DEPARTMENT OF
COMPUTER SCIENCE

Curriculum and Syllabus for
Bachelor of Computer Application Programme
Under Credit Semester System
(with effect from 2019 admissions)

St Berchmans College
Founded 1922
AUTONOMOUS | College with Potential for Excellence | Reaccredited by NAAC with A Grade
Affiliated to Mahatma Gandhi University, Kottayam, Kerala
Changanassery, Kottayam, Kerala, India-686101

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BOARD OF STUDIES IN COMPUTER SCIENCE

1. Dr. R. Vijayakumar, Professor
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2. Dr. Gladston Raj S, Associate Professor
   Dept. of Computer Science, Government College, Nedumangadu, TVM.
3. Dr. Preetha Mathew, Associate Professor
   Dept. of Computer Science, CUSAT-Kuttanadu
4. Dr. Sajimon Abraham, Faculty Member
   School of Management and Business studies, M.G University, Kottayam.
5. Mr. Jiss James, Test Analyst, Infosys, Ernakulam
6. Mr. Johnson Joy, Lecturer
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7. Mr. M.C Jose, Associate Professor
   Department of Statistics, SBCollege, Changanassery
8. Ms. Bobby Joseph, Head of the department
   Department of Computer Science, SB College, Changanassery
9. Mrs. Ashalakshmi R, Faculty
   Department of Computer Science, SB College, Changanassery
10. Ms. Dhanya C Nair, Faculty
    Department of Computer Science, SB College, Changanassery
11. Mr. Bijumon Xavier, Faculty
    Department of Computer Science, SB College, Changanassery
12. Ms. Linu Joseph, Faculty
    Department of Computer Science, SB College, Changanassery
13. Ms. Smitha Krishnan, Faculty
    Department of Computer Science, SB College, Changanassery
14. Mr. Tomin James, Faculty
    Department of Computer Science, SB College, Changanassery

SCHEME & SYLLABUS

(Effective from 2019 Admissions onwards)

The revised syllabus for BCA Programme provides a strong foundation to pursue postgraduation programme in computer science / applications. The knowledge acquired by the students may also equip them to meet the industrial need, and get placed.

Programme Objectives:

The BCA Programme is designed with the following specific objectives.

- To attract young minds to the potentially rich & employable field of computer applications.
- To be a foundation graduate programme that will act as a feeder course for higher studies in the area of Computer Science/Applications
- To develop skills in software development so as to enable the BCA graduates to take up self-employment in Indian & global software market.
- To train and Equip the students to meet the requirements of the Industrial standards.

Programme Outcome:

- BCA Honours candidates have a promising future in the IT field as they can take up sufficient employment opportunities such as Programmers and grow to become project managers.
- They can look for employment both in public and private divisions, insurance, banking, accounting, e-commerce, stock markets, and marketing.
- Many of our students got placed in MNCs like Wipro, TCS, Infosys, CTS, Deloitte etc.
- BCA Honours gives significant comprehension of concepts in key areas of Computer Science.

REGULATIONS FOR UNDERGRADUATE (UG) PROGRAMMES UNDER CREDIT SEMESTER SYSTEM (SB-CSS-UG) 2019

1. SHORT TITLE

1.1 These Regulations shall be called St. Berchmans College (Autonomous) Regulations (2019) governing undergraduate programmes under Credit Semester System.

1.2 These Regulations shall come into force with effect from the academic year 2019 - 20 onwards.

2. SCOPE

2.1 The regulation provided herein shall apply to all regular undergraduate programmes, BA/BSc/BCom/BCA, conducted by St. Berchmans College (Autonomous) with effect from the academic year 2019 - 20.

3. DEFINITIONS

3.1 'University' means Mahatma Gandhi University, Kottayam, Kerala.

3.2 'College' means St. Berchmans College (Autonomous).

3.3 There shall be an Academic Committee nominated by the Principal to look after the matters relating to the SB-CSS-UG system.

3.4 'Academic Council' means the Committee consisting of members as provided under section 107 of the University Act 2014, Government of Kerala.

3.5 'Parent Department' means the Department, which offers a particular undergraduate programme.

3.6 'Department Council' means the body of all teachers of a Department in the College.

3.7 'Faculty Mentor' is a teacher nominated by a Department Council to coordinate the continuous evaluation and other academic activities of the undergraduate programme undertaken in the Department.

3.8 'Programme' means a three year programme of study and examinations spread over six semesters, the successful completion of which would lead to the award of a degree.

3.9 'Duration of Programme' means the period of time required for the conduct of the programme. The duration of an undergraduate programme shall be six (6) semesters.

3.10 'Semester' means a term consisting of a minimum 90 working days, inclusive of tutorials, examination days and other academic activities within a period of six months.

3.11 'Course' means a portion of a subject to be taught and evaluated in a semester.

3.12 'Course Teacher' means the teacher who is taking classes on the course.

3.13 'Core Course' means a course in the subject of specialization within a degree programme. It includes a course on environmental studies and human rights.

3.14 'Complementary Course' means a course, which would enrich the study of core courses.

3.15 'Common Course I' means a course that comes under the category of courses for English.

3.16 'Common Course II' means additional language, which can be opted by a student, from among the languages offered by the College.

3.17 The Common Course I and II is compulsory for all students undergoing undergraduate programmes.

3.18 'Open Course' means a course offered by the departments other than the parent department outside the field specialization of the student, which can be opted by a student.

3.19 'Elective Course' means a course, which can be substituted, by equivalent course from the same subject.

3.20 'Vocational Course' means a course that enables the students to enhance their practical skills and ability to pursue a vocation in their subject of specialization.

3.21 'Audit Course' means a course opted by the students, in addition to the compulsory courses, in order to develop their skills and social responsibility.

3.22 'Extra Credit Course' means a course opted by the students, in addition to the compulsory courses, in order to gain additional credit that would boost the performance level and additional skills.

3.23 Extra credit and audit courses shall be completed by working outside the regular teaching hours.

3.24 There will be two categories of extra credit courses, mandatory and optional. If a student fails to complete the mandatory course, he/she shall complete the same within the tenure of the programme.

The details of the extra credit and audit courses are given below:

Semester	Course	Type
I	Course on Basic Life Support System and Disaster Management	Compulsory, audit course, Grades shall be given
I to VI	Value Education	Compulsory, extra credit
	Virtual Lab experiments/MOOC	Optional, extra credit
II & III	Add on Course	Compulsory, extra credit, Grades shall be given
Summer vacation following semester II	50 hours (10 days) Social Awareness Programme	Compulsory, extra credit, Grades shall be given
IV	Internship/Skill Training	Compulsory, audit course, Grades shall be given
V	Finishing School	Compulsory, audit course

3.25 'On the Job Training' means a job training course given to the students to acquaint them with various industrial skills.

3.26 'Project' means a regular project work with stated credits on which the student conducts a project under the supervision of a teacher in the parent department/any appropriate research centre in order to submit a dissertation on the project work as specified.

3.27 'Dissertation' means a minor thesis to be submitted at the end of a research work carried out by each student on a specific area.

3.28 'Plagiarism' is the unreferenced use of other authors' material in dissertations and is a serious academic offence.

3.29 'Seminar' means a lecture expected to train the student in self-study, collection of relevant matter from books and internet resources, editing, document writing, typing and presentation.

3.30 'Improvement Examination' is an examination conducted to improve the performance of a student in the courses of a particular semester as per the exam manual.

3.31 'Supplementary Examination' is an examination conducted for students who fail in the courses of a particular semester as per the exam manual.

3.32 The minimum credits, required for completing an undergraduate programme is one hundred and twenty (120).

3.33 'Credit' (C) of a course is a measure of the weekly unit of work assigned for that course in a semester.

3.34 'Course Credit': One credit of the course is defined as a minimum of one (1) hour lecture/minimum of two (2) hours lab/field work per week for eighteen (18) weeks in a semester. The course will be considered as completed only by conducting the final examination.

3.35 'Grade' means a letter symbol (A, B, C etc.) which indicates the broad level of performance of a student in a course/semester/programme.

3.36 'Grade Point' (GP) is the numerical indicator of the percentage of marks awarded to a student in a course.

3.37 'Credit Point' (CP) of a course is the value obtained by multiplying the grade point (GP) by the credit (C) of the course.

3.38 'Semester Grade Point Average' (SGPA) of a semester is calculated by dividing total credit points obtained by the student in a semester by total credits of that semester and shall be rounded off to two decimal places.

3.39 'Cumulative Grade Point Average' (CGPA) is the value obtained by dividing the sum of credit points in all the courses obtained by the student for the entire programme by the total credits of the whole programme and shall be rounded off to two decimal places.

3.40 'Institution Average' is the value obtained by dividing the sum of the marks obtained by all students in a particular course by the number of students in the respective course.

3.41 'Weighted Average Score' means the score obtained by dividing sum of the products of marks secured and credit of each course by the total credits of that semester/programme and shall be rounded off to two decimal places.

3.42 'Grace Marks' means marks awarded to course/courses as per the choice of the student, in recognition of meritorious achievements of a student in NCC/NSS/sports/arts and cultural activities.

3.43 First, Second, Third, Fourth and Fifth position shall be awarded to students who come in the first five places based on the overall CGPA secured in the programme in the first chance itself.

4. PROGRAMME STRUCTURE

4.1. The programme shall include core courses, vocational courses, complementary courses, common courses, open course and elective courses. There shall be a project/dissertation to be undertaken by all students. The programme will also include assignments, seminars, practical, viva-voce, OJT, field visit, industry visit etc., if they are specified in the curriculum.

4.2. Total credits for a programme is one hundred and twenty (120). The credit distribution for various UG programmes is shown below.

Model III BSc/BCA

i.	Programme duration	6 Semesters
ii.	Total credits required for successful completion of the programme	120
iii.	Minimum credits required from Core + Elective + Project + Complementary courses	109
iv.	Minimum credits required from Common course I	8
v.	Minimum credits required from Open course	3
vi.	Minimum attendance required	75%

4.3. **Project/Dissertation**

Mini project:

All students shall do a mini project in the fifth semester. The project shall be done individually or as a group of maximum five (5) students. The report of the project shall be submitted before

the examiners appointed by the College. The project report shall be subject to internal and external evaluation followed by a viva-voce.

Main project:

All students shall do a major project in the sixth semester. The project shall be done individually. The report of the project shall be submitted to the department during sixth semester and shall be produced before the examiners appointed by the College. The project report shall be subject to internal and external evaluation followed by a viva-voce.

4.4. **Evaluations**

The evaluation of each course shall contain two parts.

i Internal or In-Semester Assessment (ISA)

ii External or End-Semester Assessment (ESA)

Both ISA and ESA shall be carried out using indirect grading. The ISA:ESA ratio shall be 1:4, for courses with or without practical. There shall be a maximum of eighty (80) marks for external evaluation and twenty (20) marks for internal evaluation.

4.5. **In-semester assessment**

The components of the internal or in-semester assessment and their marks are as below.

Common Courses

There are four components for ISA, which include attendance, assignment/seminar and in-semester examinations. All the components of the internal assessment are mandatory.

Component	Marks
Attendance	2
Assignment/Seminar	5
Class test	5
Model examination	8
Total	**20**

Marks for attendance

% of Attendance	Marks
Above 90	2
75 – 90	1

(Decimals shall be rounded off to the next higher whole number)

Courses other than common courses

Component	Marks
Attendance	2
Viva	4
Assignment/Seminar	4
Class test	4
Model examination	6
Total	**20**

Marks for attendance

% of Attendance	Marks
Above 90	2
75 – 90	1

(Decimals shall be rounded off to the next higher whole number)

4.6 **Assessment of practical courses**

The internal assessment of practical courses shall be conducted in each semester. The components for internal assessment are given below.

Practical courses in 1st and 5th semesters

Maximum Marks: 100

ISA: 20

ESA: 80

Components of ISA	Marks
Attendance	2
Viva	4
Record*	4
Test paper(s) (1 or 2) (1×10=10; 2×5=10)	10
Total	**20**

Marks for attendance

% of Attendance	Marks
Above 90	2
75 – 90	1

(Decimals shall be rounded off to the next higher whole number)

Practical courses in 2nd, 3rd and 4th semesters

Maximum Marks: 50

ISA: 10

ESA: 40

Components of ISA	Marks
Attendance	1
Viva	2
Record*	2
Test paper(s) (1 or 2) (1×5=5; 2×2.5=5)	5
Total	**10**

*Marks awarded for Record shall be related to number of programs/practicals recorded.

Marks for attendance

% of Attendance	Marks
Above 75	1

(Decimals shall be rounded off to the next higher whole number)

4.6. **Assignments**

Assignments shall be submitted for every course in the first four semesters. At least one assignment for each course shall be submitted in each semester.

4.7. **Seminar**

A student shall present a seminar in the fifth and sixth semesters.

4.8. **In-semester examination**

Every student shall undergo at least two in-semester examinations as class test and model examination as internal component for every course.

4.9. To ensure transparency of the evaluation process, the ISA mark awarded to the students in each course in a semester shall be published on the notice board according to the schedule in the academic calendar published by the College. There shall not be any chance for improvement of ISA. The course teacher and the faculty mentor shall maintain the academic record of each student registered for the course which shall be forwarded to the office of the Controller of Examinations through the Head of the Department and a copy shall be kept in the office of the Head of the Department for at least two years for verification.

4.10. A student who has not secured minimum marks in internal examinations can redo the same before the end semester examination of the semester concerned.

4.11. **End-semester assessment**

The end-semester examination in theory and practical courses shall be conducted by the College.

4.12. The end-semester examinations shall be conducted at the end of each semester. There shall be one end-semester examination of three (3) hours duration in each lecture based course.

4.13. The question paper shall be strictly on the basis of model question paper set by Board of Studies.

4.14. A question paper may contain short answer type/annotation, short essay type questions/problems and long essay type questions. Marks for each type of question can vary from programme to programme, but a general pattern may be followed by the Board of Studies.

4.15. End-semester Examination question pattern shall be as given below.

Courses without practical

Section	Total No. of Questions	Questions to be Answered	Marks	Total Marks for the Section
A	12	10	2	20
B	9	6	5	30
C	4	2	15	30
			Maximum	**80**

4.16. End-semester Examination question pattern for undergraduate programme in Mathematics shall be as given below.

Section	Total No. of Questions	No. of Questions to be Answered	Mark for Each Question	Maximum Marks
A	12	10	1	10
B	At most 13	Questions with total marks 40 will be given. All questions can be answered.	3, 4, 5 or 6	30
C	Four question sets, one from each module. Each set consists of two questions out of which one is to be answered.	4	10	40
			Grand Total	**80**

4.17. Photocopies of the answer scripts of the external examination shall be made available to the students for scrutiny as per the regulations in the examination manual.

4.18. Practical examination shall be conducted annually or in each semester. The duration and frequency of practical examination shall be decided by the respective Board of Studies.

4.19. Practical examination shall be conducted by one external examiner and one internal examiner.

4.20. The marks for end-semester theory and practical examinations are given below

Course	Marks
Theory courses	80
Practical courses	80

4.21. The project report/dissertation shall be subject to internal and external evaluation followed by a viva-voce at the end of the programme. Internal Evaluation is to be done by the supervising teacher and external evaluation by an external evaluation board consisting of an examiner appointed by the Controller of Examinations and the Head of the Department or his nominee. A viva-voce/defence related to the project work shall be conducted by the external evaluation board and students have to attend the viva-voce/defence individually.

Components of Project Evaluation	Marks
Internal Evaluation	20
Dissertation (External)	50
Viva-Voce (External)	30
Total	**100**

4.22. If the student fails in project evaluation, he or she shall submit the project report/dissertation after modifying it on the basis of the recommendations of the examiners.

4.23. For all courses (theory and practical) an indirect grading system based on a seven (7) point scale according to the percentage of marks (ISA + ESA) is used to evaluate the performance of the student in that course. The percentage shall be rounded mathematically to the nearest whole number.

Percentage of Marks	Grade	Performance	Grade Point
95 and above	S	Outstanding	10
85 to below 95	A+	Excellent	9
75 to below 85	A	Very Good	8
65 to below 75	B+	Good	7
55 to below 65	B	Above Average	6
45 to below 55	C	Satisfactory	5
35 to below 45	D	Pass	4
Below 35	F	Failure	0

5. CREDIT POINT AND GRADE POINT AVERAGE

5.1. **Credit Point**

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

CP = C × GP

where C is the credit and GP is the grade point

5.2. **Semester Grade Point Average**

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

SGPA = TCP/TCS

where TCP is the total credit point of all the courses in the semester and TCS is the total credits in the semester

GPA shall be rounded off to two decimal places.

5.3. **Cumulative Grade Point Average**

Cumulative Grade Point Average (CGPA) is calculated using the formula

CGPA = TCP/TC

where TCP is the total credit point of all the courses in the whole programme and TC is the total credit in the whole programme

GPA shall be rounded off to two decimal places.

5.4. **Grade Point Average (GPA)** of different category of courses viz. Common Course I, Common Course II, Complementary Course I, Complementary Course II, Vocational Course, Core Course etc. are calculated using the formula

GPA = TCP/TC

where TCP is the Total Credit Point of a category of course and TC is the total credit of that category of course

Grades for the different courses, semesters, Semester Grade Point Average (SGPA) and grades for overall programme, Cumulative Grade Point Average (CGPA) are given based on the corresponding Grade Point Average (GPA) as shown below:

GPA	Grade	Performance
9.5 and above	S	Outstanding
8.5 to below 9.5	A+	Excellent
7.5 to below 8.5	A	Very Good
6.5 to below 7.5	B+	Good
5.5 to below 6.5	B	Above Average
4.5 to below 5.5	C	Satisfactory
3.5 to below 4.5	D	Pass
Below 3.5	F	Failure

5.5. 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 in a course.

5.6. For a pass in a programme, a separate minimum of grade 'D' is required for all the individual courses.

5.7. If a candidate secures F Grade for any one of the courses offered in a semester/programme, only F grade will be awarded for that semester/programme until the student improves this to D grade or above within the permitted period.

5.8. Candidate who secures D grade and above will be eligible for higher studies.

6. SUPPLEMENTARY/IMPROVEMENT EXAMINATION

6.1 There will be supplementary examinations and chance for improvement. Only one chance will be given for improving the marks of a course.

6.2 There shall not be any improvement examination for practical examinations and examinations of the final year.

7. ATTENDANCE

7.1. The minimum requirement of aggregate attendance during a semester for appearing the end semester examination shall be 75%. Condonation of shortage of attendance to a maximum of ten (10) days in a semester subject to a maximum of two times during the whole period of undergraduate programme may be granted by the College. This condonation shall not be counted for internal assessment.

7.2. Benefit of attendance may be granted to students representing the College, University, State or Nation in Sports, NCC, NSS or Cultural or any other officially sponsored activities such as College union/University union activities etc., on production of participation/attendance certificates, within one week from competent authorities, for the actual number of days

participated, subject to a maximum of ten (10) days in a semester, on the specific recommendations of the Faculty Mentor and Head of the Department.

7.3. A student who does not satisfy the requirements of attendance shall not be permitted to appear for the end-semester examinations.

7.4. Those students who are not eligible even with condonation of shortage of attendance shall repeat the course along with the next batch after obtaining readmission.

8. BOARD OF STUDIES AND COURSES

8.1. The Board of Studies concerned shall design all the courses offered in the UG programme. The Board shall design and introduce new courses, modify or re-design existing courses and replace any existing courses with new/modified courses to facilitate better exposure and training for the students.

8.2. The syllabus of a programme shall contain programme objectives and programme outcome.

8.3. The syllabus of a course shall contain the title of the course, course objectives, course outcome, contact hours, the number of credits, reference materials and model questions.

8.4. Each course shall have an alpha numeric code which includes abbreviation of the course in two letters, the semester number, course code and the serial number of the course.

8.5. Every programme conducted under Credit Semester System shall be monitored by the Academic Council.

9. REGISTRATION

9.1. A student who registers his/her name for the external examination for a semester will be eligible for promotion to the next semester.

9.2. A student who has completed the entire curriculum requirement, but could not register for the semester examination can register notionally, for getting eligibility for promotion to the next semester.

9.3. A student may be permitted to complete the programme, on valid reasons, within a period of twelve (12) continuous semesters from the date of commencement of the first semester of the programme.

9.4. The minimum strength of students for open courses is 15 and the maximum is 75 per batch.

9.5. Each student shall register for the open courses in the prescribed registration form in consultation with the faculty mentor during fourth semester. Faculty mentor shall permit registration on the basis of the preferences of the student and availability of seats.

10. ADMISSION

10.1. The admission to all UG programmes shall be as per the rules and regulations of the College/University.

10.2. The eligibility criteria for admission shall be as announced by the College/University from time to time.

10.3. Separate rank lists shall be drawn up for seats under reservation quota as per the existing rules.

10.4. There shall be an academic and examination calendar prepared by the College for the conduct of the programmes.

11. MARK CUM GRADE CARD

11.1. The College under its seal shall issue to the students, a Mark cum Grade Card on completion of each semester, which shall contain the following information.

i. Name of the Student
ii. Register Number
iii. Photo of the student

iv. Degree
v. Programme
vi. Semester and Name of the Examination
vii. Month and Year of Examination
viii. Stream
ix. Course Code, Title and Credits of each course opted in the semester
x. Marks for ISA, ESA, Total Marks (ISA + ESA), Maximum Marks, Letter Grade, Grade Point (GP), Credit Point (CP) and Institution Average in each course opted in the semester
xi. Total Credits, Marks Awarded, Credit Point, SGPA and Letter Grade in the semester
xii. Weighted Average Score
xiii. Result
xiv. Credits/Grade of Extra Credit and Audit Courses

11.2. The final Mark cum Grade Card issued at the end of the final semester shall contain the details of all courses taken during the entire programme including those taken over and above the prescribed minimum credits for obtaining the degree. The final Mark Cum Grade Card shall show the CGPA and the overall letter grade of a student for the entire programme.

11.3. A separate grade card shall be issued at the end of the final semester showing the extra credit and audit courses attended by the student, grade and credits acquired.

12. AWARD OF DEGREE

The successful completion of all courses other than extra credit and audit courses with 'D' grade shall be the minimum requirement for the award of the degree.

13. MONITORING COMMITTEE

There shall be a Monitoring Committee constituted by the Principal to monitor the internal evaluation conducted by the College. The Course Teacher, Faculty Mentor, and the College Coordinator shall keep all the records of the continuous evaluation, for at least a period of two years, for verification.

14. GRIEVANCE REDRESS MECHANISM

14.1. In order to address the grievance of students regarding ISA, a two-level grievance redress mechanism is envisaged.

14.2. A student can approach the upper level only if grievance is not addressed at the lower level.

14.3. Department level: The Principal shall form a Grievance Redress Committee in each Department comprising of course teacher and one senior teacher as members and the Head of the Department as Chairman. The Committee shall address all grievances relating to the internal assessment of the students.

14.4. College level: There shall be a College level Grievance Redress Committee comprising of Faculty Mentor, two senior teachers and two staff council members (one shall be an elected member) and the Principal as Chairman. The Committee shall address all grievances relating to the internal assessment of the students.

15. TRANSITORY PROVISION

Notwithstanding anything contained in these regulations, the Principal shall, for a period of three years from the date of coming into force of these regulations, have the power to provide by order that these regulations shall be applied to any programme with such modifications as may be necessary.

REGULATIONS FOR ADD ON COURSES FOR UNDERGRADUATE PROGRAMMES

1. **DEFINITIONS**

1.1 'Add On Course General Coordinator' is a senior teacher nominated by the Principal to coordinate and monitor the Add On courses conducted by various departments.

1.2 'Add On Course Coordinator' is a teacher nominated by a Department Council to coordinate the evaluation and other academic activities of the Add On Course undertaken in the Department.

2. **COURSE STRUCTURE**

2.1 Add On Course shall be completed outside the regular teaching hours of the undergraduate programmes and shall be completed within the first four semesters of the programme.

2.2 The credit will be awarded only if the student get D grade (35% marks) and above.

2.3 A student can earn any number of extra credits according to his/her choice.

2.4 The minimum credits for an Add On Course shall be two (2).

3. **EVALUATIONS**

The evaluation of each course shall be done internally and contain two parts.

i. Continuous evaluation
ii. Final evaluation

Both continuous evaluation and final evaluation shall be carried out using indirect grading. The marks for continuous evaluation is twenty (20) and that of final evaluation is eighty (80).

2.1 **Continuous evaluation**

The components of the continuous evaluation and their marks are as below.

For all courses without practical

There are two components for continuous evaluation, which include attendance and assignment. All the components of the continuous evaluation are mandatory.

Components	Marks
Attendance	10
Assignment	10
Total	**20**

Marks for attendance

% of Attendance	Marks
90 and above	10
85 - 89	8
80 – 84	6
76 – 79	4
75	2

(Decimals shall be rounded mathematically to the nearest whole number)

For all courses with practical

The components for continuous evaluation of courses with practical are given below.

Components	Marks
Attendance	10
Lab involvement	10
Total	**20**

Marks for attendance

% of Attendance	Marks
90 and above	10
85 - 89	8
80 – 84	6
76 – 79	4
75	2

(Decimals shall be rounded mathematically to the nearest whole number)

4. **Assignments**

At least one assignment shall be submitted for each course.

5. **Final evaluation**

The final evaluation of theory and practical courses shall be conducted by the College/Department. It can be eighty marks written examination or eighty marks project/practical examination or eighty marks written and project/practical examination combined, as decided by the Board of Studies.

4.1 The question paper shall be strictly on the basis of model question paper set by Board of Studies.

4.2 A question paper may contain objective type, short answer type/annotation, short essay type questions/problems and long essay type questions.

4.3 The duration of written examination shall be decided by the respective Board of Studies and the duration of the practical examination shall be decided by the concerned course coordinator.

4.4 Practical examination shall be conducted by one internal examiner.

4.5 For all courses (theory and practical) an indirect grading system based on a seven (7) point scale according to the percentage of marks (ISA + ESA) is used to evaluate the performance of the student in that course. The percentage shall be rounded mathematically to the nearest whole number.

Percentage of Marks	Grade	Performance
95 and above	S	Outstanding
85 to below 95	A+	Excellent
75 to below 85	A	Very Good
65 to below 75	B+	Good
55 to below 65	B	Above Average
45 to below 55	C	Satisfactory
35 to below 45	D	Pass
Below 35	F	Failure

4.6 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 in a course.

5 ATTENDANCE

5.1. The minimum requirement of aggregate attendance for appearing the final evaluation shall be 75%.

6 BOARD OF STUDIES AND COURSES

6.1 The Board of Studies concerned shall design the Add On Course offered by the department. The Board shall design and introduce new Add On Course, modify or redesign existing Add On Course and replace any existing Add On course with new/modified Add On course to facilitate better exposure and training for the students.

6.2 The syllabus of an Add On course shall also include the title of the course, contact hours, the number of credits, reference materials and question paper pattern.

6.3 Each course shall have an alpha numeric code which includes programme code, abbreviation of the course in two letters, course code and serial number of the course

6.4 The Add On courses conducted under Credit Semester System shall be monitored by the Academic Council.

6.5 For redressing the complaints in connection with the conduct of Add On course, students shall approach the Grievance Redress Committee functioning in the college.

REGULATIONS FOR CERTIFICATE COURSE IN VALUE EDUCATION FOR UNDERGRADUATE PROGRAMMES

Value Education is a compulsory extra credit course for all the students admitted to the undergraduate programmes.

i. **Duration**

The duration of the course shall be three academic years (six semesters) spanning 60 hrs. There shall be minimum 20 hours in an academic year.

ii. **Evaluation**

The evaluation of each course shall contain two parts.

i. Continuous evaluation
ii. Final evaluation

There shall be a maximum of forty (40) marks for external assessment and ten (10) marks for internal assessment.

iii. **Continuous Evaluation**

Assignment

The students are supposed to submit at least one assignment in every year and five (5) marks will be given for a submitted assignment

Attendance

The minimum requirement of aggregate attendance during a semester for appearing the end final examination shall be 75%.

Marks for attendance

Maximum of five (5) marks will be given for attendance as follows.

% of Attendance	Marks
90 and above	5
85-89	4
80-84	3
76-79	2
75	1

(Decimals shall be rounded off to the next higher whole number)

iv. **Final evaluation**

The final examination shall be conducted by the course coordinator. The final assessment examination shall be conducted at the end of every year. There shall be an annual written examination of one and a half hours (1½) duration. The question paper shall be strictly on the basis of model question paper set by Expert Committee. A question paper consists of short answer type, short essay type and long essay type questions.

v. A separate minimum of 30% marks each for continuous and final evaluation and aggregate minimum of 35% are required for a pass in a course.

vi. **Grading**

The total marks of the course shall be one hundred and fifty (150). The grading of the course is as follows:

Percentage of Marks	Grade	Performance
95 and above	S	Outstanding
85 to below 95	A+	Excellent
75 to below 85	A	Very Good
65 to below 75	B+	Good
55 to below 65	B	Above Average
45 to below 55	C	Satisfactory
35 to below 45	D	Pass
Below 35	F	Failure

vii. **Award of certificate**

The course is envisaged with three levels in three academic years. There shall be examination in every year. If a student does not acquire minimum marks he/she can continue with further levels. But he/ she shall be eligible to get certificate only after completing all the levels successfully. The certificate will be issued after completing all the levels with minimum grade D for the pass. On successful completion of the course, grade card shall be issued to the students indicating the grade. The college issues the certificate on value education to all the undergraduate students who successfully complete the course. The course shall be completed during the tenure of the programme.

REGULATIONS FOR COURSE ON BASIC LIFE SUPPORT SYSTEM AND DISASTER MANAGEMENT (BLS & DM)

i. The course on BLS & DM shall be conducted by a nodal centre created in the college.
ii. The nodal centre shall include at least one teacher from each department. A teacher shall be nominated as the Director of BLS & DM.
iii. The team of teachers under BLS & DM shall function as the trainers for BLS & DM.
iv. The team of teachers under BLS & DM shall be given intensive training on Basic Life Support System and Disaster Management and the team shall be equipped with adequate numbers of mannequins and kits for imparting the training to students.
v. Each student shall under go five (5) hours of hands on training in BLS & DM organised by the Centre for BLS & DM.
vi. The training sessions shall be organised on weekends/holidays/vacation during the first semester of the programme.
vii. After the completion of the training, the skills acquired shall be evaluated using an online test and grades shall be awarded.
viii. Nodal centre for BLS & DM shall conduct online test and publish the results.
ix. The grading of the course is as follows:

Percentage of Marks	Grade	Performance
95 and above	S	Outstanding
85 to below 95	A+	Excellent
75 to below 85	A	Very Good
65 to below 75	B+	Good
55 to below 65	B	Above Average
45 to below 55	C	Satisfactory
35 to below 45	D	Pass
Below 35	F	Failure

x. Students who could not complete the requirements of the BLS & DM training shall appear for the same along with the next batch. There shall be two redo opportunity.
xi. For redressing the complaints in connection with the conduct of BLS & DM students shall approach the Grievance Redress Committee functioning in the college.

REGULATIONS FOR SOCIAL AWARENESS PROGRAMME (SAP)

i. Social Awareness Programme shall be conducted by a nodal centre created in the college.

ii. The nodal centre shall include at least one teacher from each department. A teacher shall be nominated as the Director of the SAP.

iii. The centre shall identify the areas where the students can serve the society through the SAP.

iv. During the first semester itself, the centre for SAP shall organise programmes to sensitize the students about the significance and relevance of SAP and publish a list of different areas where they can work as volunteers. Students shall register their preferences (three) with the centre for SAP. The centre shall allot students to various areas based on their preference. For the preparation of the allotment list, the marks obtained in the higher secondary examination shall also be used as a criterion. Centre for SAP shall take the help of the Head of the concerned department and the mentor(s) of the concerned batch at the time of finalization of the allotment list.

v. Students shall carry out the voluntary work allotted to them after the regular class hours/weekends/holidays falling in the second semester or the summer vacation following the second semester.

vi. Evaluation of the SAP activity shall be based on the hours of work put in by a student. A minimum of 50 hours of social work (corresponding to 50 marks) is required for the successful completion of SAP. Every additional work beyond the minimum 50 hours shall fetch five (5) marks per hour. Maximum marks shall be 100. Students who donate blood during the second semester shall be given 10 marks upon the production of the certificate from the medical officer. However, Marks earned through blood donation shall not be counted for a pass in the programme. Mark for blood donation shall be awarded only once during the SAP.

vii. Upon completion of SAP, the marks earned and the grades awarded shall be published by the Director of SAP. The grading is as follows:

Percentage of Marks	Grade	Performance
95 and above	S	Outstanding
85 to below 95	A+	Excellent
75 to below 85	A	Very Good
65 to below 75	B+	Good
55 to below 65	B	Above Average
45 to below 55	C	Satisfactory
35 to below 45	D	Pass
Below 35	F	Failure

viii. Two credits shall be awarded to students who complete the requirements of SAP.

ix. Students who could not complete the requirements of the SAP shall appear for the same with the next batch. There shall be two redo opportunity.

x. For redressing the complaints regarding allotment, harassment at the place of work, and the marks and grades awarded students shall approach the Grievance Redress Committee functioning in the college.

xi. Director of SAP has the right to exclude students who are physically handicapped from SAP.

REGULATIONS FOR INTERNSHIP/SKILL TRAINING PROGRAMME

i. Every UG student shall undergo an internship for a minimum period of five days (25 hours) at a centre identified by the concerned department. In the case of disciplines where internship opportunities are scanty (eg. Mathematics) special skill training programmes with duration of five days (25 hours) shall be organised.

ii. Each department shall identify a teacher in charge for internship/skill training programme.

iii. The department shall select institutions for internship/organising skill training programme.

iv. Internship/skill training programme shall be carried out preferably during the summer vacation following the fourth semester or during the Christmas vacation falling in the fourth semester or holidays falling in the semester.

v. At the end of the stipulated period of internship each student shall produce an internship completion cum attendance certificate and an illustrated report of the training he/she has underwent, duly certified by the tutor and Head of the institution where the internship has been undertaken.

vi. Students undergoing skill training programme shall submit a training completion cum attendance certificate and a report of the training he/she has underwent, duly certified by the trainer, teacher co-ordinator of the programme from the concerned department and the head of the department concerned.

vii. Upon receipt of the internship completion cum attendance certificate and illustrated report of the training or a training completion cum attendance certificate and a report of the training, the teacher in charge of internship/skill training programme shall prepare a list of students who have completed the internship/skill training programme and a list of students who failed to complete the programme. Head of the department shall verify the lists and forward the lists to the Controller of Examinations.

viii. Students who could not complete the requirements of the internship/skill training programme shall appear for the same with the next batch. There shall be only one redo opportunity.

REGULATIONS FOR FINISHING SCHOOL

i. The training to help students develop their soft skills and interview skills, 'The Finishing School', shall be coordinated by a nodal centre.

ii. The nodal centre shall include at least one teacher from each department. A teacher shall be nominated as the Director of the nodal centre.

iii. The training shall impart soft skills comprising of language skills, personal presentation and grooming, resume preparation, group discussion techniques, and interview skills among the undergraduate students.

iv. This course shall be conducted during the fifth semester for all the undergraduate students.

v. There will be a total of 20 contact hours which shall be handled by a team of professional members/faculty. In addition, a one-day outbound training session by a team of professional trainers that touches on the aspects of creativity, problem solving and team building shall also be organized.

vi. **The students shall be assessed and grades shall be awarded based on the components as shown below.**

Component	Marks
Attendance	5
Class Test	10
Assignments	10
Group discussion	10
Interview	15
Total	**50**

vii. The grading of the course is as follows:

Percentage of Marks	Grade	Performance
95 and above	S	Outstanding
85 to below 95	A+	Excellent
75 to below 85	A	Very Good
65 to below 75	B+	Good
55 to below 65	B	Above Average
45 to below 55	C	Satisfactory
35 to below 45	D	Pass
Below 35	F	Failure

viii. For redressing the complaints in connection with the conduct of finishing school students shall approach the Grievance Redress Committee.

VIRTUAL LAB EXPERIMENTS/MOOC

i. There shall be a Nodal officer and a team of teachers to coordinate the logistics for conducting Virtual Lab experiments and MOOC courses and to authenticate the claims of the students regarding the successful completion of the Virtual Lab experiments and or MOOC courses.

ii. Students who are desirous to do Virtual Lab experiments and or MOOC courses shall register with the Nodal officer at the beginning of the experiment session/MOOC course. Students also shall submit proof of successful completion of the same to the Nodal officer.

iii. Upon receipt of valid proof, the nodal officer shall recommend, to the Controller of Examinations, the award of extra credits. In the case of Virtual Lab experiments, 36 hours of virtual experimentation shall equal one credit and in the case of MOOC courses 18 hours of course work shall equal one credit.

iv. College shall arrange infrastructure for taking up Virtual Lab experiments and/or MOOC courses.

Model Mark cum Grade Card

St Berchmans College
Founded 1922
AUTONOMOUS | College with Potential for Excellence | Reaccredited by NAAC with A Grade
Affiliated to Mahatma Gandhi University, Kottayam, Kerala
Changanassery, Kottayam, Kerala, India-686101

MARK CUM GRADE CARD

Date:

Name of the Candidate :

Permanent Register Number (PRN) :

Degree :

Programme :

Stream :

Name of Examination :

Photo

Course Code	Course Title	Credits (C)	Marks						Grade Awarded (G)	Grade Point (GP)	Credit Point (CP)	Institution Average	Result
			ISA		ESA		Total						
			Awarded	Maximum	Awarded	Maximum	Awarded	Maximum					
	Common Course I												
	Core Course												
	Complementary Course												
	Complementary Course												
	Total												
	Weighted Average Score												
	Semester Result												
	SGPA												
	End of Statement												

Entered by:

Verified by:

Controller of Examinations **Principal**

St Berchmans College
Founded 1922
AUTONOMOUS
College with Potential for Excellence | Reaccredited by NAAC with A Grade
Affiliated to Mahatma Gandhi University, Kottayam, Kerala
Changanassery, Kottayam, Kerala, India - 686101, Tel: 91-481-2420025, 9961231314
E-mail: sbc@sbcollege.org Web: www.sbcollege.ac.in

CONSOLIDATED MARK CUM GRADE CARD

Photo

Name of the Candidate :

Permanent Register Number (PRN) :

Degree :

Programme :

Stream :

Date :

Course Code	Course Title	Credits (C)	Marks						Grade Awarded (G)	Grade Point (GP)	Credit Point (CP)	Institution Average	Result
			ISA		ESA		Total						
			Awarded	Maximum	Awarded	Maximum	Awarded	Maximum					
SEMESTER I													
	Common Course I Core Course Core Course Complementary Course Complementary Course												

SEMESTER II													
	Common Course I **Core Course** **Core Course** **Core Course** **Complementary Course**												
SEMESTER III													
	Common Course I **Core Course** **Core Course** **Core Course** **Core Course** **Complementary Course**												
SEMESTER IV													
	Common Course I **Common Course II** **Core Course** **Complementary Course**												
SEMESTER V													
	Core Course **Open Course** **Mini Project**												
SEMESTER VI													
	Core Course **Project** **Viva-Voce**												

SEMESTER RESULTS

Semester	Marks Awarded	Maximum Marks	Credits	SGPA	Grade	Month & Year of Passing	Result
I II III IV V VI							

PROGRAMME PART RESULTS

Programme Part	Marks Awarded	Maximum Marks	Credits	CGPA	Grade
Common Course I: Common Course II: Core Course: Complementary Course: Complementary Course: Open Course:					
Total					

FINAL RESULT

CUMULATIVE GRADE POINT AVERAGE (CGPA) =

GRADE =

*** Separate grade card is issued for Audit and Extra Credit courses.**
**** Grace Mark awarded.**

Entered by:

Verified by:

Controller of Examinations **Principal**

Reverse side of the Mark cum Grade Card (COMMON FOR ALL SEMESTERS)

Description of the Evaluation Process

Grade and Grade Point

The evaluation of each course comprises of internal and external components in the ratio 1:4 for all Courses. Grades and Grade Points are given on a seven (7) point scale based on the percentage of Total Marks (ISA + ESA) as given in Table 1. Decimals are corrected to the nearest whole number.

Percentage of Marks	Grade	Performance	Grade Point
95 and above	S	Outstanding	10
85 to below 95	A+	Excellent	9
75 to below 85	A	Very Good	8
65 to below 75	B+	Good	7
55 to below 65	B	Above Average	6
45 to below 55	C	Satisfactory	5
35 to below 45	D	Pass	4
Below 35	F	Failure	0

Table 1

Credit Point and Grade Point Average

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

CP = C × GP

where C is the Credit and GP is the Grade Point

Grade Point Average of a Semester (SGPA) or Cumulative Grade Point Average (CGPA) for a Programme is calculated using the formula

SGPA or CGPA = TCP/TC

where TCP is the Total Credit Point for the semester/programme and TC is the Total Credit for the semester/programme

GPA shall be rounded off to two decimal places.

Grades for the different Semesters and overall Programme are given based on the corresponding GPA, as shown in Table 2.

GPA	Grade	Performance
9.5 and above	S	Outstanding
8.5 to below 9.5	A+	Excellent
7.5 to below 8.5	A	Very Good
6.5 to below 7.5	B+	Good
5.5 to below 6.5	B	Above Average
4.5 to below 5.5	C	Satisfactory
3.5 to below 4.5	D	Pass
Below 3.5	F	Failure

Table 2

The percentage of marks is calculated using the formula;

$$\% \text{ Marks} = \left(\frac{\text{total marks obtained}}{\text{maximum marks}}\right) \times 100$$

Weighted Average Score (WAS) is the score obtained by dividing sum of the products of marks secured and credit of each course by the total credits of that semester/programme and shall be rounded off to two decimal places.

Note: Course title followed by (P) stands for practical course. A separate minimum of 30% marks each for internal and external assessments (for both theory and practical) and an aggregate minimum of 35% marks is required for a pass in each course. For a pass in a programme, a separate minimum of Grade D for all the individual courses and an overall Grade D or above are mandatory. If a candidate secures Grade F for any one of the courses offered in a Semester/Programme, only Grade F will be awarded for that Semester/Programme until the candidate improves this to Grade D or above within the permitted period.

PROGRAMME STRUCTURE

Semester I

Sl. No.	Course Title	Hours/ Week	Credit	Marks
1	Common Course I	5	4	100
2	Core Course	4	4	100
3	Core Course	4	4	100
4	Core Course Practical	4	2	100
5	Complementary Course: Mathematics	4	3	100
6	Complementary Course: Statistics	4	3	100
	Total	**25**	**20**	**600**

Semester II

Sl. No.	Course Title	Hours/ Week	Credit	Marks
1	Common Course I	5	4	100
2	Core Course	3	3	100
3	Core Course	4	4	100
4	Core Course	4	4	100
5	Core Course Practical	2	2	50
6	Core Course Practical	3	2	50
7	Complementary Course: Mathematics	4	3	100
	Total	**25**	**22**	**600**

Semester III

Sl. No.	Course Title	Hours/ Week	Credit	Marks
1	Core Course	4	4	100
2	Core Course	4	4	100
3	Core Course	3	3	100
4	Core Course	4	3	100
5	Core Course Practical	3	2	50
6	Core Course Practical	3	2	50
7	Complementary Course: Statistics	4	4	100
	Total	**25**	**22**	**600**

Semester IV

Sl. No.	Course Title	Hours/ Week	Credit	Marks
1	Core Course	4	3	100
2	Core Course	4	3	100
3	Core Course	4	3	100
4	Core Course	3	3	100
5	Core Course Practical	3	2	50
6	Core Course Practical	3	2	50
7	Complementary Course: Statistics	4	4	100
	Total	**25**	**20**	**600**

Semester V

Sl. No.	Course Title	Hours/ Week	Credit	Marks
1	Core Course	4	4	100
2	Core Course	4	4	100
3	Core Course	3	3	100
4	Core Course Practical	7	2	100
5	Open Course	3	3	100
6	Mini Project	4	2	100
	Total	**25**	**18**	**600**

Semester VI

Sl. No.	Course Title	Hours/ Week	Credit	Marks
1	Core Course	5	4	100
2	Core Course	5	4	100
3	Elective Course	5	4	100
4	Seminar	3	1	100
5	Main Project	7	4	100
6	Viva-Voce	-	1	100
	Total	**25**	**18**	**600**
	Grand Total		**120**	**3600**

OUTLINE OF THE CORE COURSES

Course Code	Course Title	Hours /Week	Total Hours	Credits	ISA	ESA	Total
Semester I							
BBCS101	Introduction to IT	4	72	4	20	80	100
BBCS102	Programming in C	4	72	4	20	80	100
BBCS1P01	Programming in C (P)	4	72	2	20	80	100
Semester II							
BBCS203	Internet Programming	3	54	3	20	80	100
BBCS204	Data Structures and Algorithms	4	72	4	20	80	100
BBCS205	Digital Electronics	4	72	4	20	80	100
BBCS2P02	Internet Programming Lab (P)	2	36	2	10	40	50
BBCS2P03	Data Structure Lab (P)	3	54	2	10	40	50
Semester III							
BBCS306	Data Analytics using R	4	72	4	20	80	100
BBCS307	Computer Architecture	4	72	4	20	80	100
BBCS308	Object Oriented Programming and C++	3	54	3	20	80	100
BBCS309	Computer Graphics	4	72	3	20	80	100
BBCS3P04	R Programming Lab (P)	3	54	2	10	40	50
BBCS3P05	Programming C++ Lab (P)	3	54	2	10	40	50
Semester IV							
BBCS410	Programming in Python	4	72	3	20	80	100
BBCS411	Software Engineering	4	72	3	20	80	100
BBCS412	Data Base Management System	4	72	3	20	80	100
BBCS413	Web Programming with PHP	3	54	3	20	80	100
BBCS4P06	Programming in Python Lab (P)	3	54	2	10	40	50
BBCS4P07	PHP and MYSQL Lab (P)	3	54	2	10	40	50
Semester V							
BBCS514	Data Communications and Computer Networks	4	72	4	20	80	100
BBCS515	Environmental Studies	4	72	4	20	80	100
BBCS516	Java Programming	3	54	3	20	80	100
BBCS5P08	Programming in JAVA Lab (P)	7	126	2	20	80	100
BBCS5PJ	Mini Project	4	72	2	20	80	100
Semester VI							
BBCS617	Operating Systems	5	90	4	20	80	100
BBCS618	Cyber Security and Cyber Laws	5	90	4	20	80	100
	Elective Course	5	90	4	20	80	100
BBCS6SR	Seminar	3	54	1	100	-	100
BBCS6PJ	Main Project	7	126	4	20	80	100
BBCS6VV	Viva-Voce	-	-	1	-	100	100

ELECTIVE COURSES

Course Code	Course Title	Hours /Week	Total Hours	Credits	ISA	ESA	Total
BBCS6E01	Internet of Things	5	90	4	20	80	100
BBCS6E02	Data Mining	5	90	4	20	80	100
BBCS6E03	Cloud Computing	5	90	4	20	80	100

COMPLEMENTARY COURSES FOR UNDERGRADUATE PROGRAMME IN INDUSTRIAL MICROBIOLOGY AND ZOOLOGY

Course Code	Course Title	Hours /Week	Total Hours	Credits	ISA	ESA	Total
Semester I							
BDCS101	Introduction to IT	2	36	2	15	60	75
BDCS1P01	Software Lab – I (P)	2	36	1	5	20	25
Semester II							
BDCS202	Advanced Excel	2	36	2	15	60	75
BDCS2P02	Software Lab – II (P)	2	36	1	5	20	25
Semester III							
BDCS303	Trends in IT	3	54	3	15	60	75
BDCS3P03	Software Lab – III (P)	2	36	1	5	20	25
Semester IV							
BDCS404	Python	3	54	3	15	60	75
BDCS4P04	Software Lab – IV (P)	2	36	1	5	20	25

OPEN COURSE

Course Code	Course Title	Hours /Week	Total Hours	Credits	ISA	ESA	Total
BOCS501	Web Designing	3	54	3	20	80	100

ADD ON COURSE

Course Code	Course Title	Total Hours	Credit	CE	FE	Total
BCSEX01	Advanced Excel	36	2	20	80	100

SEMESTER I

BBCS101: INTRODUCTION TO IT

Total Hours: 72

Credit: 4

Objectives:

- To understand the evolution of computers in different generations.
- To provide the basic knowledge about the functional units of computer system
- To familiarize the operating system and network.

Outcome:

To provide the students Basic knowledge of computers and information technology.

Module 1: Introduction: Parts of Computer System- Hardware, Software, Data, Users, Different types of computers, Characteristics of computers, Computer Languages -Machine, Assembly Language and Higher Level languages - 3GL, 4GL, 5GL

Module 2: Interacting with Computers:-Input Devices - Key Board, Mouse, Variants of Mouse, Handheld devices, Optical Input devices, Output Devices: Monitors, Sound Systems, and Hard copy devices, Graphics software. Display devices- Raster Scan Display, DVST, Flat panel, LCD, Raster Scan systems, Random Scan systems.

Module 3: Data Processing: Representation of data, processing of data - The CPU, Memory-different types of RAM and ROM, Factors affecting speed

Module 4: Storing Information in a Computer: Types of Storage Devices - Magnetic Storage Devices –Data storage and organization on a Magnetic Disk, Finding data on a disk - Diskettes - Hard Disks- Tape drives- Optical Storage devices, Solid state storage devices

Module 5: System Maintenance: Control panel - Display properties, Adding and removing software, setting date and time, screen saver, appearance. Antivirus installation, Disk cleanup, Disk defragmenter. Configure and Connect Dial-Up Networking, writing data on disc- CD/DVD Burning, Customize the Windows Desktop, Use Files and Folders.

Core Reference:

1. Peter Norton's Introduction to Computers, Published by Tata McGraw Hill, Seventh Edition

References:

1. P K Sinha & Priti Sinha, Computer Fundamentals, BPB Publications, Sixth Edition
2. Introduction to Computer Science, ITL Education Solution limited, Second edition

BBCS102: PROGRAMMING IN C

Total Hours: 72

Credit: 4

Objectives:

- To be able to build own logic for a given problem and finally develop one's own programs
- To understand the syntax and the semantics of C programming language.

Outcome:

To Understand the Programming Fundamentals and the basics of the 'C' Programming Language.

Module 1: Program Concept, Characteristics of Programming, Various stages in Program Development Programming Aids Algorithms, Flow Charts - Symbols, Rules for making Flow chart, Programming Techniques – Top down, Bottom up, Modular, Structured - Features, Merits, Demerits, and their Comparative study. Programming Logic- Simple, Branching, Looping.

Module 2: 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.

Module 3: Control flow: If statement, if…. else statement, nested if...else statement, switch statements, looping – for loop, while loop, do … while statements, nested loop structure, break, continue and go to statements.

Arrays and Strings: Single dimensional arrays, multidimensional arrays, initializing array using static declaration, Searching and sorting of Arrays, Array of Characters, Character arrays and strings, String handling Functions.

Module 4: User Defined Functions: Function declaration, definition & scope, recursion, Arrays and functions, call by value, call by reference, Storage Classes: automatic, external (global), static & registers.

Module 5: Structures: Definition of Structures, declaration, structure passing to functions, array of structures, arrays with in structures, unions, typedef statements.

Pointers: Pointer Definition, pointer arithmetic, array & pointer relationship, pointer to array, pointer to structure, dynamic memory allocation.

Core References:

1. E. BalaGuruswamy, Programming in ANSI C 6E, TMH
2. Byron S Gottfried, Shaum's Outline series, Programming in C, TMH

References:

1. P K Sinha & Priti Sinha Computer Fundamentals, Sixth Edition.
2. B. Kernighan and D. Ritchie, "The ANSI C Programming Language", PHI, Second Edition

PRACTICAL

BBCS1P01: PROGRAMMING IN C LAB

Total Hours: 72

Credit: 4

1. Programs using Basic Constructs: Fundamental data types, qualifiers- long, short, unsigned, input/output functions – scanf(), printf(), Arithmetic expressions, Evaluation of integer, real and mixed mode arithmetic expressions, truncation effect, type casting, relational and logical expressions, Conditional operators, trigonometric functions- sin(), cos(), tan(), mathematical functions – abs(), sqrt(), round() defined in math.h, printing formatted outputs using width specifier.

2. Programs using control structures: if, switch, for, while, do…while, nested structures, break and continue. Sample programs should include printing of Fibonacci numbers, prime numbers, check for Armstrong numbers, summation series – exp(x), sin series etc and verification of result using built in functions, printing pyramid like pattern & other similar patterns using nested loops.

3. Programs using Arrays: Array based programs – Creation of array containing prime numbers, matrix addition, matrix multiplication, transpose of a matrix, array sorting, preparing rank lists based on marks, searching of arrays (linear) for finding price of an item. Static initialization of arrays.

4. String manipulation programs – reading strings using %s, gets(), getchar(), copying one string into another, counting number of characters, vowels, words etc, using string handling functions.

5. User Defined Functions: Programs using return type functions, void type functions, example program using recursive functions, array sorting program using function with call by reference, function to copy one string into another.

6. Program using structures: array of structures, program using structure containing arrays and array of structures. Rank list preparation

7. Simple program using pointers

8. IT (for In Semester Assessment only-ISA)

1. Installation - Operating System, CD-ROM Drive, Sound Card, printer
2. Control panel –
   - 2.1 Display properties
   - 2.2 Adding and removing software

2.3 Setting date and time

2.4 Setting Screen saver, appearance using windows accessories.

2.5 Antivirus installation

2.6 Formatting, Disk cleanup, Disk defragmenter.

2.7 Configure and Connect Dial-Up Networking, Configure a Peer-to-Peer Network, Troubleshoot Software and Hardware,

3. Writing data on disc using CD DVD Burner
4. Customize the Windows Desktop
5. File & Folder Operations

SEMESTER II

BBCS203: INTERNET PROGRAMMING

Total Hours: 54

Credit: 3

Objectives:

- To design and implement websites.
- To use client-side technologies (CSS, forms, JavaScript).
- To recognize and evaluate website organizational structure and design elements.

Outcome:

To highlight the features of different technologies involved in Web Development

Module 1: Internet- Basics of internet- Addresses and names for the internet, , E-mail, WWW, Search engine, The TELNET, The USENET, Internet chat, Web server, Proxy server, Web Browser

Module 2: HTML, Basic HTML, Document Body Text, Hyperlink, Adding more formatting, LISTS- Using Colour and images- Tables, Multimedia objects, Frames, forms- MARQUEE.

Module 3: DHTML, Cascading ,style sheets, Introduction using styles, Working simple examples, Defining your own styles, Properties & values in styles , Style sheets– A worked example , Formatting blocks of information.

Module 4: Java script – Introduction to Java script – Basics – Variables – String manipulation – Mathematical Functions – Operations – Arrays – Functions –- regular expressions – Built- in objects – Data validation – Messages & Confirmation – Status bar- Writing to a different frame.

Module 5: CGI Programming: HTML Forms and Fields; Perl: Basic control structures, data types and operators, mathematical functions, array manipulation functions; CGI Programs: GET & POST methods, simple applications.

Core References:

1. Raj Kamal, Internet & Web Technologies, Tata McGraw Hill
2. Chris Bates, Web Programming, John Wiley & Sons, Third Edition

References:

1. Steven Holzner, HTML Black Book, Dreamtech Publishers

BBCS204: DATA STRUCTURES AND ALGORITHMS

Total Hours: 72

Credit: 3

Objectives:

- To learn the use and working of the various data structures.
- To build own algorithms and pseudocodes for the various applications of the basic data structures.

Outcome:

To understand the use of the basic data structures along with their applications.

Module 1: Concept of Structured data: Data structure definition, Different types and classification of data structures, Arrays– representation of array in the memory, linear array operations, Bubble sort, Selection sort, linear search, binary search, sparse matrix.

Module 2: 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.

Module 3: **Linked list**: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion– examples, circular list – doubly linked lists, garbage collection.

Module 4: **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.

Module 5: **Algorithm**: Introduction, Definition, Areas of algorithm study, performance analysis - space complexity, time complexity, asymptotic notations

Core References:

1. G.S Baluja Danapat Rai & Co. Data Structures Through C (A Practical Approach)
2. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures, Galgotia Publications, Second Edition

References:

1. Ashok N. Kamthane, Introduction to data structures in C, Person Education
2. Seymour Lipschutz, Theory and Problems of Data Structures, Schaum's Outline Series
3. Tanenbaum, Data structures using C and C++, Second Edition

BBCS205: DIGITAL ELECTRONICS

Total Hours: 72

Credit: 3

Objectives:

- To understand number systems
- To learn about the design principles of different digital electronic circuits
- To design different logic circuits

Outcome:

To understand various digital systems and their applications.

Module 1: 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's Complement, 2's 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.

Module 2: Boolean Algebra: 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), Don't care conditions

Module 3: Gate Networks: Logic gates- AND, OR, NOT, NAND and NOR – Truth tables and graphical representation, Representation of simplified expressions using NAND/NOR Gates, XOR and its applications, parity generator and checker.

Module4: Sequential and Combinational Logic. Flip flops- Latch, Clocked, RS, JK, T, D and Master slave , Triggering of flip flops , Counters- Synchronous and asynchronous , BCD, Ripple counters, Half adder, Full adder(need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers (working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle).

Module 5: The Memory Elements: Concept of Registers, Shift Registers, and Flip flops as building blocks of memory, introduction to RAM & ROM

Core References:

1. M.M. Mano-Digital Logic and Computer design

References:

1. Thomas C Bartee- Digital computer Fundamentals, Sixth Edition
2. Floyd- Digital Fundamentals, Tenth Edition
3. Malvino & Leach- Digital Principles and Applications

PRACTICAL

BBCS2P02: INTERNET PROGRAMMING LAB

Total Hours: 36

Credit: 2

1. Web page designing using basic HTML tags
3. Style specifications using CSS
4. Programs using JavaScript
5. CGI Programming

BBCS2P03: DATA STRUCTURE LAB

Total Hours: 54

Credit: 3

1. Array search and sort – Bubble sort, Selection sort, linear search, binary search, sparse matrix, polynomial addition.
6. Stack implementation, Application of stacks – Conversion of infix expression to postfix, expression evaluation.
7. Queue implementation, Implementation of circular queue.
8. Linked list- implementation, concatenation etc., circular list and doubly linked list implementation, implementation of stacks and queue using linked lists.
9. Creation and traversal of binary search trees.

SEMESTER III

BBCS306: DATA ANALYTICS USING R

Total Hours: 72

Credit: 4

Objectives:

- To familiarize statistical programming
- Basic understanding of R language constructs
- To analyze data using various graphics plotting function

Outcome:

- To understand the basics of R programming for data science
-

Module 1: Introduction to Data Analytics: Introduction to analytics, case studies - How analytics is used in practice. Examples of successful analytics work from companies such as Google, Facebook, Kaggle, and Netflix. UNDERSTANDING BIG DATA - What is big data; why big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies

Module 2: Nosql Data Management: Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – schemaless databases – materialized views – distribution models – sharding – master-slave replication – peer-peer replication – sharding and replication – consistency – relaxing consistency – version stamps – map reduce – partitioning and combining – composing map-reduce calculations.

Module 3: **Overview of R**, Concepts for Programming with R, R operational modes:- interactive and batch, R Basics: - Basic syntax, Data Types, Coercion, Variables- Naming Conventions, operators:- arithmetic operators, logical operators, special numbers:- Inf, NaN, NA,NULL,

Module 4: Data Structures and Functions in R: - Vectors, Factors, List, Data Frame, Matrix, Array. Control Structures: Decision making - If, if-else, multiple if-else, switch, Looping Structures: repeat, while, for,Loop Control Statements : break , next

Functions: Overview, Function Components, Built-in Functions-seq, mean, sum, abs, sample, User-defined Function:- Argument Matching, Arguments with Default values, Lazy Evaluation, Multiple Return Values, Functions as Objects, **Strings :-** String Manipulation-concatenating using paste(), string formatting, char(),changing the case, substring()

Module 5: Programming statistical graphics: High level plots:- Bar charts, dot charts, pie charts, histograms, box plots, scatterplots, plotting data from data frames, QQ plots, Choosing a high level graphics

Core References:

1. Joseph Adler , R In A Nutshell: A Desktop Quick Reference, O'Reilly; First edition

References

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
3. W. John Braun and Duncan J. Murdoch, “A First Course in Statistical Programming with R” Second Edition, Cambridge university press.
4. https://www.tutorialspoint.com/r/index.htm

BBCS307: COMPUTER ARCHITECTURE

Total Hours: 72

Credit: 4

Objectives:

- To gain knowledge in addressing modes, memory organization
- To know about parallel computer structures
- To familiarize different processing techniques

Outcome:

- To understand the organization & architecture of computer

Module 1: Functional units of a computer: Basic operational concepts, Bus structure, Addressing methods, Memory locations and addresses, Instructions and instruction sequencing, Instruction execution**.**

Module 2: Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Instruction Classification, Addressing modes.

Module 3: Main Memory: Organization of RAM, ROM, Auxiliary memory, Cache memory, Virtual Memory, Memory mapping Techniques.

Module 4: **Input-Output organization:** Peripheral devices, I/O interface, Accessing I/O devices- Modes of transfer, interrupts-daisy chaining, priority interrupt, MA

Module 5: **Pipelining and Vector processing:** Introduction to parallel processing, Pipeline computers, Multi processing systems, Architectural classification scheme-SISD, SIMD, MISD, MIMD. Introduction to pipelining, Instruction and Arithmetic pipelines (design) Vector processing, Array Processors.

Core References:

1. M.M Mano-Computer Systems Architecture, Third Edition
2. Hamachar-Computer Organization, TMH, Fifth Edition

References:

1. W. Stallings, "Computer Organization and Architecture - Designing for Performance", Prentice Hall of India

BBCS308: OBJECT ORIENTED PROGRAMMING AND C++

Total Hours: 54

Credit: 3

Objectives:

- To discuss the principles of object oriented model and its implementation in C++.
- To know about constructing programs using Bottom-up design approach.
- To implement different stream operations.

Outcome:

- To understand the basics of Object Oriented Programming and their applications.

Module 1: 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

Module 2: 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. Constructors and Destructors- Constructors- Parameterized Constructors-Multiple constructors - Copy constructor - Dynamic constructor-Destructors –

Module 3: Operator overloading& Inheritance-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.

Module 4: 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, Manipulating strings.

Module 5: File input and output: Reading a File, Managing I/O Streams, Opening a File – Different Methods, Checking for Failure with File Commands, Checking the I/O Status Flags, Dealing with Binary Files, Useful Functions.

Core References*:*

1. E. Balaguruswamy, Object oriented Programming with C++, Sixth edition

References:

1. Yashwant Kanetkar, Let Us C++,BPB Publications, Second Edition
2. John R Hubbard, Programming with C++, Shaum's Outline series.
3. Rajesh K Shukla, Wiley India, Objected-Oriented Programming in C++
4. Venugopal, Rajkumar, Ravishankar, *Mastering C++*, TMH

BBCS309: COMPUTER GRAPHICS

Total Hours: 72

Credit: 3

Objectives:

- To provide a comprehensive introduction to computer graphics
- To focus on 2D & 3D Modelling
- To create interactive graphics techniques using different algorithms

Outcome:

- To understand the computer graphics and its applications.

Module 1: Points and lines: Line drawing algorithms, Simple DDA. Circle generation, Midpoint circle algorithm, Character generation.

Module 2: 2D Transformations: Translation, Rotation, Scaling – Matrix representation and homogenous coordinates, composite transformation, raster methods for transformations. **Two-dimensional viewing:** viewing pipeline, concept of window and view port, window to viewport transformation. Clipping operations – point clipping, line clipping, Cohen Sutherland line clipping, polygon clipping, Sutherland-Hodgeman polygon clipping.

Module 3: Structure Concepts: Basic structure functions, setting structure attributes, Editing structures. **Graphical User interface and interactive input methods:** Input of graphical data, interactive picture construction techniques.

Module 4: Three-dimensional concepts: Three-dimensional display methods, three dimensional graphics packages. **Three-dimensional object representations:** Polygon surfaces, sweep representations, constructive solid geometry methods, octrees and quad trees.

Module 5: Working with Scilab: Installation of the software Scilab. Basic syntax, Mathematical Operators, Predefined constants, Built in functions. Complex numbers, Polynomials, Vectors, Matrix. Handling these data structures using built in functions. Programming – Functions, Loops, Conditional statements, Handling .sci files. Graphics handling- 2D, 3D, Generating .jpg files

Core References:

1. Hearn D & Baker MP, “Computer Graphics”, PHI
2. Amarendra Sinha, Computer Graphics, PHI

References:

1. Newman W M & R F Sproul, “Principles of Interactive Computer Graphics”, Mc-Graw Hill Book Company.

2. Plastock R & Xiang Z, “Theory and problems of computer Graphics”, Schaum Series, McGraw Hill book Company.

PRACTICAL

BBCS3P04: R PROGRAMMING LAB

Total Hours: 54

Credit: 2

1. Program to create and manipulate different data structures
   (Vectors, Factors, List, Data Frame, Matrix, Array)
2. Program to illustrate the control structures (decision making & looping statements)
3. Programs based on functions (both built-in and user defined.)
4. Program to related to sampling
5. Program to show the use of various statistical graph plotting functions.

PRACTICAL

BBCS3P05: PROGRAMMING C++ LAB

Total Hours: 54

Credit: 2

I. Programs using C++

1. Programs based on class, objects and manipulation of objects using member functions
2. Programs based on friend functions, passing objects as arguments to function.
3. Programs based on array of objects.
4. Programs based on function overloading, Default arguments.
5. Programs based on operator overloading (binary, unary) using member functions and friend functions.
6. Programs based on constructors, different types of constructors- copy constructor, default constructor.
7. Programs based on Inheritance, different types of inheritance.
8. Programs using virtual functions and polymorphism, this pointer

SEMESTER IV

BBCS410: PROGRAMMING IN PYTHON

Total Hours: 72

Credit: 3

Objective:

- To build programming logic and thereby developing skills in problem solving using Python programming language;
- To be able to do testing and debugging of code written in Python Emphasize the concepts and constructs rather than on language features.

Outcome:

- To get fundamental understanding of programming in Python by creating a variety of scripts and applications for the Web and for systems development.

Module 1: Introduction to Python - Features of Python - Identifiers - Reserved Keywords - Variables Comments in Python – Input , Output and Import Functions - Operators – Data Types and Operations – int, float, complex, Strings, List, Tuple, Set, Dictionary - Mutable and Immutable Objects – Data Type Conversion - Illustrative programs: selection sort, insertion sort, bubble sort

Module 2: Decision Making -conditional (if), alternative (if-else), if..elif..else -nested if - Loops for, range() while, break, continue, pass; Functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum of an array of numbers, linear search, binary search, bubble sort, insertion sort, selection sort

Module 3: Built-in Modules - Creating Modules - Import statement - Locating modules - Namespaces and Scope - The dir() function - The reload function - Packages in Python

Module 4: **Files and exception**: text files, reading and writing files Renaming and Deleting files Exception handling exceptions, Exception with arguments, Raising an Exception - User defined Exceptions - Assertions in

Module 5: GUI Programming- Introduction – Tkinter Widgets – Label – Message Widget – Entry Widget – Text Widget – tk Message Box – Button Widget – Radio Button- Check Button – Listbox- Frames _ Toplevel Widgets – Menu Widget

Core References:

- "Taming PYTHON By Programming", Jeeva Jose Khanna Publications

References:

- Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
- Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC,2013.
- Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.

BBCS411: SOFTWARE ENGINEERING

Total Hours: 72

Credit: 3

Objectives:

- To gain knowledge of various software models.
- To gain knowledge of various software design activities.
- To familiarize about coding and metrics.

Outcome:

- To understand the importance, limitations and challenges of processes involved in software development.

Module 1: Introduction to Software Engineering, Definition, Program Vs Software, and Software process and product metrices, Software Characteristics, Brief introduction about product and process, Software process and product matrices. Software life cycle models-Definition, Waterfall model, Increment process models, spiral model, prototyping model, Evolutionary process models, Selection of a life cycle model.

Module 2: Software Requirement Analysis and Specification, Requirements Engineering, type of requirements, Feasibility Studies, Requirement Elicitation, Various steps for requirement analysis, DFD, Leveling of DFD, Requirement documentation, Requirement validation, an example to illustrate the various stages in Requirement analysis. Project planning-Size estimation, cost estimation, the constructive cost model (COCOMO).

Module 3: Software Design: **Function oriented design**-Design principles, problem partitioning, abstraction, modularity, top-down & bottom-up approach, **Object oriented design**- OO Analysis & design, design methodology, **Detailed design**- PDL, logic algorithm design, state modeling of classes.

Module 4: Coding & Testing: Programming practice- top-down & bottom-up approach, structured programming, information hiding, programming style, internal documentation, verification-code reading, static analysis, symbolic execution, code inspections and reviews. Software Testing-Functional testing & structural testing.

Module 5: Software Maintenance: Categories, problems, process, Maintenance models, and estimation of maintenance cost.

Core References:

1. K KAggarwal, Yogesh Singh, Software Engineering, New Age International Publications, Third Edition

2. Pankaj Jalote, An Integrated approach to Software Engineering, Narosa Publishing Company, Pearson Education, Third Edition

References:

1. Rajib Mall, Fundamentals of Software Engineering, PHI, Fourth edition
2. Waman S Jawadekar, Software Engineering Principles and Practice, Tata McGraw-Hill

BBCS412: DATA BASE MANAGEMENT SYSTEM

Total Hours: 72

Credit: 3

Objectives:

- To understand conceptual and physical design of a database.
- To understand RDBMS and queries to design database and manipulate data in it.
- To know basic database backup and recovery.

Outcome:

- To introduce the concept of Back end, data storage in computers, design of a DBMS, Queries to construct database, store and retrieve data from the database

Module 1: 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, sample ER diagrams.

Module 2: 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.

Module 3: 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

Module 4: Data Normalization:- Informal Design Guide lines for relation schemas, functional dependencies, Normal forms- first, second and third normal form, Boyce- Codd normal form.

Indexing structures for files- types of single level ordered indexes.

Module 5: Transaction processing:- Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions. Concurrency Control:- Locking techniques for concurrency control.

Database Security and Authorization:- Types of security , control measures, database security and the DBA, Access protection, User accounts and database audits, Access Control based on granting and Revoking privileges.

Core Reference:

1. RamezElmasri and Shamkant B. Navathe, "Fundamentals of Database Systems" Pearson Education, Fifth edition

References:

1. C.J Date, An Introduction to Database systems
2. Reghu Ramakrishnan, Data base Management Systems, McGraw Hill International Edition.
3. Bipin Desai, " An Introduction to Database Systems" Galgotia Publications

BBCS413: WEB PROGRAMMING WITH PHP

Total Hours: 54

Credit: 3

Objectives:

- To implement different navigation strategies in website.
- To develop simple back-end database to support a website.
- To recognize and evaluate website organizational structure and design elements.

Outcome:

- To highlight the features of different technologies involved in Web Development

Module 1: Introduction - Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type , Operator and Expression, Decisions and loop - Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html

Module 2: Array - Anatomy of an Array, Creating index based and Associative array, Accessing array Element, Looping with Index based array, Looping with associative array using each() and for each(), Some useful Library functions

Module 3: Function - What is a function, Define a function, Call by value and Call by reference, Recursive function , String - Creating and accessing String, Searching & Replacing String, Formatting String , String Related Library function, String matching with regular expression, regular expression, Pattern matching in Php, Replacing text, Splitting a string with a Regular Expression

Module 4: Handling Html Form with Php - Capturing Form Data, Dealing with Multi-value filed, uploaded form, redirecting a form after submission, Working with file and Directories, Understanding file& directory, Opening and closing a file, Copying, renaming and deleting a file, File Uploading & Downloading

Module 5: Database–Introduction to OOPS, Class, Object, New Keyword and constructor, Connectivity with MySql, Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query, Join.

Core References:

1. Vikram Vaswani, PHP A Beginner‘s Guide, Tata McGraw-Hill
2. Steven Holzner, PHP: The Complete Reference

References:

1. George Schlossnagle, Advanced PHP Programming, Pearson Education
2. Luke Welling & Laura Thomson, PHP and MYSQL Web Development
3. Steven Holzner, Spring into PHP5 –Tata McGraw Hill Edition

PRACTICAL

BBCS4P06: PROGRAMMING IN PYTHON LAB

Total Hours: 54

Credit: 2

1. Simple Programs in python
2. Simple programs using decision making and loops.
3. Programs related to functions
4. Programs related to files
5. Object oriented programs

BBCS4P07: PHP AND MYSQL LAB

Total Hours: 54

Credit: 2

PHP

1. Designing User Interface
2. Simple programs using decision making and loops.
3. Database Connectivity using Controls - Designing user interface with forms and controls and create database connectivity using MySQL
4. Mini project using PHP

MYSQL

I MySQL Commands (2 hours)

1. **Data definition commands** - CREATE, ALTER, DROP, Adding Constraints – Primary key, foreign key, unique key, check, not null.
2. **Basic SQL queries** – INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of rows using ORDER BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, BETWEEN operator.
3. **Complex Queries** – Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.
4. **Managing views, Simple stored procedures.**
5. **Data Control commands** - Access Control and Privilege commands.

SEMESTER V

BBCS514: DATA COMMUNICATIONS AND COMPUTER NETWORKS

Total Hours: 72

Credit: 4

Objectives:

- To build an understanding of the fundamental concepts of computer networking.
- To familiarize the categories and topologies of networks
- To understand the details of IP operations in the Internet and associated routing principles

Outcome:

- The aim of this course is to allow students to develop background knowledge as well as core expertise in networking technologies

Module 1: Need of network: Network classifications-LAN, MAN, WAN, wireless networks & Internet. Data and signals-analog and digital periodic analog signals, digital signals, bit rate, baud rate, bandwidth. Transmission impairments- attenuation distortion and noise. Data communication protocols and standards, Network models - OSI model-layers and their functions. TCP/IP protocol suite.

Module 2: Bandwidth utilization Multiplexing: FDM, TDM, spread spectrum. Transmission Media- guided media and unguided media. Switching: message, Circuit and packet switched networks, datagram networks, virtual- circuit networks.

Module 3: Hop to Hop Delivery: Error Detection and Correction –Type of Errors, Redundancy, Detection, Correction, Forward Error and Retransmission. Coding -Block Coding (Parity Check Code and Hamming Code) and Cyclic Codes. Framing, flow and error control, Protocols - Noiseless channels (Simplest, Stop and Wait) and Noisy channels (Stop and Wait and Piggy Backing) .

Module 4: Multiple Access Protocols, Multiple Access Protocols -Random Access-ALOHA, CSMA. Wired LANs-IEEE standards, standard Ethernet, wireless LANs-Bluetooth, Wireless Lan- Cellular Telephony-Frequency Reuse Principle ,Transmitting, Receiving, Handoff, Hard Hand off, Soft Hand off, Roaming .Cellular Telephony Generations -First, Second and Third generations. Satellite Networks- Geo, Meo,Leo.

Module 5: Host-To-Host Communication, Network Level Logical addressing-IPv4 addresses, IPv6 addresses, Internet protocol-IPv4 andIPv6, Process to Process Delivery – Connectionless and Connection Oriented Service: UDP, TCP. Congestion control, quality of service. Client Server Programs. Name space, domain name space, Remote logging, Electronic mail, File transfer.

Core Reference:

1. Data communications and Networking, B.A. Forouzan, fourth edition

References:

1. W. Stallings, Data and Computer Communications, Macmillan Publishing, Fourth Edition
2. Andrew S Tanenbaum, Computer Networks, Fourth Edition

BBCS515: ENVIRONMENTAL STUDIES

Total Hours: 72

Credit: 4

Objectives:

- To create awareness, acquire knowledge so that students manage their society properly inculcate skills for identifying problems associated with environment and develop ability to evaluate participate in environmental protection activities that is helpful to all living things.

Outcome:

- To understand basics about environment and its related recent problems.
- To identify environmental issues around them.
- To make the people aware, around them, about environment protection & improvement and thus creating awareness amongst the society

Module 1: Environmental Studies – Introduction, Multidisciplinary nature, Scope and importance, Concept of sustainability and sustainable development. **Ecosystems -** Structure and function, Energy flow, food chains, food webs and ecological succession, Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries), **Natural Resources** -Renewable and Non---renewable Resources, Land resources and land use change; Land degradation, soil erosion and desertification, Deforestation - Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations, Water: Use and over---exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter---state), Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs.

Module 2: Biodiversity and Conservation - Levels of biological diversity: genetic, species and ecosystem diversity; Bio geographic zones of India; Biodiversity patterns and global biodiversity hot spots, biodiversity in India, Endangered and endemic species of India, Threats - Habitat loss, poaching of wildlife, man---wildlife conflicts, biological invasions; Conservation of biodiversity: In---situ and Ex---situ conservation of biodiversity, Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Module 3: Environmental Pollution - Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution, Nuclear hazards and human health risks, Solid waste management: Control measures of urban and industrial waste, Pollution case studies.

Module 4: Environmental Policies & Practices - Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture, Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Module 5: Human Communities and the Environment - Human population growth: Impacts on environment, human health and welfare., Resettlement and rehabilitation of project affected persons; case studies., Disaster management: floods, earthquake, cyclones and landslides., Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan., Environmental ethics: Role of Indian and other religions and cultures in environmental conservation., Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Core Reference:

- "Text book for Environmental Studies for undergraduate courses of all branches of Higher Education", Erach Bharucha for University Grants Commission.

BBCS516: JAVA PROGRAMMING

Total Hours: 54

Credit: 4

Objectives:

- To understand the model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism
- To use the Java environment to create, debug and run simple Java programs.
- To write a computer program to solve specified problems.

Outcome:

- To understand the use of object oriented features along with their applications

Module 1: Object oriented programming: Encapsulation-Inheritance-Polymorphism-Genesis of Java-characteristics of java- program structure-identifiers-operators-variables-literals-data types-Arrays. Control Statements-selection statements-iterative statements-jump statements - Loops- while loop-do while loop- for loop

Module 2: Classes: Declaration –object references-instantiation- method declaration-method calling – this operator- constructor- method overloading-constructor overloading-method overriding-inheritance-super class-dynamic method dispatch-final-static-abstract classes–String Handling.

Module 3: Packages: Creating packages-using packages-Interfaces-Exception Handling Techniques-try-catch-throw-throws-finally-Multithreading- creation of multithreaded program-Thread class-Runnable interface- thread priorities.

Module 4: Event Handling: Delegation Event Model-Event Classes-Sources of Events-Event Listeners- AWT: Frame Class-AWT Controls: Label-Button-Checkbox-List-Choice control-Text Field-Text Area- Lay out Managers.

Module 5: Applet Fundamentals: Applet tag-applet life cycle-passing parameters to applets- working with graphics –Line-Rectangle-Oval – Arc- color setting-I/O Streams: Data Input Stream-Data Output Stream-Buffered Reader-Buffered Writer classes

Core Reference:

1. E. Balagurusamy, Programming with java, McGraw-Hill Education India, Fifth edition

References:

1. Patrick Naughton, Java2 The Complete Reference, Seventh Edition.
2. Java 6 Programming Black Book, Dreamtech press

PRACTICAL

BBCS5P08: JAVA LAB

Total Hours: 126

Credit: 2

Part I: Applet Programs: Graphics- AWT controls- Event Handling (using class and read inputs from keyboard)

Part II: Java Programs: Method Overloading- Method Overriding-inheritance-abstract class – interfaces- packages-Exception Handling-Multithreading.

BBCS5PJ: MINI PROJECT

Total Hours: 72

Credit: 2

Mini project shall be a small complete project, to make the student confident in designing a system based on ***Software Engineering*** course.

SEMESTER VI

BBCS617: OPERATING SYSTEMS

Total Hours: 90

Credit: 4

Objectives:

- To understand the services provided by an operating system.
- To understand what a process is and how processes are synchronized and scheduled.
- To know about memory management and the file system.

Outcome:

- To introduce the Operating System and describe the functionalities of Operating System.

Module 1: 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.

Module 2: Process: Basic Concepts, Process Scheduling, Operations on 'Processes, Inter process communication, Process Scheduling – Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

Module 3: 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.

Module 4: Memory Management: Memory Management Strategies–Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement

Module 5: Storage Management :-File System :- File Concept, Access Methods, Directory Structure, protection , Implementing File Systems-File System Structure, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.

Core References:

1. Abraham Silberschatz, Peter Galvin and Greg Gagne, John Wiley Operating System Principles, Seventh Edition.
2. William Stallings, Operating Systems, Fifth Edition

Reference:

1. Milan Kovic, Operating Systems, TMH, Second Edition

BBCS618: CYBER SECURITY AND CYBER LAWS

Total Hours: 90

Credit: 4

Objectives:

- Be aware of principles and protocols of internetworks
- Understand the basic issues in information security
- Understand the concept of ciphers and cryptography.
- Understand the concept of digital signatures and e-mail security policies
- To impart an idea on malicious software and remedies.

Outcome:

- To introduce internetworking and the issues and methods of information security over internetworks.

Module 1: Information Security: Elements, Confidentiality, integrity, authentication, security policy, basic network security terminology, cryptography, symmetric encryption, substitution ciphers, transposition ciphers, steganography.

Module 2: Data Encryption Standards: Block ciphers, modes of operation, Data Encryption Standard, Public key cryptography, applications, strength and weakness, RSA algorithm, key distribution (concepts only).

Module 3: Authentication- authentication methods, **Message digest**-MD-5 &SHA-1, **Digital signatures,** digital signature algorithm (DSA) **E-mail security**: Pretty Good Privacy, working of PGP, S/MIME, MIME, IP Security, **Web Security:** Secure Socket layer, SSL session and connection

Module4: Malicious Software, viruses, working of anti-virus software, worms, Trojans, Spyware, Digital Immune System, Attacks

Module 5: Firewall, characteristics of firewall, packet filters, application level gateways, Firewall architecture, trusted systems. **Cyber Crime and the IT Act 2000/2008**.

Core References:

1. Pachghare, V.K., Cryptography and Information Security, PHI.
2. Brijendra Singh, Network Security& Management, PHI.23

References:

1. Behrouz A. Forouzan, “Cryptography and Network Security”, Tata McGraw Hill, Special Indian Edition

2. William Stallings, “Cryptography and Network Security: Principles and Practice”, Pearson Education, Sixth edition

ELECTIVE COURSES

BBCS6E01: INTERNET OF THINGS

Total Hours: 90

Credit: 4

Objectives:

- To Understand the Architectural Overview of IoT
- To Understand the IoT Reference Architecture and Real World Design Constraints 3
- To Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service)

Outcome:

- To impart knowledge on IoT Architecture and various protocols, study their implementations

Module 1: Introduction to IoT: - Genesis of IoT, Digitization, Impact, Connected Roadways - Challenges- safety, mobility, environment, Connected Factory -industry – mechanical assistance, mass production, electronics and control, integration, Smart Connected Buildings – heating, ventilation, HVAC systems, BAS System, BACNet, Smart Creatures, Convergence of IT and OT, IoT Challenges – Scale, Security, Privacy, Big data and data analytics.

Module 2: IoT Network Architecture and Design: - Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack

Module 3: Engineering IoT Networks: Smart Objects **-** Sensors, Actuators, and Smart Objects, Sensor Networks, **Connecting Smart Objects:** Communications Criteria IoT Access Technologies

Module 4: IP as the IoT Network Layer: Business Case for IP, Need for Optimization, Optimizing IP for IoT, Profiles and Compliances, **Application Protocols for IoT:** Transport Layer, IoT Application Transport Methods

Module 5: Securing IoT: A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment, **Public Safety:** Overview of Public Safety, An IoT Blueprint for Public Safety,

Emergency Response IoT Architecture, IoT Public Safety Information Processing, School Bus Safety

Core Reference:

1. David Hanes, " IoT Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things", Cisco Press, Pearson, 2017.

References:

1. Graham Meikle, "The internet of things", polity press, 2017
2. Andrew Minteer, "Analytics for the internet of things: Intelligent analytics for your intelligent devices", Packt publishing, 2017
3. 1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Aves and, Stamatis Karnouskos, David Boyle, **"**From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence**",** 1st Edition, Academic Press, 2014.
4. Peter Waher**, "**Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
5. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

BBCS6E02: DATA MINING

Total Hours: 90

Credit: 4

Objectives:

- Interpret the contribution of data warehousing and data mining to the decision-support level of organizations
- Evaluate different models used for olap and data preprocessing
- Categorize and carefully differentiate between situations for applying different data-mining techniques: frequent pattern mining, association, correlation, classification, prediction, and cluster and outlier analysis
- Design and implement systems for data mining
- Evaluate the performance of different data-mining algorithms
- Propose data-mining solutions for different applications

Outcome:

- To impart knowledge on Data mining study the algorithms and applications

Module 1: Introduction Data Mining, Data Ware House, Transactional Databases, Data Mining Functionalities Characterization and Discrimination, Mining frequent patterns, Association and correlation, Classification and Prediction, Cluster Analysis, Classification of Data Mining Systems, Data Mining Task Primitive, Integration of Data Mining systems, Major issues in Data Mining, Data integration and transformation, Data reduction, Data discretization.

Module 2: Data Warehouse and OLAP technology Data Warehouse, Multidimensional data Model, Data warehouse architecture, Data Warehouse implementation, OLAP, Data Warehouse and data mining.

Module 3 : Association Rules and Classification Concepts Efficient and Scalable Frequent item set Mining methods, Mining various kind of association rules, from association mining to Co-relation analysis, Classification and prediction, Issues, Classification by Decision tree induction, Bayesian Classification, Rule-based classification, Support Vector Machines, Learning from your neighbours, Prediction.

Module 4: Cluster Analysis Definition, Types of data in cluster analysis, A categorization major Clustering methods-Partitioning methods, K-means and kmedoids, from k-medoids to CLARANS, Hierarchical methods, Density based methods.

Module 5: Mining Complex Data Spatial Data Mining, Multimedia Data Mining, Text Mining and Mining WWW.

Core Reference:

1. Jiawei Han and Micheline Kamber Data Mining - Concepts and Techniques (Second Edition) Elsevier, 2006

Reference:

1. Witten and Frank Data Mining Practical Machine Learning Tools and Techniques (Second Edition) Elsevier, 2005
2. Soman, Divakar and Ajay Data Mining Theory and Practice PHI, 2006

BBCS6E03: CLOUD COMPUTING

Total Hours: 90

Credit: 4

Objectives:

- Basics of cloud computing.
- Key concepts of virtualization.
- Different Cloud Computing services
- Cloud Implementation, Programming and Mobile cloud computing
- Cloud computing risks an security

Outcome:

- Use and Examine different cloud computing services

Module 1: Introduction to Cloud computing, , Fundamental concepts, cloud computing mechanisms, Cloud service providers, Properties, Characteristics - Benefits of Cloud Computing- Cloud computing vs. Cluster computing vs.

Module 2: Grid computing- Pros and Cons of Cloud Service Development - Cloud deployment models, Alternative Deployment Models- The Linthicum Model, The Jericho Cloud Cube Model.

Module 3: The NIST model- Cloud services- PaaS, SaaS, IaaS, TaaS, DaaS, Security as a Service, Issues in cloud computing, advantages and disadvantages of cloud computing, Cloud Management.

Module 4: Virtualization concepts, Virtualization architecture, Types of Virtualization, Virtualization in clusters, Pros and cons of virtualization, Virtual machines, Types of virtual machines, Virtual desktop infrastructure and virtual machine monitoring.

Module 5: Security objectives- services, Security design principles, secure cloud software requirements, Secure Cloud Software Testing, Cloud computing risks, Security architecture, Cloud storage and disaster recovery, Cloud storage providers, Disaster management in cloud.

References

1. Ronald L. Krutz, Russell Dean Vines, “Cloud Security – A comprehensive Guide to Secure Cloud Computing”, Wiley – India, 2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009.
3. M.N Rao “Cloud Computing” , PHI Learning Private Limited, 2015
4. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

5. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing from Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
6. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, first edition, 2008.
7. Haley Beard, “Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs”, Emereo Pty Limited, 2008.

BBCS6SR: SEMINAR

Total Hours: 54

Credit: 1

The student shall choose a modern topic of current day interest in the areas of Computer Science / Information Technology and present a seminar using appropriate presentation media such as LCD projector, OHP etc. A seminar report in bound form in the pattern of a complete technical report (with contents page, well structured presentation, references etc.) shall be submitted.

BBCS6PJ: MAIN PROJECT

Total Hours: 126

Credit: 4

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. 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.

PROJECT WORK

TITLE OF THE PROJECT

Bonafide Work Done

by

STUDENT NAME

REG. NO.

Project submitted in partial fulfillment of the requirements for the award of

Bachelor of Computer Applications

GUIDE **HOD**

Submitted for the Viva-Voce Examination held on _____

Internal Examiner **External Examiner**

MONTH – YEAR

CONTENTS

Model Question Papers

COMPLEMENTARY COURSES

SEMESTER I

BDCS101: INTRODUCTION TO IT

Total Hours: 36

Credit: 2

Objectives:

- To understand the evolution of computers in different generations.
- To provide the basic knowledge about the functional units of computer system
- To familiarize the operating system and network.

Outcome:

- To provide the students Basic knowledge of computers and information technology.

Module1: Introduction: Parts of Computer System- Hardware, Software, Data, Users, Different types of computers, Characteristics of computers, Computer Languages - Machine, Assembly Language and Higher Level languages - 3GL, 4GL, 5 GL.

Module 2: Interacting with Computers:-Input Devices - Key Board, Mouse, Variants of Mouse, Handheld devices, Optical Input devices, Output Devices: Monitors, Sound Systems, and Hard copy devices, Graphics software. Display devices- Raster Scan Display, DVST, Flat panel, LCD, Raster Scan systems, Random Scan systems.

Module 3: Data Processing: Representation of data, processing of data - The CPU, Memory different types of RAM and ROM, Factors affecting speed

Module 4: Storing Information in a Computer: Types of Storage Devices - Magnetic Storage Devices –Data storage and organization on a Magnetic Disk, Finding data on a disk - Diskettes - Hard Disks- Tape drives- Optical Storage devices, Solid state storage devices

Module 5: System Maintenance: Installation – Operating System, CD ROM Drive, Sound Card, printer, Control panel - Display properties, Adding and removing software, setting date and time, screen saver, appearance. Antivirus installation, Formatting, Disk clean up, Disk defragmenter. Configure and Connect Dial-Up Networking, Configure a Peer-to-Peer Network, Troubleshoot Software and Hardware, Writing data on disc- CD/DVD Burning, Customize the Windows Desktop, Use Files and Folders, Familiarize DOS internal & external commands.

Core Reference:

1. Peter Norton's Introduction to Computers, Seventh Edition, Published by Tata McGraw Hill

References:

1. P K Sinha & Priti Sinha, Computer Fundamentals, Sixth Edition, BPB Publications.
2. Introduction to Computer Science, Second edition, ITL Education Solution limited

PRACTICAL

BDCS1P01: SOFTWARE LAB – I

Total Hours: 36

Credit: 1

1. Control panel
    - 1.1 Display properties
    - 1.2 Adding and removing software
    - 1.3 Setting date and time
    - 1.4 Setting Screen saver, appearance using windows accessories.
    - 1.5 Antivirus installation
    - 1.6 Formatting, Disk clean up, Disk defragmenter.
    - 1.7 Writing data on disc using CD DVD Burner
    - 1.8 Customize the Windows Desktop
2. Files and Folders

SEMESTER II

BDCS202: ADVANCED EXCEL

Total Hours: 36

Credit: 2

Objectives:

- Make the students aware of MS Excel and its applications

Outcome:

- To provide the basic knowledge about Ms-Excel

Module 1: Introducing Excel: Uses of Excel, Work book & Worksheet, Parts of Excel screen, Introducing the Ribbon-Ribbon tabs, Contextual tabs, Types of commands on the Ribbon, Entering and Editing Worksheet Data-Entering Text and Values into Worksheets, Entering Dates and Times into Worksheets, Modifying Cell Contents, Easy data-entry techniques, Applying Number Formatting.

Module 2: Essential Worksheet Operations: Fundamentals of Excel Worksheets-Working with Excel windows, Adding a new worksheet to workbook, Deleting a worksheet, Deleting a worksheet, Splitting the worksheet window into panes, Keeping the titles in view by freezing panes, Working with Rows and Columns, Working with Cells and Ranges-Understanding Cells and Ranges, Copying or Moving Ranges- Copying by using shortcut menu commands, Copying to adjacent cells, Pasting in special ways, Adding Comments to Cells

Module 3: Worksheet Formatting: Formatting Tools-tools of the Home Tab, Mini toolbar, Format Cells dialog box, Using Different Fonts to Format Worksheet, Changing Text Alignment, Wrapping or shrinking text to fit the cell, Merging worksheet cells to create additional text space, Using and Creating Templates, Printing Your Work, Adding a Header or Footer, Inserting a Watermark, Conditional Formatting

Module 4: Working with Formulas and Functions: Understanding Formula Basics, Operators Used in Formulas, Operator Precedence in Excel Formulas, Using Cell References in Formulas, Referencing cells outside the worksheet, Referencing cells in other workbooks.

Module 5: Creating Charts and Graphics: Working with Charts, Understanding Chart Types, Chart Elements, **Data Validation**- Creating a Drop-Down List, Protecting Worksheet**,** **Analysing Data with Excel**- Introducing pivot tables, What-if analysis, Analysing Data Using Goal Seeking and Solver

Reference Texts

1. Excel 2010(Excel Bible) , John Walkenbach
2. Advanced excel reporting for management accountants (Wiley corporate F&A), Neale Blackwood
3. Learn excel 2010 expert skills with the smart method, Mike Smart

PRACTICAL

BDCS2P02: SOFTWARE LAB - II

Total Hours: 36

Credit: 1

1. Familiarization of Excel Package

SEMESTER III

BDCS303: TRENDS IN IT

Total Hours: 54

Credit: 3

Objectives:

- To understand open, free software
- To familiarize open OS & Mobile OS
- To know about the different utilities of the internet

Outcome:

- To study about different Open Source Software.

Module 1: Open Source Software- Definition of open source software, essential requirements for being open, free software vs open source software, 4 degrees of freedom, FOSS examples, open source hardware

Module 2: Open OS - Features, Advantages, distributions, Basic Architecture, File System Introduction, File System Hierarchies, Desktop environments – KDE, GNOME. Editors-vim, emacs. Overview of Shells – BASH and other.

Module 3: Essential Linux Commands- 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, 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 wi , Filters pipe commands.

Module 4: Utilities- Firefox- features, versions, system requirements. Apache- features, versions, Wikipedia, Google drive, Social networking- blogging, chatting, WhatsApp.

Module 5: Googling- Introduction, Chrome, Google+, Google account, customization, doodle, search features, tips, filters, alerts, Google trends, Google beyond.

Core Reference:

1. Beginning Linux Programming, Fourth edition, Wrox publications
2. Prasanna Kumar Dixit, Android, Vikas
3. Jesús M. González-Barahona et al, “Introduction to Free Software”, Free Technology Academy, Europe

References:

1. Christopher Negus, Linux Bible, Willey India publications Ltd
2. Getting Organized in the Google Era - Douglas C. Merril and James A. Martin
3. Advanced Googling: How to Search Smarter, Faster and More Efficiently on Google (Google eBook) Garrett Wasny, MA, CMC, CITP/FIBP

PRACTICAL

BDCS3P03: SOFTWARE LAB - III

Total Hours: 36

Credit: 1

1. Working with Open OS- Linux
2. Exploring different internet utilities
    2.1. File management using Google Drive
3. Effective usage of Google.

SEMESTER IV

BDCS404: PYTHON

Total Hours: 54

Credit: 3

Objectives:

- To understand Python's essential features
- To understand the syntax and the semantics of Python programming language.

Outcome:

- To Understand the Programming Fundamentals and the basics of the 'Python' Programming Language.

Module 1: Introduction: Running Python, Variables and Arithmetic Expressions, Conditionals, File Input and Output, Strings, Lists, Tuples, Sets, Dictionaries, Iteration and Looping, Functions, Generators, Co-routines, Objects and Classes

Module 2: Lexical Conventions and Syntax: Line Structure and Indentation, Identifiers and Reserved Words, Numeric Literals, String Literals, Containers, Operators, Delimiters, and Special Symbols, Documentation Strings, Decorators, Source Code Encoding

Module 3: Operators and Expressions: Operations on Numbers, Operations on Sequences, String Formatting, Advanced String Formatting, Operations on Dictionaries, Operations on Sets, Augmented Assignment, The Attribute (.) Operator, The Function Call () Operator, Conversion Functions, Boolean Expressions and Truth Values, Object Equality and Identity, Order of Evaluation, Conditional Expressions

Module 4: Program Structure and Control Flow: Program Structure and Execution, Conditional Execution, Loops and Iteration

Module 5: Functions and Functional Programming: Functions, Parameter Passing and Return Values, Scoping Rules, Functions as Objects and Closures, Decorators, Generators and yield, Co-routines and yield Expressions, Using Generators and Co-routines, List Comprehensions, Generator Expressions, Declarative Programming, The lamda Operator, Recursion, Documentation Strings, Function Attributes, eval(), exec(), and compile()

Core Reference:

1. David M Beazley, Python Essential Reference, Fourth edition

References:

1. Michael Dawson, Python Programming, third edition
2. John Zelle, Python Programming: An Introduction to Computer Science, Second edition.

PRACTICAL

BDCS4P04: SOFTWARE LAB - IV

Total Hours: 36

Credit: 1

1. Program using variables and arithmetic expressions
2. Program using decision making and looping
3. Program using functions

OPEN COURSE

BOCS501: WEB DESIGNING

Total Hours: 54

Credit: 3

Objectives:

- To understand the importance of the web as a medium of communication.
- To learn the language of the web: HTML and CSS.
- To embed social media content into web pages.

Outcome:

- Develop the skills to design a web site.

Module 1: Internet: Basics of Internet, website, domain, Web browser, web server, search and search engine for internet, Internet Agents, mobile agents, meta search sites, URL, Email

Module 2: HTML: Introduction to HTML, Basic formatting tags: heading, paragraph, underline break, bold, italic, underline, superscript, subscript, font and image. Different attributes like align, color, bgcolor, font face, border, size. Navigation Links using anchor tag: internal, external, mail and image links. Lists: ordered, unordered and definition, Table tag, HTML Form controls: form, text, password, textarea, button, checkbox, radio button, select box, hidden controls, Frameset and frames.

Module 3: CSS: CSS Basic, HOME, Introduction, Syntax, CSS Id & Class, Backgrounds, Text, Fonts, Links, Lists, Tables

Module 4: JavaScript: Introduction What is JavaScript ,Understanding Events ,JavaScript Example ,External JavaScript , Comment ,Variable ,Global Variable ,Data Types ,operators

Module 5: Dreamweaver: Exploring the Dreamweaver, working with panels and workspace, setting up a website and its files, working with webpage elements-text, graphics, tables, hyperlinks, audio/video, frames and forms.

Core References:

1. Raj Kamal, Internet & Web technologies, Tata McGraw Hill
2. Jon Duckett, Web Programming with HTML, XHTML, CSS, Wrox Beginning.
3. Dreamweaver CS6, Dream Tech Press
4. Mastering HTML, CSS & Javascript Web Publishing (English, Paperback, Lemay Colburn Kyrnin)

References:

1. Html 4.0 In Simple Steps, Kogent Solutions, Wiley India
2. Ed Tittel & Mary Burmeister, Html 4 For Dummies, Wiley References
3. Harley Hahn, “Internet Complete Reference”

ADD ON COURSE

BCSEX01: ADVANCED EXCEL

Total Hours: 36

Credit: 2

Objectives:

At the successful completion of this course, students will be able to

- Explain common spreadsheet concepts and terms
- Use Excel's formatting features to change the appearance of an entire worksheet and of cells in a worksheet
- Use equations and built-in functions to interrelate numeric data in an Excel worksheet
- Create and modify charts to summarize numeric data in an Excel worksheet
- Use Excel's query tools to extract or filter records in a list to meet simple and complex criteria
- Set up a list in an Excel worksheet and sort the list using one or more keys, including a key based on a custom list
- Summarize data in lists using Data Tables
- Consolidate data in lists and worksheets
- Print spreadsheets and charts
- Explain and demonstrate the best ways to organize spreadsheets
- Customizing Excel User Interface, Using Custom number formats, Using Data validation

Module 1: Tables and Formatting

Working with tables, Sorting, Filtering, Converting a table back to range

Worksheet formatting, Wrapping, Merging, Displaying text, Controlling

Module 2: Functions and Formulas

Mathematical functions - Statistical functions - Database functions - Working with references on different worksheets Exercises

Working with formulas-Using Formula bar as a calculator, converting formulas to values

Module 3: Creating Charts and Graphics

Creating charts, Customizing, Working with charts, Understanding chart types

Creating Sparkline Graphics, Customizing Sparklines, Specifying a Date Axis

Using Advanced Excel Features-Customizing Excel User Interface, Using Custom number formats, Using Data validation

Reference:

1. MS EXCEL 2013 in simple steps: Kogent Learning Solutions Inc.
2. Microsoft Excel 2013 Bible: Wiley

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