

**SACRED HEART COLLEGE (AUTONOMOUS), THEVARA  
KOCHI, KERALA, 682013**



**CURRICULUM AND SYLLABI**

**CHOICE BASED COURSE CREDIT AND SEMESTER SYSTEM  
(CBCSS)**

**BSC COMPUTER APPLICATIONS (Triple Main)  
Introduced From 2019 Admission Onwards**

**BOARD OF STUDIES IN COMPUTER SCIENCE  
Sacred Heart College, Thevara, Kochi, Kerala**

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## **FORWARD**

BSc Computer Applications, a Triple Main UG, self-financing vocational programme was designed and approved by the UGC. The programme includes the subjects Computer Science, Statistics and Mathematics. After the successful completion of the programme, students can join MSc Data Science, MSc Artificial Intelligence, MSc Data Analytics, MCA, MSc Computer Science, MSc IT, MSc Mathematics or MSc Statistics. BSc Computer Applications graduates can start up their career in either Government sector or private sector since there are a lot of employment opportunities in both these sectors. This degree helps the students to get a sound knowledge on computer applications with the help of which they can have a perfect launch pad for challenging career in the field of Information technology.

In line with the changes in higher education, the state of Kerala had introduced the autonomy in its 13 selected colleges in 2014. Exercising the opportune occasion of autonomy, the department of Computer Science had attempted to modify the syllabus in 2015.

The Board of studies of BSc Computer Applications has framed the present syllabus to revise the curriculum in tune with the parent university. In this process care has been taken to give emphasis to various aspects such as the creativity of students, knowledge of current development in the discipline, the impacts due to the development of science and technology, employability and entrepreneur development. Later, consequent of the Hon'ble Supreme Court of India order and the subsequent UGC circular, the Academic Council of the college decided to incorporate Environmental studies in the UG curriculum, as an additional core course.

Mahatma Gandhi University has revised the curriculum for the UG programs in 2017. In that they have included Environmental Studies and Human Rights in an impressive way. The BoS of BSc Computer Applications of this college decided to include the 'Software Engineering and Environmental Studies' as a core course in semester V.

The Academic Council of the college decided to implement the revised syllabus with effect from the academic year 2019-20.

Thevara

Dr. Regitha M R

HoD. Dept of CS

### Members of the Board of Studies in Computer Science

| Sl.No | Name & Address   | Designation/Category   |
|-------|--|--|
| 1     | DR. Regitha M R, HoD   | Chairman   |
| 2     | Dr. Sabu M K<br>Assoc. Professor, Dept. of Computer Applications<br>CUSAT, Thrikkakara<br>Mob: 9446128197<br>Email-ID: sabumk@cusat.ac.in                    | Expert in the subject from outside the college, nominated by the academic council. |
| 3     | Rev. Dr. Jaison Paul Mulerikkal CMI<br>Principal, Jyothi Engineering College<br>Cheruthuruthy, Thrissur<br>Mob: 9567611733<br>Email-ID: principal@jecc.ac.in | Expert in the subject from outside the college, nominated by the academic council. |
| 4     | Mr. Maxon C J, Associate<br>Infrastructure Analyst, UST Global,<br>Kochi, Mob. 9207456677  | One post graduate meritorious alumnus nominated by the Principal                   |
| 5     | Mr. Sudhevan K J, Chief Consultant<br>and Head Coach, ARISE, Kochi, Mob.<br>9388637322   | Representative from industry, corporate – sector or allied area.                   |
| 6     | Ms. Tressa Shybe   | Faculty Member   |
| 7     | Ms. Achamma Cherian  | Faculty Member   |
| 8     | Ms. Jisha Soman  | Faculty Member   |
| 9     | Ms. Rency K. Renjith   | Faculty Member   |
| 10    | Fr. Nijo Antony  | Faculty Member   |
| 11    | Ms. Christy Jacqueline   | Faculty Member   |
| 12    | Mr. Shailesh Sivan   | Faculty Member   |

**REGULATIONS FOR CHOICE BASED CREDIT AND SEMESTER SYSTEM  
(CBCSS) FOR UNDER GRADUATE PROGRAMMES -2019**

**1. Title**

These regulations shall be called **“SACRED HEART COLLEGE THEVARA REGULATIONS FOR CREDIT AND SEMESTER SYSTEM 2019”**

**2. Scope**

Applicable to all programmes of the college with effect from 2019 admissions, except otherwise approved by the Academic Council of the College

**3. Definitions**

- i. **‘Programme’** means the entire course of study and examinations.
- ii. **‘Duration of Programme’** means the period of time required for the conduct of the programme. The duration of under graduate programmes shall be 6 semesters, post-graduate programme shall be of 4 semesters and MPhil programmes shall be 2 semesters.
- iii. **‘Semester’** means a term consisting of a minimum of 90 working days, inclusive of examination, distributed over a minimum of 18 weeks of 5 working days, each with 5 contact hours of one hour duration
- iv. **‘Course’** means a segment of subject matter to be covered in a semester. Each Course is to be designed variously under lectures / tutorials / laboratory or fieldwork / study tour /seminar / project / practical training / assignments/evaluation etc., to meet effective teaching and learning needs.
- v. **‘Common Course I’** means a course that comes under the category of courses for English and **‘Common Course II’** means additional language, a selection of both is compulsory for all students undergoing undergraduate programmes(Model I)
- vi. **‘Core course’** means a course in the subject of specialization within a degree programme.
- vii. **‘Complementary Course’** means a course which would enrich the study of core courses.
- viii. **‘Open course’** means a course outside the field of his/her specialization, which can be opted by a student.

- ix. **‘Additional core course’** means a compulsory course for all under graduate students (as per the UGC directive) to enrich their general awareness.
- x. The U.G. programmes shall include (a) Common courses (b) Core courses (c) Complementary Courses (d) Open Course (e) Study tour and (f) Internship for selected programmes.
- xi. **‘Additional Course’** is a course registered by a student over and above the minimum required courses.
- xii. **‘Credit’ (Cr)** of a course is the numerical value assigned to a course according to the relative importance of the content of the syllabus of the programme.
- xiii. **‘Extra credits’** are additional credits awarded to a student over and above the minimum credits required for a programme for achievements in co-curricular activities carried out outside the regular class hours OR curricular activities/courses completed for value addition, as directed by the College/ department. It is the numerical value assigned to Club activities, Social service, Internship etc. which is not added with the total academic credits of the students. Additional credit components
- (a) Talent & career club activity (optional)
  - (b) Social service (mandatory)
  - (c) Internship for Commerce, Communication and Computer applications (mandatory).
  - (d) Internship (desirable for other programmes).
  - (e) Add on courses (optional)
- xiv. **‘Programme Credit’** means the total credits of the UG Programme.
- xv. **‘Programme Elective course’** Programme Elective course means a course, which can be chosen from a list of electives and a minimum number of courses is required to complete the programme.
- xvi. **‘Programme Project’** Programme Project means a regular project work with stated credits on which the student undergoes a project under the supervision of a teacher in the parent department / any appropriate Institute in order to submit a dissertation on the project work as specified.
- xvii. **‘Internship’** is on-the-job training for professional careers.
- xviii. **‘Plagiarism’** Plagiarism is the unreferenced use of other authors’ material in

dissertations and is a serious academic offence.

- xix. **‘Tutorial’** Tutorial means a class to provide an opportunity to interact with students at their individual level to identify the strength and weakness of individual students.
- xx. **‘Seminar’** seminar means a lecture by a student expected to train the student in self-study, collection of relevant matter from the books and Internet resources, editing, document writing, typing and presentation.
- xxi. **‘Evaluation’** means every course shall be evaluated by 25% continuous (internal) assessment and 75% end course/end semester (external) assessment.
- xxii. **‘Repeat course’** is a course that is repeated by a student for having failed in that course in an earlier registration.
- xxiii. **‘Audit Course’** is a course for which no credits are awarded.
- xxiv. **‘Department’** means any teaching Department offering a course of study approved by the college / Institute as per the Act or Statute of the University.
- xxv. **‘Parent Department’** means the Department which offers a particular UG/PG programme.
- xxvi. **‘Department Council’** means the body of all teachers of a Department in a College.
- xxvii. **‘Faculty Advisor’** is a teacher nominated by a Department Council to coordinate the continuous evaluation and other academic activities undertaken in the Department.
- xxviii. **‘College Co-ordinator’** means a teacher from the college nominated by the College Council to look into the matters relating to CBCS-PG System.
- xxix. **‘Letter Grade’** or simply **‘Grade’** in a course is a letter symbol (O, A, B, C, D, etc.) which indicates the broad level of performance of a student in a course.
- xxx. Each letter grade is assigned a **‘Grade point’** (GP) which is an integer indicating the numerical equivalent of the broad level of performance of a student in a course.
- xxxi. **‘Credit point’** (CP) of a course is the value obtained by multiplying the grade point (GP) by the Credit (Cr) of the course  $CP=GP \times Cr$ .
- xxxii. **‘Semester Grade point average’** (SGPA) is the value obtained by dividing the sum of credit points (CP) obtained by a student in the various courses taken in a semester by

the total number of credits taken by him/her in that semester . The grade points shall be rounded off to two decimal places. SGPA determines the overall performance of a student at the end of a semester.

xxxiii. **Cumulative Grade point average'** (CGPA) is the value obtained by dividing the sum of credit points in all the courses taken by the student for the entire programme by the total number of credits and shall be rounded off to two decimal places.

xxxiv. **'Grace Marks'** means marks awarded to course/s, as per the orders issued by the college from time to time, in recognition of meritorious achievements in NCC/NSS/Sports/Arts and cultural activities.

#### **4. ATTENDANCE**

Being a regular college, physical presence in the regular activities, especially, classes and exams, is mandatory for the students. However, if a student secures 75% of attendance s/he is eligible to appear for the exams, provided there are no other impediments like disciplinary proceedings, malpractice record etc.

- i. A maximum of 5 marks (5%) for a course is given for attendance
- ii. **Absence:** A student found absent for one hour in the forenoon or afternoon session is deprived of the attendance for the entire session as far as eligibility for final exam is concerned.
- iii. The hour related calculation in a course is meant for awarding marks for the course concerned.
- iv. **Late entry:** A student is supposed to be in time in the class. Late arrival related treatment is left to the discretion of the individual teacher. However, as a norm, a late arriving student may be permitted to the class, if it is not inconvenient or distraction to the class as such; though attendance **MAY NOT BE GIVEN**. Late arrival beyond 5 minutes is treated as **ABSENCE**; though the teacher may consider permitting the student to sit in the class.
- v. **Leave:** A student has to formally report his/her absence with reasons either in advance, or immediately after the absence for obtaining an approved leave. This applies to all sorts of leave – medical, on duty or other.



The student is supposed to report in prescribed format on the very next day of the absence; however, upto a week's time is permitted. Afterwards, the leave applications will not be considered.

The student has to retain a copy/section of the approved leave form and produce the same as proof, in case there is any confusion regarding the leave sanctioning. In the absence of such proof, the claims will not be entertained.

- vi. **Duty Leave:** A student representing the college in sports, arts, social service or academic matters, has to get sanction from the class teacher concerned and submit the leave application form duly endorsed by teacher concerned & the class teacher, and submit it to the faculty Dean (or Vice Principal). The same will be forwarded by the Dean/Vice Principal for attendance entry. **SPORTS:** The approval of the department of Physical Education and the class teacher is required. The time limit for submission mentioned above is applicable in the case of duty leave as well.
- vii. **CONDONATION:** a student may have the privilege of condonation of attendance shortage (upto a maximum of 10 days) on the basis of genuineness of the grounds of absence (medical reasons or college duty), duly recommended by the department. This is not a matter of right. It is a matter of privilege based on Principal's discretion and the good conduct of the student on the campus. A student of UG programme may have a maximum of two such opportunities and that of PG programmes only one opportunity.
- viii. **RE-ADMISSION** – a student whose attendance is inadequate will have to discontinue the studies. Such students, whose conduct is good, may be re-admitted with the approval of governing council, on the basis of recommendation from the department, and assurance from the student and the guardian regarding good conduct and compliance in academic and discipline matters. For this the prescribed re-admission fee has to be paid.

As a condition for re-admission, the student should have cleared all academic arrears, or should have appeared for the exams in which he/she is having an arrear (if the results are not out), and should have fulfilled all academic assignments prescribed by the department for compensating for his lack of attendance.
- ix. **UNAUTHORISED ABSENCE & REMOVAL FROM ROLLS:** A student absent from the classes continuously for 10 consequent days without intimation or permission, shall be removed from the rolls, and the matter intimated to the student concerned. On the basis of recommendation of the department concerned, re-admission process may be permitted by the Principal.

## 5. PROGRAMME REGISTRATION

- i. A student shall be permitted to register for the programme at the time of admission.
- ii. A UG student who registered for the programme shall complete the same within a period of 12 continuous semesters and a PG student within a period of 8 continuous semesters from the date of commencement of the programme.

**6. PROMOTION:** A student who registers for the end semester examination shall be promoted to the next semester. However, in extreme circumstances, a student having sufficient attendance who could not register for the end semester examination may be allowed to register notionally by the Principal with the recommendation of the Head of the department concerned and , by paying the prescribed fee.

## 7. PROGRAMME STRUCTURE FOR MODEL - III

|   |  |             |
|---|--|-------------|
| A | Programme Duration   | 6 Semesters |
| B | Minimum credits required from common course                        | 08          |
| C | Minimum credits required from three Core courses including Project | 109         |
| D | Minimum credits required from Open course                          | 03          |
|   | Total Credits required for successful completion of the programme  | 120         |
| E | Club activity (desirable)  | 01          |
| F | Social service (mandatory)   | 01          |
| G | Internship (mandatory)   | 02          |
| H | Virtual Lab (desirable)  | 01          |
| I | Minimum attendance required  | 75%         |

## DETAILED DISTRIBUTION OF COURSES

### Choice-based Credit and Semester System: BSc Computer Applications

#### Programme (Triple Main) – Model III

| SEM     | COURSE CODE | TITLE OF THE COURSE  | NO. OF HOURS / WEEK | NO. OF CREDITS | WEIGHTAGE |          |
|---------|-------------|--|---------------------|----------------|-----------|----------|
|         |             |  |                     |                | INTERNAL  | EXTERNAL |
| 19U1CAP | 19U1CCENG01 | Homo Loquens: Effective Listening and Speaking                 | 5                   | 4              | 25        | 75       |
|         | 19U1CRCAP1  | Digital Electronics and Microprocessor                         | 4                   | 3              | 25        | 75       |
|         | 19U1CRCAP2  | Programming in Python  | 4                   | 3              | 25        | 75       |
|         | 19U1PRCAP1  | Programming in Python (Practical)                              | 4                   | 2              | 25        | 75       |
|         | 19U1CRCMT1  | Foundation of Mathematics                                      | 4                   | 3              | 25        | 75       |
|         | 19U1CRCST1  | Descriptive Statistics   | 4                   | 3              | 25        | 75       |
| 19U2CAP | 19U2CCENG03 | Text and Context: A Guide to Effective Reading and Writing     | 5                   | 4              | 25        | 75       |
|         | 19U2CRCAP3  | Operating System   | 4                   | 3              | 25        | 75       |
|         | 19U2CRCAP4  | Data Structures Using 'C'                                      | 4                   | 3              | 25        | 75       |
|         | 19U2PRCAP2  | Data Structures Using 'C' (Practical)                          | 4                   | 3              | 25        | 75       |
|         | 19U2CRCMT2  | Analytical Geometry, Theory of Equations and Numerical Methods | 4                   | 4              | 25        | 75       |
|         | 19U2CRCST2  | Probability and Statistics                                     | 4                   | 3              | 25        | 75       |
| 19U3CAP | 19U3CRCAP5  | Data Communication and Computer Networks                       | 4                   | 3              | 25        | 75       |
|         | 19U3CRCAP6  | Object Oriented Programming In C++                             | 4                   | 3              | 25        | 75       |
|         | 19U3PRCAP3  | Object Oriented Programming In C++ (Practical)                 | 2                   | 2              | 25        | 75       |
|         | 19U3CRCMT3  | Calculus   | 5                   | 4              | 25        | 75       |
|         | 19U3CRCMT4  | Vector Calculus, Trigonometry and Matrices                     | 5                   | 4              | 25        | 75       |
|         | 19U3CRCST3  | Probability Distributions                                      | 5                   | 4              | 25        | 75       |

| SEM     | COURSE CODE       | TITLE OF THE COURSE                                     | NO. OF HOURS / WEEK | NO. OF CREDITS | WEIGHTAGE |          |
|---------|-------------------|---|---------------------|----------------|-----------|----------|
|         |                   |   |                     |                | INTERNAL  | EXTERNAL |
| 19U4CAP | 19U4CRCAP7        | Advanced Web Technology                                 | 4                   | 4              | 25        | 75       |
|         | 19U4CRCAP8        | Database Management System                              | 4                   | 3              | 25        | 75       |
|         | 19U4PRCAP4        | Advanced Web Technology (Practical)                     | 2                   | 2              | 25        | 75       |
|         | 19U4CRCMT5        | Differential Equations                                  | 5                   | 4              | 25        | 75       |
|         | 19U4CRCST4        | Statistical Inference                                   | 5                   | 4              | 25        | 75       |
|         | 19U4CRCST5        | Sample Survey Analysis and Design of Experiments        | 5                   | 4              | 25        | 75       |
| 19U5CAP | 19U5CRCAP9        | Programming in Java                                     | 4                   | 4              | 25        | 75       |
|         | 19U5CRCAP10       | Software Engineering and Environmental Studies          | 5                   | 3              | 25        | 75       |
|         | 19U5OCCAP1        | Internet, Web Designing And Cyber Laws (Open Course)    | 4                   | 3              | 25        | 75       |
|         | 19U5PRCAP5        | Programming in Java (Practical)                         | 2                   | 3              | 25        | 75       |
|         | 19U5CRCMT6        | Mathematical Analysis                                   | 5                   | 4              | 25        | 75       |
|         | 19U5CRCST6        | Statistical Quality Control and Operations Research     | 5                   | 4              | 25        | 75       |
| 19U6CAP | 19U6CRCAP11       | Computer Graphics                                       | 5                   | 4              | 25        | 75       |
|         | 19U6CRCAP12<br>EL | 1. Artificial Intelligence<br>2. Linux Operating System | 5                   | 4              | 25        | 75       |
|         | 19U6CRCAP13<br>EL |   |                     |                |           |          |
|         | 19U6PJCAP1        | Project   | 5                   | 4              | 25        | 75       |
|         | 19U6CRCMT7        | Graph Theory and Numerical Analysis                     | 5                   | 4              | 25        | 75       |
|         | 19U6CRCST7        | Computer Aided Data Analysis using Excel and R          | 5                   | 4              | 25        | 75       |

|  |          |            |
|--|----------|------------|
| <b>Total Credits for Core Courses</b>  | <b>:</b> | <b>109</b> |
| <b>Open Course</b>                     | <b>:</b> | <b>03</b>  |
|  |          | -----      |
|  |          | <b>112</b> |
| <b>Total Credits for Common Course</b> | <b>:</b> | <b>08</b>  |
|  |          | -----      |
|  |          | <b>120</b> |

## 8. EXAMINATIONS

All the End Semester Examinations of the college will be conducted by the Controller of Examination. The Principal will be the Chief Controller of Examinations. An Examination committee consists of the Chief Controller of Examinations, Controller of Examinations, Additional Chief Superintendent, Deans, IQAC Coordinator and other faculty members nominated by the Principal will act as an advisory body of the matters relating to the conduct of examinations.

## 9. EVALUATION AND GRADING

The evaluation scheme for each course shall contain two parts;

- a. Continuous Internal Evaluation (CIA) and
- b. End Semester Examination (ESE).

The internal to external assessment ratio shall be 1:3, for both courses with or without practical. For courses without practical, there shall be a maximum of 75 marks for external evaluation and maximum of 25 marks for internal evaluation. For courses with practical, generally external evaluation shall be for a maximum of 60 marks and internal evaluation for 20 marks. Both internal and external evaluation shall be carried out in the mark system and the marks are to be rounded to the nearest integer.

- a. **Continuous Internal Assessment (CIA)/ Continuous Assessment:** The internal evaluation shall be based on predetermined transparent system involving periodic written tests, assignments, seminars/viva/field survey and attendance in respect of theory courses and based on written tests, lab skill/records/viva and attendance in respect of practical courses. The marks assigned to various components for internal evaluation as follows.

### Components of Internal Evaluation (for theory without practical)

|     | Components                              | Marks |
|-----|---|-------|
| i.  | Assignments                             | 5     |
| ii  | Seminar/Quiz/Field survey<br>/Viva etc. | 5     |
| iii | Attendance                              | 5     |
| iv  | Two Test papers(2x5)                    | 10    |
|     | Total                                   | 25    |

- i. **Assignments:** Every student shall submit one assignment as an internal component for every course.

| Components       | Marks    |
|------------------|----------|
| Punctuality      | 1        |
| Content          | 2        |
| Conclusion       | 1        |
| Reference/Review | 1        |
| <b>Total</b>     | <b>5</b> |

- ii. **Seminar:** The seminar lecture is expected to train the student in self-study, collection of relevant matter from the books and Internet resources, editing, document writing, typing and presentation.

| Components       | Marks    |
|------------------|----------|
| Content          | 2        |
| Presentation     | 2        |
| Reference/Review | 1        |
| <b>Total</b>     | <b>5</b> |

### iii. Evaluation of Attendance

2.10 The attendance of students for each course shall be another component of internal

assessment.

| % of attendance         | Mark |
|-------------------------|------|
| Above 90%               | 5    |
| Between 85 and below 90 | 4    |
| Between 80 and below 85 | 3    |
| Between 76 and below 80 | 2    |
| Between 75 and below 76 | 1    |

**Components of Internal Evaluation (for theory with practical)**

| <b>Components of Theory – Internal Evaluation</b>  | <b>Marks</b> |
|--|--------------|
| Attendance   | 5            |
| Seminar/ Assignment ( Written assignments, preparation of models, charts, posters etc., field survey, field work ) | 5            |
| Test paper(s)  | 10           |
| Total  | 20           |

**Components of Practical- Continuous internal assessment**

| <b>Components</b>              | <b>Marks</b> |
|--------------------------------|--------------|
| Attendance and Lab involvement | 2            |
| Record                         | 2            |
| Viva/Model Exam                | 1            |
| Total                          | 5            |

**iv. Class Tests:** Every student shall undergo **two class tests** as an internal component for every course.

**b. End Semester Examination (ESE):** The End Semester Examination in theory courses shall be conducted by the college with question papers set by external experts/ question bank. The evaluation of the answer scripts shall be done by the examiners based on a well-defined scheme of evaluation given by the question paper setters/Prepared as per the direction of the Chairman, Board of Examiners. The evaluation of the End Semester Examinations shall be done immediately after the examination preferably through the centralised valuation.

**c. Project**

Project work is a part of the syllabus of most of the programmes offered by the college. The guidelines for doing projects are as follows:

- i. Project work shall be completed by working outside the regular teaching hours.
- ii. Project work shall be carried out under the supervision of a teacher in the concerned department or an external supervisor.
- iii. A candidate may, however, in certain cases be permitted to work on the project in an industrial / Research Organization/ Institute on the recommendation of the Supervisor.
- iv. There should be an internal assessment and external assessment for the project work in the ratio 1:3
- v. The external evaluation of the project work consists of valuation of the dissertation (project report) followed by presentation of the work and viva voce.
- vi. The mark and credit with grade awarded for the program project should be entered in the grade card issued by the college.

**Components of Internal Evaluation for Projects**

| <b>Components</b>               | <b>Marks</b> |
|---------------------------------|--------------|
| Topic/Area selected             | 2            |
| Experimentation/Data collection | 5            |
| Punctuality-Regularity          | 3            |



|              |           |
|--------------|-----------|
| Compilation  | 5         |
| Content      | 5         |
| Presentation | 5         |
| <b>Total</b> | <b>25</b> |

d. **Comprehensive Viva-voce**

Comprehensive Viva-voce shall be conducted at the end of the programme, which covers questions from all courses in the programme as per the syllabus.

e. **Grade and Grade Points**

For all courses (theory & practical), Letter grades and grade point are given on a 10-point scale based on the total percentage of marks, (CIA+ESE) as given below:-

| <b>Percentage of Marks</b> | <b>Grade</b>             | <b>Grade Point (GP)</b> |
|----------------------------|--------------------------|-------------------------|
| 95 and above               | O Outstanding            | 10                      |
| 85 to below 95             | A <sup>+</sup> Excellent | 9                       |
| 75 to below 85             | A Very Good              | 8                       |
| 65 to below 75             | B <sup>+</sup> Good      | 7                       |
| 55 to below 65             | B Above Average          | 6                       |
| 45 to below 55             | C Average                | 5                       |
| 35 to below 45             | D Pass                   | 4                       |
| Below 35                   | F Fail                   | 0                       |
|                            | Ab Absent                | 0                       |

**Grades for the different semesters and overall programme are given based on the corresponding SGPA/CGPA as shown below:**

| <b>SGPA/CGPA</b>       | <b>Grade</b>         |
|------------------------|----------------------|
| Equal to 9.5 and above | <i>O Outstanding</i> |

|                            |                        |
|----------------------------|------------------------|
| Equal to 8.5 and below 9.5 | <i>A+ Excellent</i>    |
| Equal to 7.5 and below 8.5 | <i>A Very Good</i>     |
| Equal to 6.5 and below 7.5 | <i>B+ Good</i>         |
| Equal to 5.5 and below 6.5 | <i>B Above Average</i> |
| Equal to 4.5 and below 5.5 | <i>C Average</i>       |
| Equal to 3.5 and below 4.5 | <i>D Pass</i>          |
| Below 3.5                  | <i>F Failure</i>       |

A separate minimum of 30% marks each for internal and external (for both theory and practical) and aggregate minimum of 35% are required for a pass for a UG programme. A candidate who has not secured minimum marks/credits in internal examinations can re-do the same registering along with the end semester examination for the same semester, subsequently. A student who fails to secure a minimum marks/grade for a pass in a course can be permitted to write the examination along with the next batch.

After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below. For the successful completion of semester, a student should pass all courses and score at least the minimum CGPA grade 'D'. However, a student is permitted to move to the next semester irrespective of her/his SGPA.

**Credit Point (CP)** of a course is calculated using the formula

**CP = Cr x GP**, where Cr = Credit; GP = Grade point

**Semester Grade Point Average (SGPA)** of a Semester is calculated using the formula

**SGPA = TCP/TCr**, where

**TCP = Total Credit Point of that semester =  $\sum_1^n CP_i$ ;**

**TCr = Total Credit of that semester =  $\sum_1^n Cr_i$**

Where n is the number of courses in that semester

**Cumulative Grade Point Average (CGPA)** of a Programme is calculated using the formula

$$\text{CGPA} = \frac{\sum(\text{SGPA} \times \text{TCr})}{\sum \text{TCr}}$$

SGPA/CGPA shall be round off to two decimal places

To ensure transparency of the evaluation process, the internal assessment marks awarded to the students in each course in a semester shall be published on the notice board/website at least one week before the commencement of external examination. There shall not be any chance for improvement for internal mark.

The course teacher and the faculty advisor shall maintain the academic record of each student registered for the course which shall be forwarded to the controller of examinations through the Head of the Department and a copy should be kept in the department for at least two years for verification.

#### **10. Registration for the examination**

- a. All students admitted in a programme with remittance of prescribed fee are eligible for the forthcoming semester examinations.
- b. Online application for registration to the various End Semester Examinations shall be forwarded to the CE along with prescribed fee for each course in prescribed format.
- c. The eligible candidates who secure the prescribed minimum attendance of the total duration of the course and possess other minimum qualification prescribed in the regulations for each course shall be issued the hall tickets. The hall ticket shall be downloaded by the students from the college website.
- d. The mode of fee remittance shall be through the prescribed bank.

#### **11. Supplementary Examinations**

Candidates who failed in an examination can write the supplementary examination conducted by the College along with regular examinations.

#### **12. Improvement of Examination**

A candidate can improve his/her marks once by appearing again for the examination with the subsequent batch with the remittance of prescribed fee. In such cases the better of the two marks shall be taken as the marks awarded to him.

Internal assessment marks shall be carried over to the subsequent semester examination. There shall not be any provision for improving internal assessment marks.

**There will be no improvement examinations for PG programmes**

#### **13. Promotion to the Next Higher Semester**

A candidate shall be eligible for promotion from one semester to the next higher semester if,

a. He / she secures a minimum 75 % attendance and registered for the End Semester Examination of the programme for which he/she is studying.

b. His / her progress of study and conduct are satisfactory during the semester completed, as per the assessments recorded by the course teachers and the Head of the Department concerned.

#### **14. Certificates**

1. Diploma and Degree certificates are issued by the Mahatma Gandhi University, Kottayam as per the act and statues of the University on the submission of the consolidated mark / score cards of the students by the College.

2. A consolidated mark / scored card shall be issued to the candidates after the publication of the results of the final semester examination taken by the candidate.

3. A Course Completion Certificate with classification shall be issued to students till the provisional certificate is issued by the university.

#### **15. Award of Degree**

The successful completion of all the courses with 'D' grade shall be the minimum requirement for the award of the degree. For M.Phil., minimum grade required is 'C'

#### **16. Monitoring**

There shall be a Monitoring Committee constituted by the principal consisting of faculty advisors, HoD, a member from teaching learning evaluation committee (TLE) and the Deans to monitor the internal evaluations conducted by college. The Course teacher, Class teacher and the Deans should keep all the records of the internal evaluation, for at least a period of two years, for verification.

Every Programme conducted under Choice Based Credit System shall be monitored by the College Council under the guidance of IQAC Coordinator, Controller of Exams, academic deans and HoDs.

#### **17. Grievance Redressal Mechanism**

In order to address the grievance of students regarding Continuous internal assessment (CIA) a three-level Grievance Redressal mechanism is envisaged. A student can approach the upper level only if grievance is not addressed at the lower level.

**Level 1:** At the level of the concerned course teacher

**Level 2:** At the level of a department committee consisting of the Head of the Department, a coordinator of internal assessment for each programme nominated by the HoD and the course teacher concerned.

**Level 3:** A committee with the Principal as Chairman, Dean of the Faculty concerned, HOD of the department concerned and one member of the Academic council nominated by the principal every year as members.

## Programme Outcomes

| PROGRAMME<br>OUTCOMES<br>(POs) | PO DESCRIPTION                            |
|--------------------------------|---|
| <b>PO1</b>                     | Critical Thinking & Deep Domain Knowledge |
| <b>PO2</b>                     | Effective Communication                   |
| <b>PO3</b>                     | Contribute to Nation Building             |
| <b>PO4</b>                     | Care for the Environment                  |
| <b>PO5</b>                     | Ethical Values                            |
| <b>PO6</b>                     | Global Perspective                        |

## Programme Specific Outcomes

| PROGRAMME<br>SPECIFIC<br>OUTCOMES<br>(PSOs) | PSO DESCRIPTION  |
|---|--|
| <b>PSO1</b>                                 | Pursue a successful professional career in the software industry, government, academia, research, or other areas where computer applications are deployed. |
| <b>PSO2</b>                                 | Demonstrate proficiency in areas of Computer science such as, networking, web development, database queries, cyber security and software engineering.      |
| <b>PSO3</b>                                 | Develop programming skills, networking skills, learn applications, packages, programming languages and modern techniques of IT.                            |
| <b>PSO4</b>                                 | Apply theoretical concepts to design and develop programs and develop industry-focused skills for a successful career.                                     |
| <b>PSO5</b>                                 | Acquire an understanding in advanced areas of mathematics and statistics.  |

**SEMESTER I**

## SEMESTER I

### DIGITAL ELECTRONICS AND MICROPROCESSOR

|                             |                   |
|-----------------------------|-------------------|
| <b>Course Code</b>          | <b>19U1CRCAP1</b> |
| <b>No. of credits</b>       | 3                 |
| <b>No. of contact hours</b> | 72                |

#### Course Description:

This subject deals with the basic concepts of functioning of a computer. The subject starts with an introduction to number systems and its applications in computers. The subject exposes the students to basic concepts of flip-flops, logic gates and design of different types of flip flops and counters. The discussion about working of devices like encoders and decoders, multiplexers and de multiplexers are dealt here. The design of half adders and full adders are also included as part of this subject. Classification of memory, registers and flags are also dealt with.

#### Objectives:

- Familiarize the working of functional units of computer
- Learn the Concepts of Boolean logic and digital logic circuit
- Analyze and design combinational and sequential digital systems. Use different techniques, among them a hardware description language and a functional programming language, to design digital systems
- Explain the concept of 8086 microprocessor

#### Course Outcomes:

|            |  |
|------------|--|
| <b>CO1</b> | Understand the number system and perform arithmetic operations             |
| <b>CO2</b> | Implementing the boolean expression using boolean algebra                  |
| <b>CO3</b> | Design and implement the logic gates                                       |
| <b>CO4</b> | Analyse and design combinational and sequential circuit                    |
| <b>CO5</b> | Understand the addressing methods and instruction sequencing and execution |
| <b>CO6</b> | Understand the concept of 8086 microprocessor                              |



**UNIT 1:****(14 Hrs)**

**Number Systems:** Base of a number system, Positional number system, Popular number systems (Decimal, Binary, Octal and Hexadecimal), Counting in binary number system, Conversion-Decimal to Binary, Binary to Decimal, Decimal to Octal, Octal to decimal and binary, Decimal to hexadecimal, Hexadecimal to decimal, Binary and octal, Concept of binary addition and subtraction, Complements in binary number systems, 1<sup>s</sup> Complement, 2<sup>s</sup> Complement and their applications, Number representation in memory- bi-stable devices, Signed magnitude form, Representation of real numbers, BCD numbers- concept and addition, Concept of parity bit.

**UNIT 2:****(16 Hrs)**

**Boolean Algebra and Gate Networks:** Logic gates- AND, OR, NOT, NAND and NOR – Truth tables and graphical representation, Basic laws of Boolean Algebra, Simplification of Expressions, De Morgan's theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Representation of simplified expressions using NAND/NOR Gates, Don't care conditions, XOR and its applications, parity generator and checker.

**UNIT 3:****(16 Hrs)**

**Sequential and Combinational Logic:** Flip flops- Latch, Clocked, RS, JK, T, D and Master slave, Triggering of flip flops, Half adder, Full adder (need and circuit diagram), Encoders, Decodes, Multiplexers and De-multiplexers (working of each with diagram), Analog to digital and digital to analog converters

**UNIT 4:****(10 Hrs)**

**Concept of Registers:** Shift Registers, Counters - Synchronous and asynchronous, BCD, Ripple counters.

**UNIT 5:****(16 Hrs)**

Basic operational concepts, Bus structure, Memory locations and addresses, Instructions and instruction sequencing, Instruction execution. Introduction to the concept of 8086 microprocessor: Pin-out Diagram, Operating modes, Operation of 8086, Registers, Interrupts, Bus Cycle, Addressing modes.

**Books of study:**

1. Mano M.M-2016-Digital Logic and Computer design/Computer Architecture 1<sup>ST</sup> Edition-Pearson
2. LYLA B.DAS- 2014-The x86 MicroProcessors Second Edition- Pearson publications

**References:**

1. B RAM-2018 – Fundamentals of Micro Processors and Micro Computers- Dhanpat Rai Publications
2. Thomas C Bartee- 1991-Digital computer Fundamentals Sixth Edition- Tata McGraw-Hill Education
3. Floyd-2006- Digital Electronics- Pearson/Prentice Hall

## SEMESTER I

### PROGRAMMING IN PYTHON

|                             |                   |
|-----------------------------|-------------------|
| <b>Course Code</b>          | <b>19U1CRCAP2</b> |
| <b>No. of credits</b>       | 3                 |
| <b>No. of contact hours</b> | 72                |

#### Course Description

Python is a language with a simple syntax, and a powerful set of libraries. This course is an introduction to the Python programming language for students without prior programming experience. Emphasis is placed on common algorithms and programming principles utilizing the standard library distributed with Python. Upon completion, students should be able to design, code, test, and debug Python language programs.

#### Course Objectives

Upon the successful completion of this course, the student will be able to

- Write algorithms and to draw flowcharts for solving problems. Perform basic calculations, print text on the screen and create lists, and perform simple control flow operations.
- Reuse code with functions.
- Create and execute Python programs
- Understand the concepts of file I/O

#### Course Outcomes (COs)

|            |  |
|------------|--|
| <b>CO1</b> | Write algorithms and to draw flowcharts for solving problems.  |
| <b>CO2</b> | Install and run the Python interpreter.  |
| <b>CO3</b> | Understand the Numbers, Math functions, Strings, List, Tuples, Dictionaries and operators in Python. |
| <b>CO4</b> | Apply different Decision Making statements and loops.  |
| <b>CO5</b> | Understand and summarize different File handling operations and packages.                            |

**UNIT 1:****(14 Hrs)**

**Introduction to programming:** Program Logic and Flowcharts- Introduction to Program Logic, Methodology of Problem Solving, Flowcharts and Flowcharts Symbols. Introduction to Python: Features of Python, How to Run Python, Identifiers, Reserved Keywords, Variables, Comments in Python, Indentation in Python, Multi-Line Statements, Multiple statement Group(Suite), Quotes in Python, Input, Output and Import Functions- Displaying and Output, Reading the Input and Import function, Operators - Arithmetic Operators, Comparison Operators, Assignment Operators, Bitwise Operators, Membership Operators, Identify Operators and Operator Precedence

**UNIT 2:****(12 Hrs)**

**Data Types and Operations:** Numbers- Mathematical Functions, Trigonometric Functions and Random Number Functions. Strings- Escape Characters, String Formatting Operator and String Formatting Functions. List- Built-in List Functions and Built-in List Methods. Tuple-Built-in Tuple Functions. Set- Built-in Set Functions, Built-in Set Methods and Frozenset. Dictionary: - Built-in Dictionary Functions and Built-in Dictionary Methods. Mutable and Immutable Objects, Data Type Conversion

**UNIT 3:****(16 Hrs)**

**Flow Control:** Decision Making- if statement, if..else statement, if...elif...else statement, nested if statement. Loops- for loop, for loop with else, while loop, while loop with else statement, nested loops. Control Statements- break, continue and pass statement. Types of Loops- Infinite Loop, Loops with condition at the - top, middle & bottom.

**UNIT 4:****(18 Hrs)**

**Functions and Modules:** Function Definition, Function Calling, Function Arguments - Required arguments, Keyword arguments, Default Arguments, Variable-Length Arguments, Anonymous Functions (Lambda functions) – Uses of lambda function, Recursive Functions. Functions with more than one return value. Modules- Built-in Modules, Creating Modules, import statement – import with renaming, from...import statement and import all names, Locating Modules – PYTHONPATH variable, Namespaces and Scope, The dir() function, The reload() function, Date and Time Modules- The time Module, The calendar Module and The datetime Module.

**UNIT 5:****(12 Hrs)**

**Packages And Files:** Packages- Importing modules from a Package. Files-Opening a file – Modes for opening a file and Attributes of file object, Closing a file, Writing to a file, Reading from a file, Renaming a file, Deleting a file, Directories in Python – mkdir() method, chdir() method, getcwd() method and rmdir() method.

**Books for study**

1. Dr. Jeeva Jose and Dr. Sojan P. Lal.- ( )-Introduction to Computing & Problem Solving with Python kindle edition-Khanna book publishing
2. John M. Zelle-2003- Python Programming: An Introduction to Computer Science 2nd Edition-originally Published
3. David Ascher and Mark Lutz-2004-Learning Python Kindle Edition-O'REILLY

**References:**

- John M. Zelle Python Programming: An Introduction to Computer Science
- David Ascher and Mark Lutz Learning Python

## SEMESTER I

### PROGRAMMING IN PYTHON (Practical)

|                      |            |
|----------------------|------------|
| Course Code          | 19U1PRCAP1 |
| No. of credits       | 2          |
| No. of contact hours | 72         |

#### Objectives:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.

#### Part I

1. Compute the GCD of two numbers.
2. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
3. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
  - Grade A: Percentage  $\geq 80$
  - Grade B: Percentage  $\geq 70$  and  $< 80$
  - Grade C: Percentage  $\geq 60$  and  $< 70$
  - Grade D: Percentage  $\geq 40$  and  $< 60$
  - Grade E: Percentage  $< 40$
4. Find the square root of a number (Newton's method)
5. Exponentiation (power of a number).
6. Find the maximum of a list of numbers

## **Part II**

7. Linear search.
8. Bubble sort
9. Program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
10. Program to display the first n terms of Fibonacci series.
11. Program to find factorial of the given number.
12. Program to find sum of the following series for n terms:  $1 - 2/2! + 3/3! - \dots - n/n!$
13. First n prime numbers
14. Multiply matrices
15. Programs that take command line arguments (word count)
16. Find the most frequent words in a text read from a file

### **Division of Marks (Practical - 3 hours External)**

#### **First program - questions from Part I - 25 marks**

- Logic – 10 marks
- Successful compilation – 8 marks
- Result – 7 marks

#### **Second program – questions from Part II - 30 marks**

- Logic – 15 marks
- Successful compilation – 10 marks
- Result – 5 marks
- Viva Voce - 10 marks
- Lab Record - 10 marks (Minimum of 25 Programs)

### **Total Marks - 75 marks**

**SEMESTER II**



## SEMESTER II

### OPERATING SYSTEM

|                             |                   |
|-----------------------------|-------------------|
| <b>Course Code</b>          | <b>19U2CRCAP3</b> |
| <b>No. of credits</b>       | 3                 |
| <b>No. of contact hours</b> | 72                |

#### Course Description:

Operating System is the manager of computer resources. The subject introduces the basic components of an operating system and various types of operating systems. Different CPU scheduling techniques gives a clear picture about how an operating system handles different types of tasks. Memory management policies are dealt to give information about how the main memory can be handled by an operating system. Since the secondary storage devices cannot handle more than one request at a time, it is necessary for an operating system to synchronize the jobs waiting for the devices. There are different types of algorithms, which can be used for the same. The subject deals with all these algorithms, which is of great help for an operating system designer. Case studies about DOS and Windows NT are also dealt as part of this subject.

#### Objectives:

- To introduce the fundamental concepts and principles of operating systems
- To emphasize the functions of operating systems to the computer system, the system operator (user), and variations in the design and implementations of operating systems.
- To focus on Foundational concepts, Process management, Memory management, virtual memory, file systems and I/O management

#### Course Outcomes (COs):

|            |   |
|------------|---|
| <b>CO1</b> | The course will allow students to understand the fundamental principles for the analysis, design, and development of operating systems measured by examinations |
| <b>CO2</b> | Student will be able to identify the major components parts of an OS and able to develop a design schema or architecture  |
| <b>CO3</b> | Students will be able to evaluate or validate the OS principles via simulations and/or realistic  |

|            |  |
|------------|--|
| <b>CO4</b> | Students will be able to integrate OS and programming language concepts to solve theoretical problems such as interrupts or similar mechanisms for synchronization, process management and resource scheduling |
|------------|--|

**UNIT 1: (15 Hrs)**

**Introduction:** OS Definition, Functions, OS as a resource manager, types of OS , Evolution of OS, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

**UNIT 2: (15 Hrs)**

**Process:** Basic Concepts, Process Scheduling, Operations on ‘Processes, Inter process communication, Process Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

**UNIT 3: (15 Hrs)**

**Process Coordination:** Synchronization - The Critical Section problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Dead Locks : System Model, Dead Lock Characterization, Methods of Handling Dead Locks, Dead Lock Prevention, Dead Lock Avoidance, Dead Lock Detection, Recovery from Dead Lock.

**UNIT 4: (15 Hrs)**

**Memory Management:** Memory Management Strategies -Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement.

**UNIT 5: (12 Hrs)**

**Storage Management:** File System- File Concept, Access Methods, Directory Structure, Implementing File Systems:-File System Structure, Directory Implementation, Allocation Methods.

**Books for study:**

1. Abraham Silberschatz, Peter Galvin and Greg Gagne, John Wiley -2006- Operating System Principles Seventh Edition-John Wiley and Sons
2. William Stallings -2008-Operating Systems fifth Edition-Pearson Education

References:

1. Milan Kovic-1992-Operating Systems 2nd Edition- McGraw Hill

## SEMESTER II

### DATA STRUCTURES USING 'C'

|                             |                   |
|-----------------------------|-------------------|
| <b>Course Code</b>          | <b>19U2CRCAP4</b> |
| <b>No. of credits</b>       | 3                 |
| <b>No. of contact hours</b> | 72                |

#### Course Description:

The subject deals with the representation of data inside a computer. The subject concentrates on different data structures and their applications. The concepts of arrays linked lists, stacks, queues and trees gives an exposure about how operating systems and compilers are handling their data and symbol table. The subject also deals with different sorting techniques and their time and space complexities. The subject deals with some interesting problems like towers of Hanoi, which can be solved using recursion with the help of a stack. To conclude, the subject gives an overall view of the concepts of systems programming.

#### Objectives:

- To design and implementation of various basic and advanced data structures.
- To improve the logical ability
- To understand the abstract data types stack, queue, de-que and list.
- To understand prefix, infix, and postfix expression formats.
- To use stacks to evaluate postfix expressions.
- To use stacks to convert expressions from infix to postfix.
- To be able to recognize problem properties where stacks, queues, de-queues, tree and graph are appropriate data structures.

#### Course Outcomes (COs)

|            |   |
|------------|---|
| <b>CO1</b> | Understand a variety of techniques for designing algorithms.  |
| <b>CO2</b> | Understand a wide variety of data structures and should be able to use them appropriately to solve problems |
| <b>CO3</b> | Understand some fundamental algorithms.   |

**UNIT 1:** (16 Hrs)

**C language basics:** C character set, Identifiers and keywords, Data types, Enumeration type, constants, variables, declarations, qualifiers – long, short and unsigned declarations, expressions, symbolic constants, input/output functions, compound statements, arithmetic operators, unary operators, relational and logical operators, assignment operators, increment and decrement operators, Precedence and order of evaluation, conditional operators, bit operators, type casting, using library functions in math.h.

**UNIT 2:** (16 Hrs)

Concept of Structured data: Data structure definition, Different types and classification of data structures, Operations on Data structures, Arrays – representation of array in the memory, operations on one dimensional and two dimensional arrays, Bubble sort, Selection sort, linear search, binary search, sparse matrix.

**UNIT 3:** (14 Hrs)

Stacks and Queues: organization and operation on stacks – Conversion between infix to postfix & prefix representations- Expression Evaluation - Organization and operations on queues- circular queue-multiple stacks and queue - Applications of stacks and queues.

**UNIT 4:** (14 Hrs)

Linked list: Memory allocation (dynamic vs. static), concept of dynamic data structures, linked list, need, basic operations and types of linked list, linked list using pointers, insertion and deletion – examples, circular list – doubly linked lists, garbage collection.

**UNIT 5:** (12 Hrs)

Trees: Concept of recursion, definition of - trees, binary trees, strictly binary trees, complete binary tree and Binary search tree, Creation of binary search tree, traversing methods – examples, Graph.

**Books of study:**

1. G.S Baluja-2012-Data Structures through C (A Practical Approach) - Dhanpat Rai & Co.
2. Ellis Horowitz and Sartaj -2008-Fundamentals of Data Structures second edition-Sajni Galgotia Publications

**References:**

1. Ashok N. Kamthane-2004 -Introduction to data structures in C -Person Education
2. Seymour Lipschutz-2005-Theory and Problems of Data Structures(Schaum's Outline Series)-Kindle Edition
3. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein-1998-Data structures using C Second Edition- Pearson

## SEMESTER II

### DATA STRUCTURES USING 'C' (Practical)

|                      |            |
|----------------------|------------|
| Course Code          | 19U2PRCAP2 |
| No. of credits       | 3          |
| No. of contact hours | 72         |

#### Part I:

1. Array search and sort – Bubble sort, Selection sort, linear search, binary search, sparse matrix, polynomial addition.
2. Stack implementation, Application of stacks – Conversion of infix expression to postfix, expression evaluation.

#### Part II.

1. Queue implementation, Implementation of circular queue.
2. Linked list- implementation, concatenation etc., circular list and doubly linked list implementation, implementation of stacks and queue using linked lists.
3. Creation and traversal of binary search trees.
4. Creation and traversal of graph.

#### Division of Marks (Practical - 3 hours External)

First program - questions from Part I - 25 marks

- Logic – 10 marks
- Successful compilation – 8 marks
- Result – 7 marks

Second program – questions from Part II - 30 marks

- Logic – 15 marks
- Successful compilation – 10 marks
- Result – 5 marks

Viva Voce - 10 marks

Lab Record - 10 marks (Minimum of 25 Programs)

**Total Marks - 75 marks**



**SEMESTER III**

## SEMESTER III

### DATA COMMUNICATION AND COMPUTER NETWORKS

|                      |            |
|----------------------|------------|
| Course Code          | 19U3CRCAP5 |
| No. of credits       | 3          |
| No. of contact hours | 72         |

#### Course Description:

This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. This course covers layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, wired and wireless networks, error detection and correction, mobile computing, and cloud computing and its advantages.

#### Objectives:

- Build an understanding of the fundamental concepts of computer networking.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- Introduce the area of cryptography, symmetric and asymmetric cyphers.
- Introduce the basic concepts of mobile computing, cloud computing and IoT.
- Introduce key features, advantages, disadvantages, sensors and devices of IoT.

#### Course Outcomes (COs)

|     |  |
|-----|--|
| CO1 | Understand the concepts of data communication, types of communication, topology, categories of network, protocols & standards, transmission modes, ISO-OSI and TCP/IP model. |
| CO2 | Discuss about analog and digital signals, transmission impairment, transmission modes, transmission media and types of switching.  |
| CO3 | Discuss different types of error detection and correction methods, types of framing, flow control protocols and random access protocols in data link layer.                  |

|            |   |
|------------|---|
| <b>CO4</b> | Distinguish different types of connecting devices, wired and wireless LAN in network layer. |
| <b>CO5</b> | Discuss about the concepts of mobile computing, cloud computing and IoT.                    |
| <b>CO6</b> | Discuss about the cyphers used in cryptography.   |

**UNIT 1: (10 Hrs)**

**Introduction to Data Communication:** Components – Data Representation – Data Flow. Networks: Distributed Processing - Network Criteria. **Physical Structures:** Types of Connection. Physical Topology: Categories of Topologies – Bus – Star – Ring – Mesh. Categories of Networks: LAN – MAN - WAN. **Protocols and Standards:** Protocols – Standards - Standards Organizations. **Transmission modes:** Network models – OSI model – seven layers and their functions in OSI model - TCP/IP protocol suite.

**UNIT 2: (12 Hrs)**

**Data and Signals: Analog and Digital Data** – Analog and Digital Signals– Periodic and Non-Periodic Signals. **Periodic Analog Signals:** Sine Wave - Phase - Wave Length –Time and Frequency Domain – Composite Signals – Bandwidth. **Digital Signals:** Bit Rate - Bit Length. **Transmission Impairment:** Attenuation - Distortion –Noise. **Transmission Modes:** Parallel Transmission – Serial Transmission. Multiplexing: FDM – TDM – Synchronous and Statistical TDM – WDM, Spreading, **Transmission Media:** Guided Media –Twisted Pair, Coaxial and Fiber Optic, Unguided Media - Radio Waves – Microwaves – Infrared. **Switching:** Circuit Switching - Datagram Network.

**UNIT 3: (14 Hrs)**

**Data Link layer: Error detection and Correction:** Types of Errors – Redundancy – Detection versus Correction – Forward Error Correction versus Retransmission – Coding – Modular Arithmetic. **Block Coding:** Error Detection – Error Correction – Hamming Distance – Minimum Hamming Distance. Linear Block Codes: Some Linear Block Code. Cyclic Codes: Cyclic Redundancy Check – Checksum. **Framing:** Fixed Size Framing – Variable Size Framing. **Flow Control:** Noiseless Channel Protocol: Simplest Protocol – Stop and Wait

Protocol. Noisy Channel Protocols: Stop and Wait ARQ – Go Back N ARQ – Selective Repeat ARQ – Piggy Backing. Multiple Access: **Random Access:** ALOHA – CSMA - CSMA/CD.

**UNIT 4:** (16 Hrs)

**Connecting Devices:** Hubs, Switches, Repeaters, Bridges, Routers and Gateway. **Network Layer:** Host to Host delivery - Logical Addressing – Internet protocol: IPV4 and IPV6 – Address Mapping – ICMP – IGMP – Unicasting, Multicasting and Broadcasting.

**Wired and Wireless LAN:** Wireless WAN-Cellular Telephony and Satellite Networks.

**Mobile Computing:** Wireless networks: Wireless communication concepts; classification of wireless networks. Cellular networks (1G, 2G, 3G, 4G), WLAN, WPAN, WMAN, Satellite Networks, Mobile and Wireless Devices –Need for Mobile Computing, Mobility management: Handoff and location management concepts.

**UNIT 5:** (20 Hrs)

**Transport Layer:** UDP – TCP, **Application Layer:** Name Space – Domain Name Space – Label, Domain Name- fully and partially qualified domain names. **Remote logging** - Telnet, FTP, SMTP, and Voice over IP. **Cryptography:** Symmetric and Asymmetric. **Cloud Computing:** cloud computing overview, definition and characteristics, grid computing, difference between grid computing and cloud computing, advantages of cloud computing, cloud deployment models/types (public, private, hybrid, and community clouds), cloud service models (IaaS, PaaS, SaaS, BPAas). **IoT:** Introduction, scope & advantages, sensors and devices of IoT.

**Books for Study and Reference:**

1. Behrouz and Forouzan – 2000-Introduction to Data Communication and Networking 4th Edition – Mc Graw Hill
2. Asoke K Talukder, RoopaYavagal- 2007-Mobile ComputingTechnology, Applications, and Service Creation 1st Edition - McGraw-Hill - 2007
3. Saurabh K-2012-Cloud Computing 2nd Edition - Wiley India Pvt. Ltd
4. Cuno Pfister -2011-Getting Started with the Internet of Things - O' Reilly

## SEMESTER III

### OBJECT ORIENTED PROGRAMMING IN C++

|                             |                   |
|-----------------------------|-------------------|
| <b>Course Code</b>          | <b>19U3CRCAP6</b> |
| <b>No. of credits</b>       | 3                 |
| <b>No. of contact hours</b> | 72                |

#### Course Description:

C++ is the first object oriented programming language taught in the course. The concept of classes and objects make it easy to represent real world entities. The subject starts with the comparison between procedural languages and object oriented languages. The concepts of operator overloading and function overloading are discussed to expose the students to the advantages of object oriented programming. Advanced topics like inheritance and its various types and virtual functions are taught in depth with its application areas. It is an important language to learn because of its compact syntax and ability to interact with hardware directly. C++ is used frequently in areas such as game development, hardware manufacturing, embedded systems, and for military applications.

#### Course Objectives:

- Explain how an existing C++ program works
- Discover errors in a C++ program and describe how to fix them
- Critique a C++ program and describe ways to improve it
- Analyze a problem and construct a C++ program that solves it
- Be able to understand and analysis any problem and derive its solution.

#### Course Outcomes (COs)

|            |   |
|------------|---|
| <b>CO1</b> | Know the principles of object-oriented problem solving and programming.   |
| <b>CO2</b> | Outline the essential features and elements of the C++ programming language.  |
| <b>CO3</b> | Explain programming fundamentals, including statement and control flow and recursion.   |
| <b>CO4</b> | Apply the concepts of class, method, constructor, data abstraction, function abstraction, inheritance, overloading, and polymorphism. |

**UNIT 1: (16 Hrs)**

**Object Oriented language C++:** Basic concept of object oriented programming -benefits of oops-Structure of C++ Program-Basic, derived and user defined data types-Symbolic constants-operators in C++ - Control Structures -Functions in C++-The main function, function prototyping-call by reference-return by reference- inline function-function overloading- friend and virtual functions.

**UNIT 2: (14 Hrs)**

**classes and objects**-specifying a class - Defining member functions - Nesting of member functions - Private member functions - arrays within a class - static data members - static member functions - Arrays of objects-objects as function arguments

**UNIT 3: (14 Hrs)**

**Constructors and Destructors**- Constructors- Parameterized Constructors-Multiple constructors - Copy constructor - Dynamic constructor-Destructors - Operator overloading & Type conversions.

**Inheritance**-Defining derived classes-Single, Multiple, Multilevel, Hierarchical and hybrid inheritance- private, public, protected inheritance-virtual base classes-Abstract classes- Constructors in derived classes- nesting of classes.

**UNIT 4: (14 Hrs)**

**Pointers-Virtual functions and polymorphism**-Pointers-Pointers to objects-this pointer-pointer to derived classes-virtual functions-Pure virtual functions-C++ streams-Stream classes-Unformatted and Formatted console I/O operations- Managing output with manipulators. Manipulation of strings.

**UNIT 5: (14 Hrs)**

**Exception Handling**- Exception Handling, principle of Exception handling, Exception handling mechanism, multiple catch, nested try, Rethrowing the exception.

**Book of study:**

1. James Rumbaugh, Michael Blaha -2007-Object Oriented Modeling and Design with UML Second Edition-Pearson Education

2. E. Balaguruswamy - Object oriented Programming with C++ Fourth edition –McGraw Hill

**References:**

1. Yashwant Kanetkar – 2001 Let Us C++Second Edition - BPB Publications
2. John R Hubbard -2004-Programming with C++ (Shaum’s Outline series) Second Edition- McGraw Hill
3. Rajesh K Shukla- 2008-Objected-Oriented Programming in C++ -Wiley India
4. Venugopal, Rajkumar Buyya-2013-Mastering C++ Second Edition - McGraw Hill

## SEMESTER III

### OBJECT ORIENTED PROGRAMMING IN C++ (Practical)

|                      |            |
|----------------------|------------|
| Course Code          | 19U3PRCAP3 |
| No. of credits       | 2          |
| No. of contact hours | 54         |

#### Part I

1. Basic C++ programs (control structures, functions etc.)
2. Programs using function prototyping, call by reference, return by reference
3. Programs using inline function
4. Programs based on class, objects and manipulation of objects using member functions
5. Programs based on friend functions, passing objects as arguments to function.
6. Programs based on array of objects.

#### Part II

7. Programs based on constructors: Copy constructor, Default constructor.
8. Programs based on static data members and static member functions
9. Programs based on function overloading, Default arguments.
10. Programs based on operator overloading (binary, unary) using member functions and friend functions.
11. Programs based on Inheritance: Single inheritance, multiple inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance
12. Programs using virtual functions and polymorphism, this pointer, exception Handling

#### Division of Marks (Practical - 3 hours External)

First program - questions from Part I - 25 marks

- Logic – 10 marks
- Successful compilation – 8 marks
- Result – 7 marks



Second program – questions from Part II - 30 marks

- Logic – 15 marks
- Successful compilation –10 marks
- Result – 5 marks

Viva Voce - 10 marks

Lab Record - 10 marks (Minimum of 25 Programs)

**Total Marks - 75 marks**

**SEMESTER IV**

## SEMESTER IV

### ADVANCED WEB TECHNOLOGY

|                      |            |
|----------------------|------------|
| Course Code          | 19U3CRCAP7 |
| No. of credits       | 4          |
| No. of contact hours | 72         |

#### Course Description:

This course provides a web development platform on Windows. It allows to create dynamic web applications with HTML5, CSS3, Apache, PHP, and MySQL. This course is designed for the absolute beginner, meaning no experience with WAMP (Windows, Apache, MySQL, PHP).

#### Objectives:

- To understand the various steps in designing a creative and dynamic website
- To introduce HTML and style sheet.
- To create good, effective and customized websites
- To practice the hands-on experience in PHP
- To know the data administration using MySQL

#### Course Outcomes (COs)

|     |  |
|-----|--|
| CO1 | Introduce the fundamental concepts of Internet.                                |
| CO2 | Understand the HTML Tags and its uses.   |
| CO3 | Learn the HTML form elements and Input Types.                                  |
| CO4 | Gain ability to explore style sheet.   |
| CO5 | Gain knowledge on writing JavaScript programme.                                |
| CO6 | Learn PHP and its various functions.   |
| CO7 | Understand PHP MySQL, its Queries and the ability to establish the connection. |

#### UNIT I

(14 Hrs)

Introduction to Internet: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers

HTML: Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, frames and frame sets, Overview and features of HTML5.

## **UNIT II** **(10 Hrs)**

Style sheets: Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes. XML, DTD and Schemas. Frameworks: Introduction to Bootstrap. Creating responsive webpages with bootstrap. JavaScript: Introduction to JavaScript, The Basics of JavaScript: Overview of JavaScript, Object Orientation and JavaScript.

## **UNIT III** **(16Hrs)**

General Syntactic Characteristics- Primitives, Operations, and expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Callback Functions, Java Script HTML DOM, Ajax - Introduction, advantages & disadvantages, Purpose of it, ajax based web application. jQuery -Introduction to jQuery: Overview and Basics.

## **UNIT IV** **(16 Hrs)**

Introduction to PHP:PHP Basics Syntax, PHP Variables, Global Array and Expression, PHP Operators, PHP Conditional Events and Switch case, PHP Flow Control and Loops, Types of Errors, Array, For each Loop, String Manipulation and Regular Expression, Global Array, String inbuilt functions, Math functions, Array Inbuilt functions.

## **UNIT V** **(16 Hrs)**

Using HTML Forms: PHP form handling, get data sent from form fields through GET and POST method, form validation, sessions and cookies.

Introduction to PHP MySQL: PHP-MySQL Connection overview, 3 different approaches – procedure, object oriented, PDO; PHP-MySQL function to connect to database, access database, fetch result.

**Text Books:**

1. Powell-2003-HTML & XHTML: The Complete Reference, 4th Edition-Tata McGraw Hill
2. Steven Holzner-2008-PHP: The Complete Reference, McGraw-Hill Higher Education
3. Robin Nixon-2009-Learning PHP, My SQL and Java Script Kindle Edition -OReilly Media

## SEMESTER IV

### **DATABASE MANAGEMENT SYSTEM**

|                             |                   |
|-----------------------------|-------------------|
| <b>Course Code</b>          | <b>19U4CRCAP8</b> |
| <b>No. of credits</b>       | 3                 |
| <b>No. of contact hours</b> | 72                |

#### **Course Description:**

All the computer-based applications require data to operate. These data are efficiently handled by a database management system. The subject deals with what is a database and how a database should be designed. It also deals the popular relational data model and SQL queries in depth. It also concentrates on various techniques for database protection and query optimization. The subject also deals with different normalization in brief.

#### **Objectives:**

- To give a good formal foundation on the relational model of data
- To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design
- To present the concepts and techniques relating to query processing by SQL engines
- To introduce the concepts of transactions and transaction processing
- To present the issues and techniques relating to concurrency and recovery in multi-user database environments

#### **Course Outcomes (COs)**

|            |   |
|------------|---|
| <b>CO1</b> | Identify and define the information that is needed to design a database management system             |
| <b>CO2</b> | Build a database management system that satisfies relational theory with queries, forms, and reports. |

|            |  |
|------------|--|
| <b>CO3</b> | Understand the core terms, concepts and tools of relational database management systems. |
| <b>CO4</b> | Design entity-relationship diagrams to represent simple database application scenarios   |

**UNIT 1: (15 Hrs)**

**Introduction:** Characteristics of database approach, Data base users-DBA, Data base designers and end users, Advantages of using DBMS. **Data Modes:** Schemas and instances, DBMS architecture and data independence. **DBMS language:** DDL, DML, DCL Data Base system environment, DBMS Component and modules. **ER Modeling:** Introduction- Entity types, Entity sets, Attributes and Keys, Relationship Types, Relationship Sets relationship instances, Constraints on relationship types, Weak entity types, and sample ER diagrams.

**UNIT 2: (15 Hrs)**

**Relational Data Model:** Relational model concepts domains, attributes, tuples and relations, characteristics of relations. Relational Model constraints Relational Databases and relational data base schemas, entity integrity, referential integrity and foreign keys with examples. **Relational algebra and Relational calculus:** Relations Operations, SELECT, PROJECT, UNION, INTERSECTION, The CARTESIAN PRODUCT, JOIN, EQUIJOIN, Aggregate functions. Examples of queries in Relations Algebra Tuple relations calculus, Domain relational calculus. Relational Data base design using ER-to-Relational mapping.

**UNIT 3: (12 Hrs)**

**SQL:** Data definition commands- CREATE, ALTER,DROP, Adding constraints, Basic SQL queries-INSERT, SELECT,DELETE,UPDATE Ordering of rows UNION,EXCEPT,INTERSET Substring comparisons using LIKE operator, BETWEEN operator, Complex Queries-Nested queries, EXISTS and UNIQUE functions, NULL values, Renaming of attributes and joining of tables, Aggregate functions and grouping, Managing views.

**UNIT 4:****(15 Hrs)**

**Data Normalization:** Informal Design Guide lines for relation schemas, functional dependencies. **Normal forms:** first, second and third normal form, Boyce- Codd normal form, fourth and fifth Normalisation. **Indexing structures for files:** types of single level ordered indexes.

**UNIT 5:****(15 Hrs)**

**Transaction processing:** Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions. **Database Security and Authorization:** Types of security, control measures, database security and the DBA. **Data Mining Concept:** Introduction to Data mining, Approaches to data mining problems, Applications. **Overview of data warehouse:** Introduction, definition, characteristics, Building a data Ware House, problems and open issues in Data warehouses. **Introduction to Big Data-** What is Big Data. Why Big Data is Important, Characteristics, Tools, Applications, Attributes of Big Data, types of Data, Challenges of big Data. **Introduction to Hadoop:** History, advantages and limitations.

**Books of study:**

1. RamezElmasri and Shamkant B. Navathe -2011- Fundamentals of Database Systems 5th edition- Pearson Education
2. Jain V. K.– 2017-Big Data and Hadoop – Khanna publishing

**References:**

1. Date C.J-2004-Database Systems 8E, Addison Wesley Pub. Co.
2. Reghu Ramakrishnan -1998-Data base Management Systems - McGraw Hill International Edition.
3. Bipin Desai -1991-An Introduction to Database Systems -Galgoria Publications
4. Subhashini Chellappan-2015-Big Data and Analytics- Wiley



## SEMESTER IV

### ADVANCED WEB TECHNOLOGY (Practical)

|                      |            |
|----------------------|------------|
| Course Code          | 19U4PRCAP4 |
| No. of credits       | 2          |
| No. of contact hours | 36         |

#### Part I:

1. Create a vertical frameset with 3 different documents & Jump to a specified section within a frame
2. Create a horizontal frameset with 3 different documents & Jump to a specified section within a frame
3. Write a HTML program to send a mail from HTML form
4. Insert images from another folder or another server in a HTML document and align the image within a text
5. Create an application form for a computer center in HTML (use textbox, check box, button)
6. Create an advertisement in HTML for a leading software company (animate pictures, link multiple documents)

#### Part II:

1. PHP Program for the following Date and Time Functions
2. Write Java Script program to check for validation in a text box
3. Write PHP program to load different advertisement in a web
4. Perform the validation in a web application form in PHP
5. Database connection - Bind student database to a DataList control in PHP

#### Division of Marks (Practical - 3 hours External)

#### First program - questions from Part I - 25 marks

- Logic – 10 marks
- Successful compilation – 8 marks

- Result – 7 marks

**Second program – questions from Part II - 30 marks**

- Logic – 15 marks
- Successful compilation –10 marks
- Result – 5 marks

Viva Voce - 10 marks

Lab Record - 10 marks (Minimum of 25 Programs)

**Total Marks - 75 marks**

**SEMESTER V**

## SEMESTER V

### PROGRAMMING IN JAVA

|                      |            |
|----------------------|------------|
| Course Code          | 19U5CRCAP9 |
| No. of credits       | 4          |
| No. of contact hours | 72         |

#### Course Description:

The course will introduce students to object oriented programming using Java. It assumes that students know the basics of scalar types (integers, strings and booleans) and fundamental control structures in procedural programming (loops, assignment statements, conditional expressions). It will focus on more sophisticated features such as design of classes, interfaces, packages and APIs. It will also cover the basic principles of event handling, multithreading, applet programming, swing programming and JDBC.

#### Course Objectives:

- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc. and exception handling mechanisms.
- Understand the principles of inheritance, packages and interfaces.
- Gain knowledge in the concepts of exception handling, applet, swing and JDBC.

#### Course Outcomes COs)

|     |  |
|-----|--|
| CO1 | Explain OOP Principles, OOP programming concepts and Java special features.  |
| CO2 | Understand the concepts of classes and Objects, constructors, method overloading, method overriding and inheritance.       |
| CO3 | Discuss about the array concepts, multiple inheritance using package and interface, exception handling and multithreading. |
| CO4 | Understand the concepts of event handling, swing architecture, swing components and layout managers.                       |

|            |   |
|------------|---|
| <b>CO5</b> | Discuss about applet life cycle, working with graphics, JDBC connection |
|------------|---|

**UNIT 1: (12 Hrs)**

Concepts of Object oriented programming, Benefits of OOP, Features of java. Java environment, java tokens, Constant, variables, data types, operators, Control Statements-branching statements, looping statements, jump statements, labelled loops.

**UNIT 2: (12 Hrs)**

Defining a Class, Fields declaration, Method declaration, Creating object, Accessing class members, method overloading, Constructors, constructor overloading, super keyword, static Members, Inheritance, overriding methods, dynamic method dispatch, final(variables, methods and classes), abstract methods and classes, interfaces, visibility control.

**UNIT 3: (16 Hrs)**

Arrays: One dimensional arrays, declaration, creation, initialization of arrays, two dimensional arrays, String class. Packages: java API packages overview (lang, util, io, awt, swing, applet), user defined packages-creating packages. Exception Handling: try-catch-throw-throws-finally. Multithreading: Creation of multithreaded program-Thread class-Runnable interface, Thread life cycle.

**UNIT 4: (16 Hrs)**

Event Handling-Delegation Event Model-Event Classes-Sources of Events-Event Listeners-Event classes. Swing- architecture, components of swing- JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTextField, JText Area, JPanel, JFrame. Layout Managers (Flow Layout, Grid Layout, Card Layout, Border Layout).

**UNIT 5: (14 Hrs)**

Applet Fundamentals -applet tag, applet life cycle, passing parameters to applets. Working with graphics - Line, Rectangle, Oval, Arc, color setting. JDBC architecture - JDBC connection, JDBC statement object, JDBC drivers.

**Books of study:**

1. E. Balagurusamy-2014- Programming with Java Third Edition- McGraw Hill Companies.
2. K. Somasundaram – 2005-PROGRAMMING IN JAVA2 First Edition-Jaico Publishing House

**References:**

1. Patrick Naughton-1999-Java2 The Complete Reference Seventh Edition-Mc graw Hill
2. Cay S Horstmann & Gary Cornell-2007-Core Java Volume 1Fundamentals Eighth edition-Sun microsystems inc
3. Kogent Learning solutions-2007-Java 6 Programming Black Book 6th Edition- Wiley

## SEMESTER V

### SOFTWARE ENGINEERING AND ENVIRONMENTAL STUDIES

|                             |                    |
|-----------------------------|--------------------|
| <b>Course Code</b>          | <b>19U5CRCAP10</b> |
| <b>No. of credits</b>       | 3                  |
| <b>No. of contact hours</b> | 90                 |

#### **Course Description:**

Our mission is to prepare students for successful careers in software engineering and graduate education with a thorough understanding of software engineering and experiential learning opportunities to apply that knowledge to solve real-world problems. Along with basic knowledge about the natural resources and human rights.

#### **Objectives:**

The program will prepare our students to be successful professionals in the field with solid fundamental knowledge of software engineering.

- Be successful professionals in the field with solid fundamental knowledge of software engineering
- Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes
- Able to understand the types of natural resources and human rights.

#### **Course Outcomes (COs)**

|            |  |
|------------|--|
| <b>CO1</b> | Apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment. |
| <b>CO2</b> | An ability to work in one or more significant application domains.   |

|            |   |
|------------|---|
| <b>CO3</b> | Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.                              |
| <b>CO4</b> | Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle. |
| <b>CO5</b> | Demonstrate an ability to use the techniques and tools necessary for engineering practice.  |

**UNIT 1: (12 Hrs)**

**Software Product and Process:** Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering, Overview – Product Engineering Overview.

**UNIT 2: (12 Hrs)**

**Software Requirements:** Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioral Models – Structured Analysis and Data Dictionary.

**UNIT 3: (15 Hrs)**

**Analysis, Design Concepts and Principles:** Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.

**UNIT 4: (15 Hrs)**

**Testing:** Taxonomy of Software Testing – Types of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing and Debugging – Software Implementation Techniques.

**UNIT 5: (18 Hrs)**

**Natural resources: Renewable and non-renewable resources:** Forest resources: Use of over exploitation, deforestation, case studies. Timber, mining, dams and their effects on forests and



tribal people. **Water resources:** Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems. **Mineral resources:** Use of exploitation and environmental effects of extracting and using mineral resources, case studies. **Food resources:** World food problems, changes caused by agriculture and overgrazing, effect of modern agricultural fertilizers- pesticides, water logging, salinity, case studies. **Energy resources:** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies. **Land resources:** Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**Environment and Human Rights** - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment.

**Books of study:**

1. Ian Sommerville-2007-Software engineering-Seventh Edition-Pearson Education Asia
2. Roger S. Pressman-2005-Software Engineering A practitioner's Approach Sixth Edition-McGraw Hill International
3. Agarwal K.C-2001- Environmental Biology- NidhiPubl.Ltd. Bikaner.
4. Bharucha Erach-2002-The Biodiversity of India-Mapin Publication Pvt.Ltd, Ahamadabad
5. Bharucha Erach-2013-Text Book of Environmental Studies for undergraduate Courses IInd Edition - University Press
6. Clark.R.S-2001-Marine Pollution fifth Edition- Clanderson Press Oxford (Ref)

## SEMESTER V

### INTERNET, WEB DESIGNING AND CYBER LAWS

(Open Course)

|                             |                   |
|-----------------------------|-------------------|
| <b>Course Code</b>          | <b>19U5OCCAP1</b> |
| <b>No. of credits</b>       | 3                 |
| <b>No. of contact hours</b> | 72                |

#### Course Description:

This course introduces the concept of the internet, internet services and its applications. The subject also deals with web designing using html, a brief introduction to cybercrimes and cyber laws.

#### Objectives:

The course aims:

- To explain the basic concepts of internet and internet services
- To explain the facilities for secure communication
- To explain HTML and cyber crimes

#### Learning Outcomes:

|            |   |
|------------|---|
| <b>CO1</b> | Understand the basic concepts related to internet and its standard protocols. |
| <b>CO2</b> | Design web pages using HTML   |
| <b>CO3</b> | Understand the basic concepts of internet services.                           |
| <b>CO4</b> | Understand about E-commerce and business                                      |
| <b>CO5</b> | Understand key terms and concepts in cyber crimes                             |

**UNIT 1:** (14 Hrs)

**Internet** – Introduction, Basic Communication, Local Area Network, Packet Switching, Internet: A Network of Networks, ISPs and Network Connections, IP Address, Transmission Control Protocol (TCP), Domain Names.

**UNIT 2:** (14 Hrs)

**Internet Services:** Electronic mail, Bulletin Board Service (Network News), browsing the World Wide Web, Automated Web Search (Search Engines), Audio and Video Communication, Faxes and Files (FTP), Remote Login.

**UNIT 3:** (12 Hrs)

**E-Commerce:** Facilities for Secure Communication, Electronic Commerce and Business.

**UNIT 4:** (16 Hrs)

**Web Programming** - Introduction to Html, Creating Web Pages, Formatting Tags, Font, lists, table, form, marquee, frame tags, Creation of simple Web Sites.

**UNIT 5:** (16 Hrs)

**Cyber Crimes** –Computer Crime, Nature of Crimes, Penalty for damage to Computer, Computer system, tampering with Computer Source Documents, Hacking, Computer Related Offences, Theft, The Language of Cyberspace.

**Books of study:**

1. Douglas E. Comer-2015- The Internet Book Third Edition- Pearson Education Limited
2. Steven Holzner-2005-HTML Black Book-Kogent Learning Solutions
3. Barkha and U. Rama Mohan -2016-Cyber Law Crimes 2nd Edition- Asia Law House

**References:**

1. Harley Hahn-1996-Internet Complete Reference- McGraw-Hill

## SEMESTER V

### PROGRAMMING IN JAVA (Practical)

|                      |            |
|----------------------|------------|
| Course Code          | 19U5PRCAP5 |
| No. of credits       | 3          |
| No. of contact hours | 36         |

#### Part I.

- Applet, JDBC connection and swing based Programs

#### Part II (using class and read inputs from keyboard)

- Java Programs: Method Overloading- Method Overriding-inheritance-abstract class
- Interfaces- packages-Exception Handling-Multithreading
- Scheme of Evaluation for software lab V external is as follows:
- (There will be two questions; the first from Part I and second from Part II)

#### Division of Marks (Practical - 3 hours External)

##### First program - questions from Part I - 25 marks

- Logic – 10 marks
- Successful compilation – 8 marks
- Result – 7 marks

##### Second program – questions from Part II - 30 marks

- Logic – 15 marks
- Successful compilation –10 marks
- Result – 5 marks
  
- Viva Voce - 10 marks
- Lab Record - 10 marks (Minimum of 25 Programs)

**Total Marks - 75 marks**

**SEMESTER VI**

## SEMESTER VI

### COMPUTER GRAPHICS

|                             |                    |
|-----------------------------|--------------------|
| <b>Course Code</b>          | <b>19U6CRCAP11</b> |
| <b>No. of credits</b>       | 4                  |
| <b>No. of contact hours</b> | 90                 |

#### Course Description:

Input and display devices, scan conversion of geometric primitives, 2D and 3D geometric transformations, clipping and windowing, scene modeling and animation, algorithms for visible surface determination, local and global shading models, color and real-time rendering methods.

#### Objectives:

- To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
- To learn the basic principles of 3- dimensional computer graphics.
- Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
- To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

#### Course Outcomes (COs):

|            |  |
|------------|--|
| <b>CO1</b> | Understand the basic concepts used in computer graphics.   |
| <b>CO2</b> | Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. |
| <b>CO3</b> | Describe the importance of viewing and projections.  |
| <b>CO4</b> | Define the fundamentals of animation, virtual reality and its related technologies.                                      |

|            |   |
|------------|---|
| <b>CO5</b> | Understand a typical graphics pipeline.                       |
| <b>CO6</b> | Design an application with the principles of virtual reality. |

**Unit 1: (16 Hrs)**

Image Representation: The RGB Colour model, Direct coding, Lookup table, Display monitor, Printer, Image files, Setting the colour attributes of pixels, Example: visualizing the Mandelbrot set. Scan Conversion: Scan-converting a point, Scan converting a line, Scan-converting a circle, Scan-converting a Ellipse, Scan-converting a arcs and sectors, Scan-converting a Rectangle, Region filling, Scan-converting a character, Anti-Aliasing, Example: recursively defined, Drawings.

**Unit 2: (16 Hrs)**

Two-Dimensional Transformation: Geometric transformations, Coordinate transformations, Composite transformations, Instance transformations. Two Dimensional Viewing and Clipping: Window-to-Viewport mapping, Point clipping, Line Clipping, Polygon Clipping, Example: A 2d Graphics pipeline.

**Unit 3: (15 Hrs)**

Three-Dimensional Transformations: Geometric transformations, Coordinate transformations, Composite transformations, Instance transformations. Three Dimensional Viewing and Clipping: Three-Dimensional Viewing, Clipping, Viewing Transformation and example: A 3D Graphics Pipeline.

**Unit 4: (14 Hrs)**

Geometric Representation: Simple Geometric forms, wireframe models, curved surfaces, curved design, polynomial basis functions, the problem of interpolation, the problem of approximation, curves surface design, transforming curves and surfaces.

**Unit 5: (14 Hrs)**

Hidden Surfaces: Depth Comparisons, z-Buffer algorithm, back-face removal, the painters algorithms, scan-line algorithm, subdivision algorithm.

Books of study:

1. Zhigang Xiang and Roy Plastock-2006-Computer Graphics Schaum's outlines 2nd Edition - McGraw Hill Education

**Reference Books:**

- 1 1 Donald Hearn and M.Pauline Baker-2000-Computer Graphics C version 2 Edition – PEARSON Education
- 2 William M. Newman and Robert F. Sproull-2001-Principles of Interactive Computer Graphics 2nd Edition- McGraw Hill
- 3 Yashwant Kanetkar-2003-Graphics under C-BPB publications



## SEMESTER VI

### ARTIFICIAL INTELLIGENCE

(Elective)

|                      |               |
|----------------------|---------------|
| Course Code          | 19U6CRCAP12EL |
| No. of credits       | 4             |
| No. of contact hours | 90            |

#### Course description:

Artificial intelligence (AI) is a research field that studies how to realize the intelligent human behaviours on a computer. This course will introduce the basic principles in artificial intelligence research. It will cover simple representation schemes, problem solving paradigms, constraint propagation, and search strategies. Areas of application such as knowledge representation, natural language processing, expert systems, vision and robotics will be explored.

#### Course Outcomes (COs)

|     |   |
|-----|---|
| CO1 | Understand both the achievements of AI and the theory underlying those achievements.  |
| CO2 | Discuss the engineering issues underlying the design of AI systems.   |
| CO3 | Understand the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs. |
| CO4 | Understand some of the more advanced topics of AI such as learning, agents and robotics, expert systems, and planning.  |

#### UNIT 1:

(16 Hrs)

Introduction to Artificial Intelligence: Definition, AI Applications, AI representation, Properties of internal Representation, Heuristic search techniques: Best first search, mean and end analysis, A\*, Game Playing.

**UNIT 2:****(16 Hrs)**

Knowledge representation using predicate logic: predicate calculus, Predicate and arguments, ISA hierarchy, frame notation, resolution, Natural deduction.

**UNIT 3:****(16 Hrs)**

Planning: block world, strips, Implementation using goal stack, Non-linear planning with goal stacks, Hierarchical planning, list commitment strategy. Perception: Action, Robot Architecture, Vision, Texture and images, representing and recognizing scenes, waltz algorithm, Constraint determination, Trihedral and non-trihedral figures labeling.

**UNIT 4:****(16 Hrs)**

Machine Learning: characteristics of machine learning types of machine learning: KNN, clustering and classification, Regression Neural Networks: Introduction to neural networks and perception-qualitative Analysis only, neural net architecture, Perceptron, MLP, RNN.

**UNIT 5:****(11 Hrs)**

Soft computing: concepts, evolutionary algorithms – Genetic algorithm. Swam optimization – Ant-colony optimization.

Books of study:

- 1 E. Charnaik and D.McDermott, -2012-Introduction to artificial Intelligence-Pearson Education
- 2 Dan W. Patterson-2013-Introduction to Artificial Intelligence and Expert Systems-Pearson

**References:**

- 1 E. Rich and K. Knight-2013-Artificial Intelligence-Tata McGraw Hill
- 2 Nils J. Nilson-2002-Principles of Artificial Intelligence- Narosa Publishing Co
- 3 Timjones M- 2010-Artificial Intelligence a Systems Approach- University Science Press

## SEMESTER VI

### **LINUX OPERATING SYSTEM**

(Elective)

|                             |                      |
|-----------------------------|----------------------|
| <b>Course Code</b>          | <b>19U6CRCAP13EL</b> |
| <b>No. of credits</b>       | 4                    |
| <b>No. of contact hours</b> | 90                   |

#### **Course Description**

The course will provide users with an Introduction to the Linux operating system. In particular we will focus on use of Linux from the command line. No prior knowledge of Linux is assumed and the course should be suitable both for those new to Linux and those wanting a refresher course.

#### **Objectives:**

- Understand and navigate the directory structure
- Obtain information on files and directories
- Create, delete, move and rename files and directories
- Manage file and directory access permissions
- Obtain information about and manipulate running processes
- Combine several simple commands in order to produce more powerful operations
- Compile simple programs under Linux
- View, set and change environment variables
- Use a range of standard Linux commands

#### **Course Outcomes (COs)**

|     |  |
|-----|--|
| CO1 | Understand the file processing utilities                     |
| CO2 | Understand the system status utilities                       |
| CO3 | Discuss about the miscellaneous utilities                    |
| CO4 | Describe programming utilities available in Linux            |
| CO5 | Examine the role and importance of operating system software |

|     |  |
|-----|--|
| CO6 | Describe the basic functionalities of the DOS, Linux and Windows Operating Systems |
| CO7 | Describe how the operating system handles resources and files                      |

**UNIT 1: (18 Hrs)**

Linux introduction and file system - Basic Features, Advantages, Installing requirement, Basic Architecture of Unix/Linux system, Kernel, Shell - Linux File system - Boot block, Super block, Inode table, Data blocks, Linux standard directories. Commands for files and directories – cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, creating and viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces.

**UNIT 2: (20 Hrs)**

Essential Linux commands, Understanding shells, Processes in Linux, process fundamentals, connecting processes with pipes, redirecting input/output, Background processing, managing multiple processes, scheduling of processes. Batch commands, kill, ps, who, Printing commands, find, sort, touch, file, file processing commands - wc, cut, paste etc - mathematical commands - expr, factor etc. Creating and editing files with vi-editor

**UNIT 3: (20 Hrs)**

System administration - Common administrative tasks, identifying administrative files – configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of user's accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command

**UNIT 4: (18 Hrs)**

Shell programming - Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash  
Conditional and looping statements, case statement, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks

**UNIT 5:****(14 Hrs)**

Simple filter commands – pr, head, tail, cut, sort, uniq, tr - Filter using regular expression – grep, egrep, sed. Understanding various Servers —DHCP, DNS, Squid, Apache, Telnet, FTP,Samba.

**Book of study:**

- 1 Cristopher Negus -2017-Red Hat Linux Bible 9th Edition- Wiley Dreamtech India
- 2 Yeswant Kanethkar-2003-UNIX Shell Programming 1st Edition--BPB Publications

**References:**

- 1 Redhat Inc -2002-Official Red Hat Linux User's guide-Wiley Dreamtech India
- 2 Graham Glass & King Ables -2007-UNIX for programmers and users –Pearson Education
- 3 Neil Mathew & Richard Stones -1996- Beginning Linux Programming fourth Eition- Wiley Dreamtech India

## SEMESTER VI

### PROJECT WORK

|                             |                   |
|-----------------------------|-------------------|
| <b>Course Code</b>          | <b>19U6PJCAP1</b> |
| <b>No. of credits</b>       | 4                 |
| <b>No. of contact hours</b> | 90                |

The BSc Computer Applications programme prepares the students to take up positions as Programmers, Systems Analysts, Systems Designers in the field related to computer science and information technology or students may go for higher studies in this area. The students are encouraged to involve themselves completely on the project work in their final semester. It is advised to students to develop their project for solving problems of software industry or any research organization. Doing this will give more exposure to handle real life problems of project development.

This project work is kept in BSc CA program to give the opportunity to develop quality software solution. During the development of the project, the students should involve in all the stages of the software development life cycle (SDLC) like requirements analysis, systems design, software development/coding, testing and documentation, with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, and develops good understanding of SDLC.

The project topic shall be chosen from areas of current day interest using latest packages/ languages running on appropriate platforms, so that the student can be trained to meet the requirements of the Industry. This is a Team project with maximum two members. . The students can do project any advanced language which is included in their syllabus.

A project report shall be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

**Scheme of Evaluation for Project external is as follows:**

**Division of Marks (Project)**

- Project demonstration and Presentation - **35 marks**
- Viva related to project - **20 marks**
- Project report with proper content and binding -**20 marks**

**Total Marks - 75marks**

**MODEL QUESTION PAPERS**



**B. Sc. DEGREE EXAMINATION**  
**First SEMESTER – COMPUTER APPLICATION (CORE)**

**DIGITAL ELECTRONICS AND MICROPROCESSOR**  
**19U1CRCAP1**

Time: Three Hours

Max. Marks: 75

**PART A**

Answer *all* questions. Each question carries **1** mark.

1. Find the BCD of  $(25)_{10}$
2. The hexadecimal representation of octal number 777 is
3. What is a parity bit?
4. What is program counter?
5. Perform the subtraction  $110011-1111$  using 2's compliment
6. State the De Morgans theorem
7. What is RAM?
8. Explain Minterms with an example
9. Define Canonical form
10. Differentiate Synchronous and asynchronous counters

(10 \* 1 = 10)

**PART B**

Answer *any eight* questions. Each question carries **2** marks.

11. Draw the Logic circuit for the expression  
$$F = x'y'z + xyz + x'y$$
12. Prove the equation  $(x+y)(x+z) = x+yz$
13. List the basic laws of boolean algebra
14. What is an interrupt?
15. Simplify the expression  $AB + A(B+C) + B(B+C)$
16. Explain the method of converting a hexadecimal number to decimal and give an example

17. Write short notes on ASCII
18. Draw the circuit diagram of a JK flip-flop
19. Prove De Morgan's theorem using truth table
20. Explain the method for converting a binary number to graycode equivalent

(8 \* 2 = 16)

### PART C

Answer *any five* questions. Each question carries **5** marks.

21. Steps to convert SOP and POS to its standard normal form and convert the expressions given below

$$F(A,B,C) = (A+B).(B+C).(A+C)$$

$$F(A,B,C) = AC+AB+BC$$

22. Explain Logic gates and describe the working of various gates with truth tables
23. Draw the block diagram of ripple counter. Explain
24. Discuss XOR and its application
25. Explain Full adder circuit with diagram
26. Discuss about encoders and decoders
27. Explain the addressing modes supported by 8086?

(5 \* 5 = 25)

### PART D

Answer *any two* questions. Each question carries **12** marks.

28. Explain about different types of flip flops and its working
29. Define K-MAP and don't care condition  
Simplify using k-map
  - a)  $F(N,X,Y,Z) = \sum(0,1,2,3,4,6,7,11,15)$
  - b)  $F(X,Y,Z,W) = \sum M(1,3,7,11,15)$  and  $dc(X,Y,Z,W) = \sum M(0,2,5)$
  - c)  $F(a,b,c,d) = \sum(2,3,6,7,8,10,11,13,14)$
30. Explain odd Parity bit generator and checker using truth table and circuit diagram.
31. a. Discuss multiplexers and demultiplexers.  
b. Discuss different types of shift registers

(2 \* 12 = 24)

**FIRST SEMESTER – COMPUTER APPLICATION (CORE)**

**19U1CRCAP2: PROGRAMMING IN PYTHON**

**Time : 3 Hrs**

**Maximum : 75 Marks**

**PART A**

Answer **All** questions in one sentence each.

Each question carries **1** mark.

1. What is an algorithm?
2. Name the four types of scalar objects in Python has.
3. What is a tuple?
4. Define Frozenset.
5. Define identifiers.
6. What is the use of pass statement?
7. What you mean by recursion?
8. Define loop.
9. What is a file?
10. What is the use of namespace?.

**(10 x1=10)**

**PART B**

Answer any **eight** questions in one or two sentences.

Each question carries **2** marks

11. Features of PYTHON.
12. What is a list? How lists differ from strings in PYTHON?
13. Write a python script to display the current date and time.
14. Discuss the usage of sep argument with respect to the print() function.
15. Distinguish between break and continue statement.
16. Explain default argument with example.
17. Difference between mutable and immutable objects in Python.
18. Syntax of nested if statement.
19. What is the use of indentation in Python?
20. Name the attributes of file object.

**(8x2=16)**

### PART C

Answer any **five** questions. Each carries **5** marks

21. Explain lambda function with its uses
22. What are the two ways of importing a module?
23. Consider the list `qty=[5,4,7,3,6,2,1]` and write the Python code to perform the following operations without using built-in methods.
  - i) Insert an element 9 at the beginning of the list.
  - ii) Insert an element 8 at the index position 3 of the list
  - iii) Delete an element at the end of the list.
  - iv) Print the list in reverse order.
  - v) Delete all the elements of the list.
24. Explain about dictionaries in Python.
25. Explain flowchart with its symbols and also draw a flowchart to print biggest among two numbers.
26. Explain any 5 mathematical functions with example.
27. How can we use 'with' statement while opening a text file? Explain.

**(5x5=25)**

### PART D

Answer any **two** Questions. Each carries **12** marks

28. Explain Operators.
29. Explain about modules and packages.
30. Explain different types of loops with example.
31. a) Write a Python program to read the content of a text file and write into another.  
b) Write the Python program to check whether a given string is palindrome or not.

**(2x12=24)**

**B. Sc. DEGREE EXAMINATION**  
**SECOND SEMESTER – COMPUTER APPLICATION (CORE)**

**19U2CRCAP3: OPERATING SYSTEM**

Time: Three Hours

Max. Marks: 75

**PART A**

Answer *all* questions. Each question carries **1** mark.

1. Distinguish between ready queue and device queue.
2. What is a process?
3. Define throughput.
4. Define Virtual memory.
5. What you mean by Context switching?
6. Define PCB.
7. What you mean by starvation?
8. What is Semaphore?
9. What is Distributed System?
10. Define Swapping.

(10 \* 1 = 10)

**PART B**

Answer *any eight* questions. Each question carries **2** marks.

11. What is internal and external fragmentation?
12. Explain critical section problem.
13. Explain the terms first-fit, best fit, and worst fit.
14. Explain about overlays.
15. Explain Readers-writers problem.
16. Explain different file operations.
17. Differentiate the single level and two level directory structure.
18. State the reason why Linux has become popular operating system.
19. Explain different states of process.
20. Explain Resource allocation graphs.

(8 \* 2 = 16)

### **PART C**

Answer *any five* questions. Each question carries **5** marks.

21. Explain the necessity of mutual exclusion.
22. Explain IPC Mechanism.
23. Explain about Demand paging.
24. Define System calls. What are the different types of System Calls?
25. Explain Multiprogramming with diagram.
26. Compare different page replacement algorithms.
27. Explain about segmentation.

(5 \* 5 = 25)

### **PART D**

Answer *any two* questions. Each question carries **12** marks.

28. What is deadlock? What are the necessary conditions of deadlock? Explain deadlock avoidance methods.
29. Explain Paging.
30. Explain CPU scheduling algorithms.
31. Explain the functions of operating system.

(2 \* 12 = 24)

**SECOND SEMESTER – COMPUTER APPLICATION (CORE)**

**19U2CRCAP4: DATA STRUCTURES USING ‘C’**

Time: Three Hours

Max. Marks: 75

**PART A**

Answer *all* questions. Each question carries **1** mark.

1. Define data types.
2. The full form of LIFO.
3. In which Tree Traversal the root node is visited last.
4. Name the queue where insertion and deletion of items can be done from any position.
5. In which data structure Recursion is used.
6. How many link fields are there in doubly linked list?
7. What is the use of malloc()?
8. Define keywords.
9. Define graph.
10. Mention the types of dequeue.

(10 \* 1 = 10)

**PART B**

Answer *any eight* questions. Each question carries **2** marks.

11. An array X[15][1..10] is stored in the memory with each element requiring 4 bytes of storage. If the base address of array is 1500, calculate the location of X[12][9] when the array X is stored in row major order.
12. Applications of stack.
13. Difference between arithmetic and logical operators.
14. Advantages of linked list over arrays.
15. Difference between variables and constants .Give examples.
16. Distinguish between static and dynamic memory allocation.
17. Give an algorithm to traverse a linked list.
18. Define the node structure of a doubly linked list
19. Define a complete binary tree.
20. Explain Sparse matrix with example.

### PART C

Answer *any five* questions. Each question carries **5** marks.

21. Explain implementation of two dimensional array in memory.
22. Write the procedure for linear search.
23. Write a program to insert a node in Singly linked list.
24. Compare push and pop operations in a stack and a queue.
25. Convert X:  $A+(B*C-(D/E^F)*G)*H$  into postfix notation using stack.
26. Describe how the disadvantages of a queue is overcome in a circular queue?
27. A binary tree has 9 nodes. The in order and pre-order traversals yield the following sequence of nodes

In order :  $A * B / C * D + E$

Pre-order :  $/ * A B + * C D E$

Construct the binary tree.

(5 \* 5 = 25)

### PART D

Answer *any two* questions. Each question carries **12** marks.

28. Describe various tree traversing techniques with examples.
29. Write a program to evaluate a postfix expression with an example.
30. Explain data structures with its types and operations.
31. Write the algorithm for selection sort and trace selection sort algorithm on the list  
 $L = \{78, 67, 90, 52, 82, 92, 33, 56, 18, 25\}$

(2 \* 12 = 24)



**B. Sc. DEGREE EXAMINATION THIRD SEMESTER–B.Sc. COMPUTER  
APPLICATIONS (CORE)  
19U3CRCAP5: DATA COMMUNICATION AND COMPUTER  
NETWORKS**

Time: **3 Hrs**

Max. Marks: **75**

**PART A** (Answer *all* questions. Each question carries *1* mark)

1. Define Data Communication.
2. Define analog and digital signals.
3. What is topology?
4. Define burst error.
5. List of any five IoT devices.
6. What is full duplex?
7. Define protocol.
8. Define three types of address.
9. What is Repeater and its use?
10. Define framing?

(10 x 1 = 10)

**PART B** (Answer *any eight* questions. Each question carries *2* marks)

11. Define about LAN, MAN and WAN.
12. Define ALOHA and slotted ALOHA.
13. Explain VOIP.
14. What is ICMP and its functions?
15. Which are the advantages of IoT?
16. Discuss about handoff management.
17. What is Hamming distance and write about minimum Hamming distance?
18. Differentiate between CSMA and CSMA/CD.
19. Write short notes on Satellite Networks.
20. Explain FTP.

(5 x 5 = 25)

**PART C (Answer any five questions. Each question carries 5 marks)**

20. What is piggy backing?
21. Explain the causes of impairment.
22. Define CRC.
23. Discuss about the advantages of IPV6 than IPV4.
24. What do you mean by multiplexing? Define the types of multiplexing.
25. Differentiate between the circuit switching packet switching.
26. Explain the advantages of cloud computing.

(5 x 5 = 25)

**PART D (Answer *any two* questions. Each question carries *12* marks)**

27. Explain all noiseless channel protocols.
28. Explain the various network topologies.
29. Discuss about the different types of guided media and unguided media.
30. Explain symmetric cipher models.

(2 x 12 = 24)

**B. Sc. DEGREE EXAMINATION THIRD SEMESTER – COMPUTER APPLICATION  
(CORE)**

**19U3CRCAP6: OBJECT ORIENTED PROGRAMMING IN C++**

Time: Three Hours

Max. Marks: 75

**PART A**

Answer *all* questions. Each question carries **1** mark.

1. Define a class and an object.
2. What you mean by function prototyping?
3. Specify the operators which cannot be overloaded.
4. What is Parameterized Constructor?
5. What is an abstract class?
6. What is the use of new Operator?
7. What are Manipulators?
8. What is early binding?
9. Define destructor.
10. What you mean by Pure Virtual functions?

(10 \* 1 = 10)

**PART B**

Answer *any eight* questions. Each question carries **2** marks.

11. Explain this operator.
12. Define Inline function. What are its advantages?
13. Explain any three Object oriented programming features in detail?
14. Explain about the operators in C++.
15. What is function overloading?
16. What you mean by default arguments. Give an example for the use of default arguments in a function.
17. Write a Program to implement array Object.
18. Compare private, public and protected access specifies.
19. What is virtual function? What are the advantages of pure virtual function?
20. Compare Cal by reference and return by reference.

(8 \* 2 = 16)

### PART C

Answer *any five* questions. Each question carries **5** marks.

21. What are the Control statements available in C++ ?
22. What is Constructor? What are the special characteristics of a Constructor? Explain the need of a destructor in a class.
23. What is Operator overloading? What are its uses?
24. What are friend functions? Explain its characteristics with a suitable example.
25. Write a program to add two complex numbers in two different classes.
26. What is Exception? What are the advantages of using exception handling mechanism in a program?
27. Write a program in C++ to illustrate the use of object as function argument.

(5 \* 5 = 25)

### PART D

Answer *any two* questions. Each question carries **12** marks.

28. Write a C++ program using binary operator overloading and explain the difference of binary operator overloading using friends function.
29. Explain Inheritance, different types of Inheritance. Write a program to implement Multilevel Inheritance.
30. Explain the different data types available in C++ with suitable example.
31. What do you mean by Static data member and static member function of a class? Explain the characteristics of a Static data members and Static member function?

(2 \* 12 = 24)

**B. Sc. DEGREE EXAMINATION FOURTH SEMESTER–B.Sc. COMPUTER  
APPLICATION (CORE)**

**19U3CRCAP7: ADVANCED WEB TECHNOLOGY**

**(Model Question paper)**

Time: 3 Hours

Max. Marks: 75

**PART A** (Answer *all* questions. Each question carries **1** mark)

1. What is cookie?
2. What is URL?
3. What is empty tag? Write any two empty tags.
4. Differentiate between *Submit* and *Reset* buttons.
5. Which is the tag of *href* attribute? Write the code segment to create a hyper link.
6. What is Text-Align property of CSS?
7. How will you create a password field in HTML form?
8. What is Bootstrap?
9. How does make a webpage as dynamic?
10. Write the SQL statement to design the structure of a table in a data base.

(10 x 1 = 10)

**PART B** (Answer *any eight* questions. Each question carries **2** marks)

11. Write an HTML program to create a table using the attributes cellspacing and cellpadding.
12. Write the code to show a video in HTML5.
13. Define the advantages of CSS and its syntax.
14. Differentiate between `<P>` and `<Pre>` tags.
15. Discuss about Unordered List. What are the different values of *list-style-type*?
16. Write a JavaScript to find the sum of two numbers using user-defined function.
17. Differentiate between *Get* and *Post* methods.
18. Discuss about arrays in PHP
19. What can PHP do in web designing?
20. MySQL is the most popular database system used with PHP. Justify.

(8 x 2 = 16)

**PART C** (Answer *any five* questions. Each question carries **5** marks)

21. What are the uses of formatting tags? Write any 5 formatting tags in detail.
22. Define DHTML and XHTML.
23. Discuss in detail about the three ways to insert CSS.
24. Discuss about array handling in PHP.
25. Define DOM.
26. Write a PHP program code to check whether the given number is prime or not.
27. What is session variable? Write the built-in function for starting a session.

(5 x 5 = 25)

**PART D** (Answer *any two* questions. Each question carries **12** marks)

28. Discuss JavaScript Flow Control and Loops with examples.
29. Discuss about Ajax - Introduction, advantages & disadvantages, Purpose.
30. Describe about jQuery.
31. Explain three types of PHP – MySQL connection with example.

(2 x 12 = 24)

**B. Sc. DEGREE EXAMINATION**  
**Fourth SEMESTER – COMPUTER APPLICATION (CORE)**

**19U4CRCAP8: DATABASE MANAGEMENT SYSTEM**

Time: Three Hours

Max. Marks: 75

**PART A**

Answer *all* questions. Each question carries **1** mark.

1. What do you mean by view
2. Define functional dependency
3. Define program Data Independence
4. what you mean by Weak Entity, mark its notation used in ER diagram
5. Define primary key and foreign key
6. What you mean by total participation
7. Define transaction processing system
8. Define the terms schemas and instances
9. Define abstraction
10. Define Hadoop.

(10 \* 1 = 10)

**PART B**

Answer *any eight* questions. Each question carries **2** marks.

11. Explain Aggregate functions. Give 2 select statements using any of the aggregate functions.
12. Explain about DBMS Interfaces
13. Explain different operators used in SQL.
14. Explain different type of attribute in ER Model
15. Explain the characteristics of relational data model
16. Explain the role of DBA
17. Write short note on SQL.
18. Explain relational calculus
19. Write about nested query with example
20. What do you mean by data mining.

(8 \* 2 = 16)

### **PART C**

Answer *any five* questions. Each question carries **5** marks.

21. Explain DDL and DML commands with syntax and examples.
22. Define constraints in SQL? Explain various constraints with examples.
23. List the commonly accepted threats to database security
24. Explain various relational algebra operations
25. Explain about Three-schema Architecture with diagram
26. What is data warehouse? Describe the characteristics of a data warehouse
27. Explain the desirable properties of transaction

(5 \* 5 = 25)

### **PART D**

Answer *any two* questions. Each question carries **12** marks.

28. Explain about how database differ from Traditional file system
29. Explain different types of Normalization with examples
30. What is the use of ER Diagram and Draw an ER diagram for a banking enterprise
31. Define indexes and Explain different types of indexes.

(2 \* 12 = 24)



**B. Sc. DEGREE EXAMINATION FIFTH SEMESTER – B.Sc. COMPUTER  
APPLICATIONSS (CORE)  
19U5CRCAP10: PROGRAMMING IN JAVA**

Time: 3 Hours

Max. Marks: 75

**PART A** (Answer *all* questions. Each question carries **1** mark)

1. Define object and class.
2. What is abstract class?
3. Explain byte code.
4. What is default constructor?
5. What is an Interface?
6. Write two different ways for creating a thread.
7. Write any five built-in exceptions available in Java.
8. How do we set priorities to threads?
9. What is package?
10. Define the term super.

(10 x 1 = 10)

**PART B** (Answer *any eight* questions. Each question carries **2** marks)

11. Define Java Virtual Machine.
12. Discuss about Java and World Wide Web.
13. When do we declare a method or class as final?
14. Differentiate between function overloading and function overriding.
15. What are the major difference between an interface and a class?
16. Define the benefits of a package.
17. Define about String class and its five methods with syntax.
18. Write a program to check a string is palindrome or not.
19. What is an array? What are the types of array supported in Java?
20. Define static variables and static functions in Java.

(8 x 2 = 16)

**PART C** (Answer *any five* questions. Each question carries **5** marks)

21. Write a program for implementing multiple inheritance using interface.
22. What is an applet? Write the different states of an applet.
23. How does implement multiple inheritance in Java. Justify.
24. Explain in detail about the creation of a Thread in two ways.
25. Discuss about event class and event listeners.
26. Explain parameter passing mechanism.
27. Explain any five swing components.

(5 x 5 = 25)

**PART D** (Answer **any two** questions. Each question carries **12** marks)

28. Illustrate the life cycle of a Thread.
29. Define exception handling. Explain more about the five terms which are used in exception handling.
30. Explain different types of layout managers.
31. Discuss about JDBC architecture, connection and statement.

(2 x 12 = 24)

**FIFTH SEMESTER – COMPUTER APPLICATION (CORE)**

**Internet Web designing and Cyber crimes**

Time: Three Hours

Max. Marks: 75

**PART A**

**Answer all questions. Each question carries 1 mark.**

1. What is internet
2. What is a search engine
3. ISP stands for\_\_\_\_
4. What is WWW?
5. What is FTP?
6. What is a browser?
7. What is a virus?
8. What is HTML?
9. What is cell padding
10. What is Cyberspace?

(10 \* 1 = 10)

**PART B**

**Answer any eight questions. Each question carries 2 marks.**

11. What is URL
12. What is LAN
13. What is IP address?
14. What is TELNET
15. What is Encryption
16. What is IP address
17. What are the different types of lists in HTML
18. Explain Phishing
19. What do you mean by remote login
20. What is cyber law?

(8 \* 2 = 16)

### **PART C**

**Answer any five questions. Each question carries 5 marks.**

21. What is TCP
22. Explain the advantages and disadvantages of cable modem.
23. Explain packet switching
24. Explain DNS
25. Explain audio and video conferencing
26. What are the facilities for secure communication
27. What is the penalty for hacking?

(5 \* 5 = 25)

### **PART D**

**Answer any two questions. Each question carries 12 marks.**

28. What is E-mail .What are the advantages and limitations.
29. What is E-commerce .Explain the types of E-Commerce
30. Explain links and frames in HTML
31. Explain the different types of cybercrime.

(2 \* 12 = 24)

**Sixth SEMESTER–B.Sc. COMPUTER APPLICATIONS (CORE)**

**19U6CRCAP11: COMPUTER GRAPHICS**

Time: **3 Hrs**

Max. Marks: **75**

**PART A** (Answer *all* questions. Each question carries *1* mark)

1. What is meant by scan code?
2. What is Ray Tracing?
3. What is Transformation?
4. Define Reflection.
5. Define Clipping.
6. Define view port.
7. Define Affine transformation.
8. What is chromaticity?
9. What is tweening?
10. What is Trasparency?

(10 x 1 = 10)

**PART B** (Answer *any eight* questions. Each question carries *2* marks)

11. What is raster scan and Random scan systems
12. What are the Input devices and Hard copy devices?
13. What is pixel addressing and object addressing?
14. Write short notes on active and passive transformations?
15. What are the different tricks used in computer graphics animation?
16. What do you mean by view plane? What is view distance?
17. What are the various visible face detection methods or hidden surface elimination
18. What are the various types of Polygon clipping?
19. Write short notes on clipping operations.
20. What is turtle graphics program?

(8 x 2 = 16)

**PART C** (Answer *any five* questions. Each question carries *5* marks)

21. What is tweening? Explain in detail about motion tween with an example
22. Explain in detail about tiling the plain.
23. Explain in detail the Sutherland-Hodgeman clipping algorithm with an example.

24. Explain the three dimensional display methods
25. What is Morphing? Explain in detail about morphing with an example.
26. Compare and contrast between RGB and CMY color models.
27. Write notes on halftone patterns and dithering techniques.

(5 x 5 = 25)

**PART D** (Answer *any two* questions. Each question carries **12** marks)

28. What is Self squaring fractal? Explain in detail Mandelbrot Set and Julia set in detail.
29. Explain (i) General Pivot point rotation (ii) General Fixed Point Scaling (iii) General Pivot Point.
30. Explain Ellipse generating Algorithm and explain Boundary Fill Algorithm.
31. Explain the following visible surface detection methods.
  - (i) Back face detection (ii) Depth –Buffer method (iii) A-Buffer method

(2 x 12 = 24)

**Sixth SEMESTER B.Sc. COMPUTER APPLICATION (CORE)**

**ARTIFICIAL INTELLIGENCE**

**19U6CRCAP12EL**

**(Elective)**

Time: **3 Hrs**

Max. Marks: **75**

**PART A** (Answer *all* questions. Each question carries *1* mark)

1. Who introduced information theory?
2. Define epistemology?
3. What is meta knowledge?
4. Define Cybernetics.
5. What is indexing?
6. Who developed LISP programming language?
7. Define Knowledge?
8. Define DFS.
9. What is semantic net?
10. What are the two type of knowledge representation?

(10 x 1 = 10)

**PART B** (Answer *any eight* questions. Each question carries *2* marks)

11. Explain the heuristic search techniques?
12. Discuss the concept of A\* algorithm with an example?
13. Discuss the alpha beta cutoffs?
14. What is resolution? Write an algorithm for predicate resolution?
15. What is perception? Discuss any two types of perception?
16. What are neural networks? Discuss the role of neural networks in AI?
17. What are the components of knowledge based system?
18. What is the difference between declarative and procedural knowledge?
19. Describe the meaning of knowledge representation and knowledge acquisition?
20. Write the procedure for the hierarchical planning?

(8 x 2 = 16)

**PART C** (Answer *any five* questions. Each question carries **5** marks)

21. What is “Artificial intelligence and artificial technique” ?Briefly explain the different applications of AI?
22. Discuss the any two search techniques with the help of an example. Also discuss the advantages and dis advantage?
23. Explain parsing technique used in Natural Language Processing?
24. What is game playing? Discuss how minmax search procedure can be used in game playing?
25. Discuss different forms of learning with relevant examples?
26. What are the different levels of knowledge representation?
27. Explain Non-Monotonic reasoning?

(5 x 5 = 25)

**PART D** (Answer *any two* questions. Each question carries **12** marks)

28. Discuss various approaches and issues in knowledge representation also the problems in representing knowledge?
29. Explain in detail the supervised learning and unsupervised learning.
30. Explain different parsing techniques used in natural language processing?
31. Write short notes on
  - a. Prolog
  - b. Fuzzy logic
  - c. Goal stack planning
  - d. ATN

(2 x 12 = 24)