate about essential and modern biology and how it relates to Informatics

Describe basic biotechnology in the context of its underlying theoretical basis with an emphasis on the technologies routinely used in modern biological sciences.

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

EVALUATION PATTERN: R14.2

18CA485 COMPUTER ORGANIZATION AND ARCHITECTURE LAB

Objectives: Provides an understanding of the hardware organization of a PC by assembling/disassembling, Digital logic circuits and installation of operating systems.

Course Outcomes

<table>
<thead>
<tr>
<th>CO1</th>
<th>Learn to assemble a PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>Learn assembly language programming.</td>
</tr>
<tr>
<td>CO3</td>
<td>Understand the representation of data, addressing modes, instructions sets.</td>
</tr>
<tr>
<td>CO4</td>
<td>Learn the basic knowledge of the design of digital logic circuits and apply to computer organization.</td>
</tr>
</tbody>
</table>


EVALUATION PATTERN: R14.2