*Your Dreams Our Goal*

# POORNIMA UNIVERSITY

Member of Association of Indian Universities & Approved by UGC (Govt. of India) under 2(f) & 12(B)

# FACULTY OF COMPUTER SCIENCE & ENGINEERING

## DEPARTMENT OF COMPUTER SCIENCE & APPLICATION

# SCHEME & SYLLABUS BOOKLET

## BCA BATCH 2022-2025

# SCHEME & SYLLABUS

# BATCH: 2022-25

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**Disclaimer:** The scheme, syllabus and other materials published in this booklet may be changed or modified as per the requirement after approval of competent authority. The decision taken by the management of Poornima University will be final and abiding to all.

## Student Details

Name of Student:

Name of Program:

Semester: Year: Batch:

Faculty of:

Your Dreams Our Goal

POORNIMA UNIVERSITY

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## *VISION*

To create knowledge based society with scientific temper, team spirit and dignity of labor to face global competitive challenges.

## *Mission*

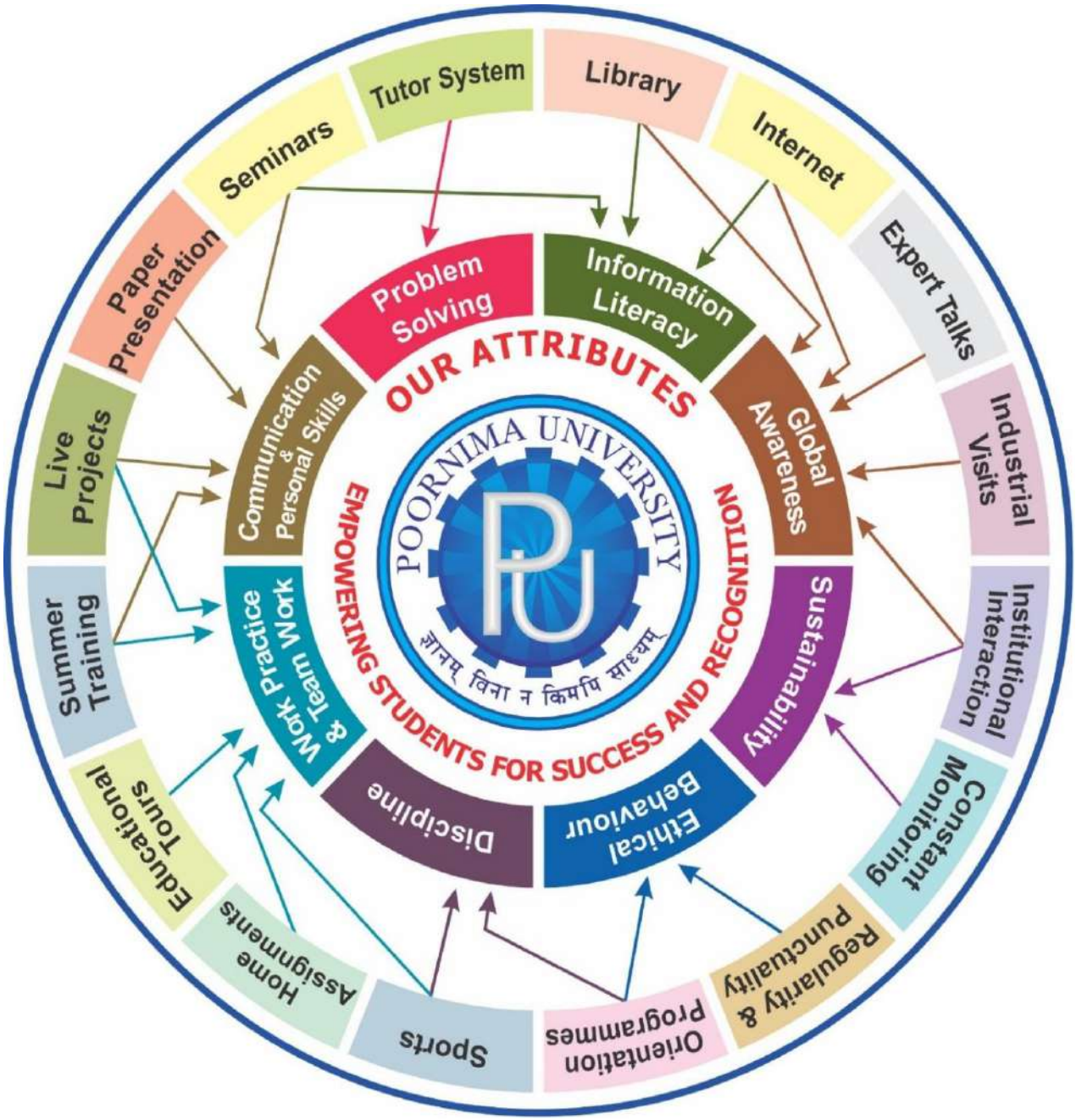
To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

## *Quality Policy*

To provide Quality Education through Faculty development, updating of facilities and continual improvement meeting University norms and keeping stake holders satisfied.

# *Knowledge Wheel*

At Poornima, the academic atmosphere is a rare blend of modern technical as well as soft skills and traditional systems of learning processes.



## About Program and Program Outcomes (PO):

**Title of the Programme:** Bachelor of Computer Applications (BCA)

**Nature of the Programme:** BCA is three-year full-time programme.

## Program Outcomes (PO) :

Graduates will be able to:

**PO1: Computational information:** Appreciate and apply mathematical organization, computing and domain information for the conceptualization of computing models from clear harms.

**PO2: Difficulty Analysis:** Talent to classify, significantly evaluate and prepare complex computing problems using fundamentals of computer knowledge and request domains.

**PO3: Drawing / Improvement of Solutions:** Facility to transform composite production scenarios and present-day issues into problems, explore, recognize and propose included solutions using rising technologies.

**PO4: Accomplish Investigations of Compound Computing Troubles:** Ability to invent and ways experiments interpret data and present well up to date conclusions.

**PO5: Current Implement Procedure:** Skill to select recent computing tools, skills and techniques compulsory for original software solutions

**PO6: Proficient Principles:** Facility to apply and give expert principles and cyber systems in a universal monetary situation.

**PO7: Ultimate Education:** Identify the need for and enlarge the ability to appoint in permanent education as a Computing qualified.

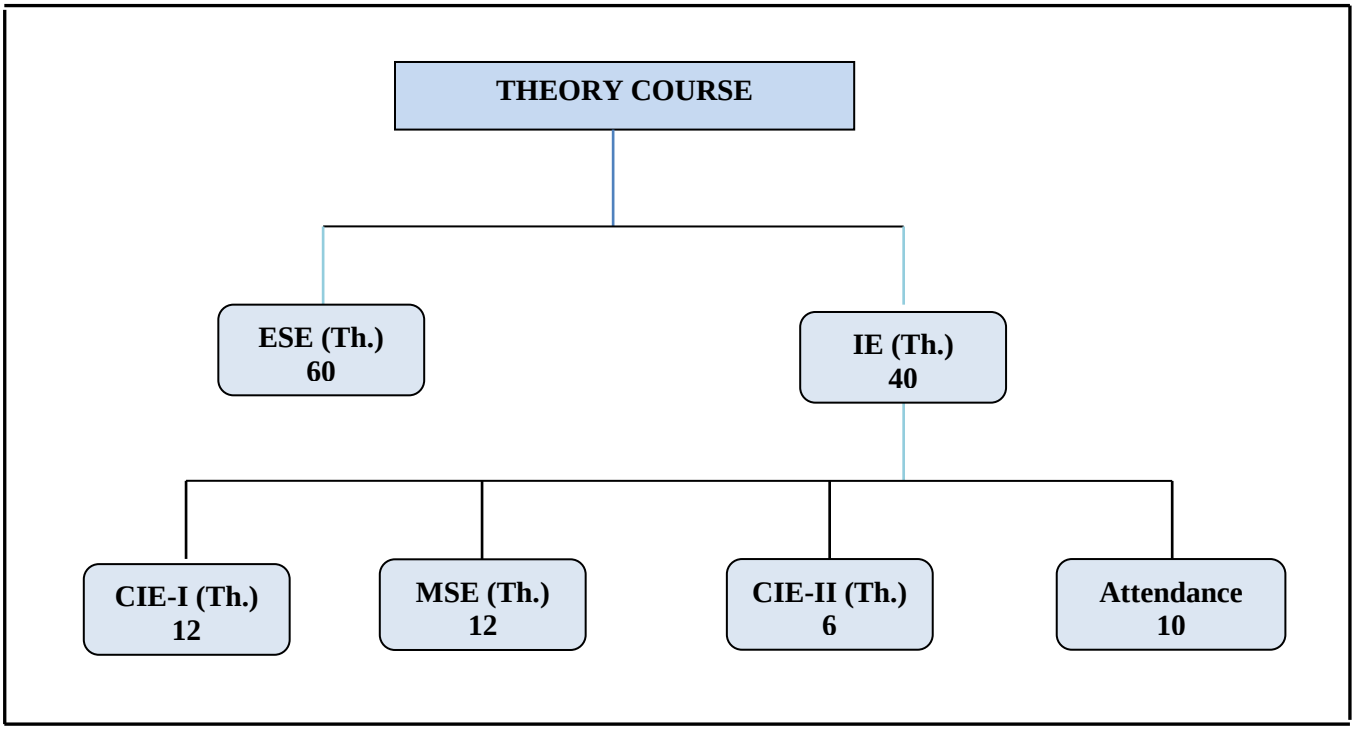
**PO8: Individual and team work:** Ability to job as a part or manager in various teams in multidisciplinary situations.

**PO9: Communication:** being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

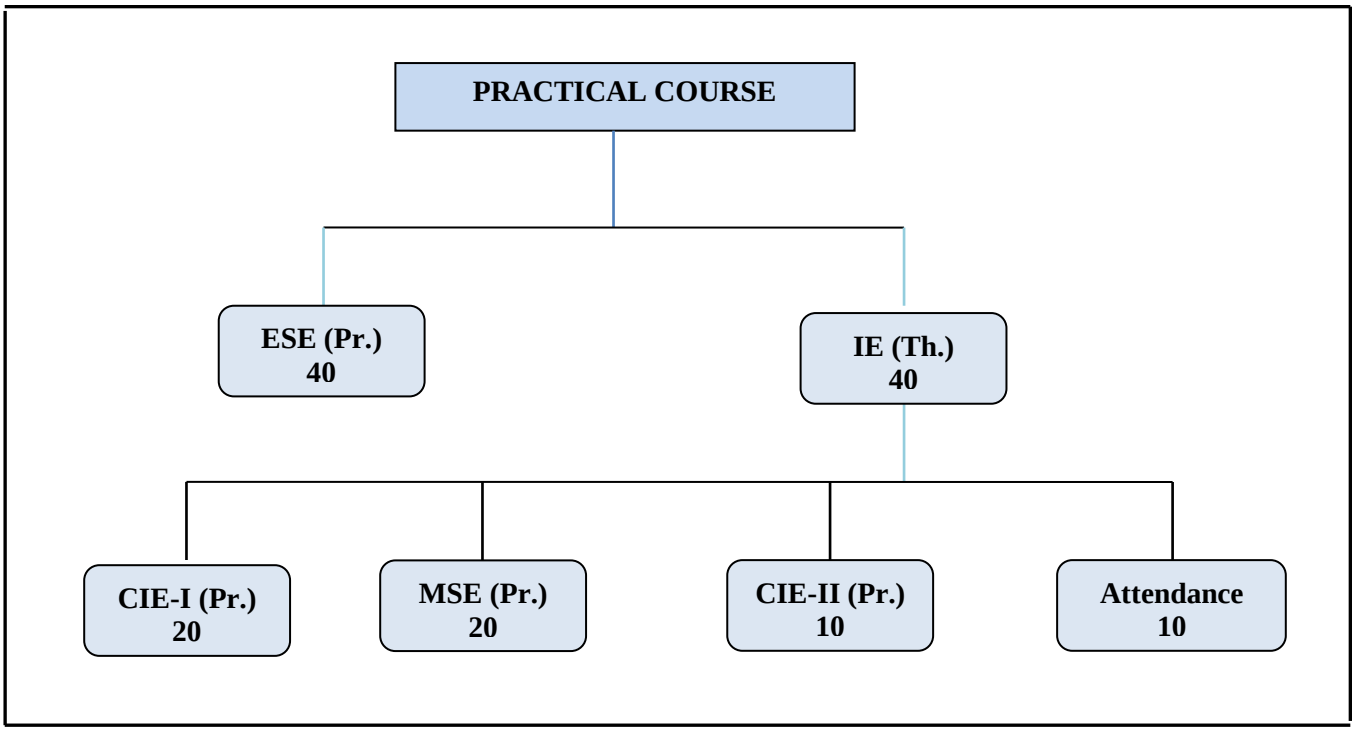
**PO10: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## Examination System:

### A. Marks Distribution of Theory Course:




### B. Marks Distribution of Practical Course :




**Th**. : Theory, **Pr.** : Practical, **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **CIE:** Continuous Internal Evaluation.

## Marks Distribution of Attendance:

| Guidelines for Marks Distribution of Attendance Component | | |
|---|---|---|
| **S No.** | **Total Course Attendance (TCA) range in Percentage** | **Marks allotted (out of 10)** |
| 1 | 95% ≤ TCA | 10 |
| 2 | 90% ≤ TCA < 95% | 9 |
| 3 | 85% ≤ TCA < 90% | 8 |
| 4 | 80% ≤ TCA < 85% | 7 |
| 5 | 70% ≤ TCA < 80% | 6 |
| 6 | 60% ≤ TCA < 70% | 5 |
| 7 | 50% ≤ TCA < 60% | 4 |
| 8 | 40% ≤ TCA < 50% | 3 |
| 9 | 30% ≤ TCA < 40% | 2 |
| 10 | 20% ≤ TCA < 30% | 1 |
| 11 | TCA < 20% | 0 |

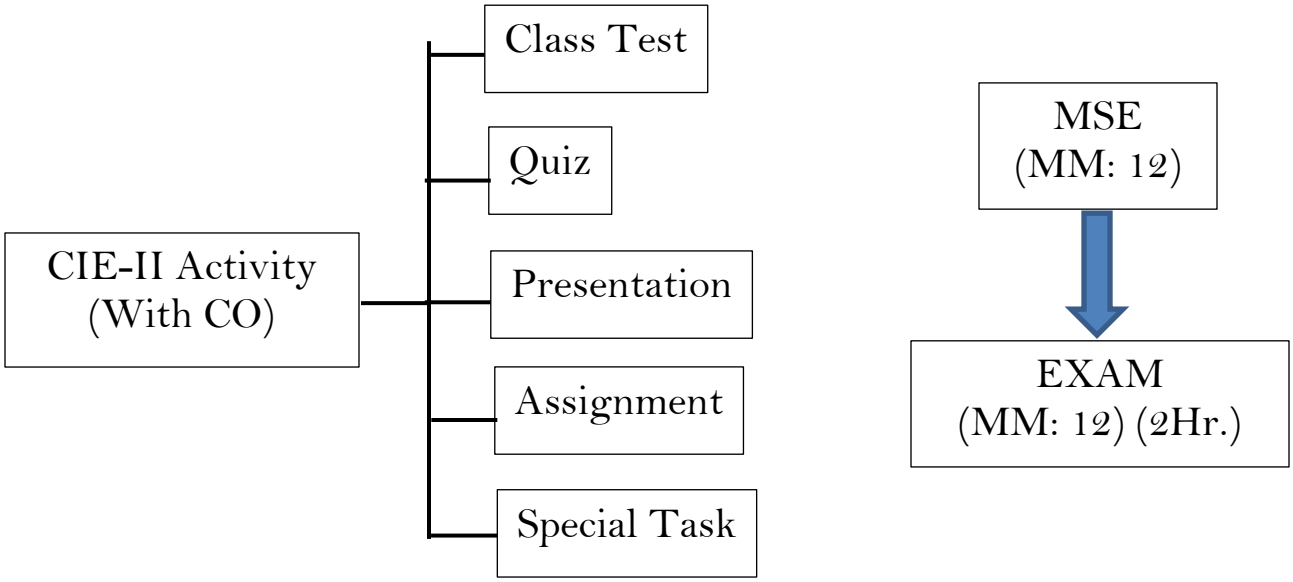
## CO Wise Marks Distribution:

| | **Theory Subject** | | **Practical/ Studio Subject** | |
|---|---|---|---|---|
| | **Maximum Marks** | **CO to be Covered** | **CO to be Covered** | **Maximum Marks** |
| **CIE-I (Class Test)** | 12 ( 6 + 6) | 1 & 2 | 1 & 2 | 20 (10 + 10) |
| **MSE** | 12 ( 6 + 6) | 3 & 4 | 3 & 4 | 20 (10 + 10) |
| **CIE-II (Activity/ Assignment )** | 6 (6) | 5 | 5 | 10 (10) |
| **Attendance** | 10 | - | - | 10 |
| **ESE** | 60 | - | - | 40 |
| **TOTAL** | 100 | - | - | 100 |

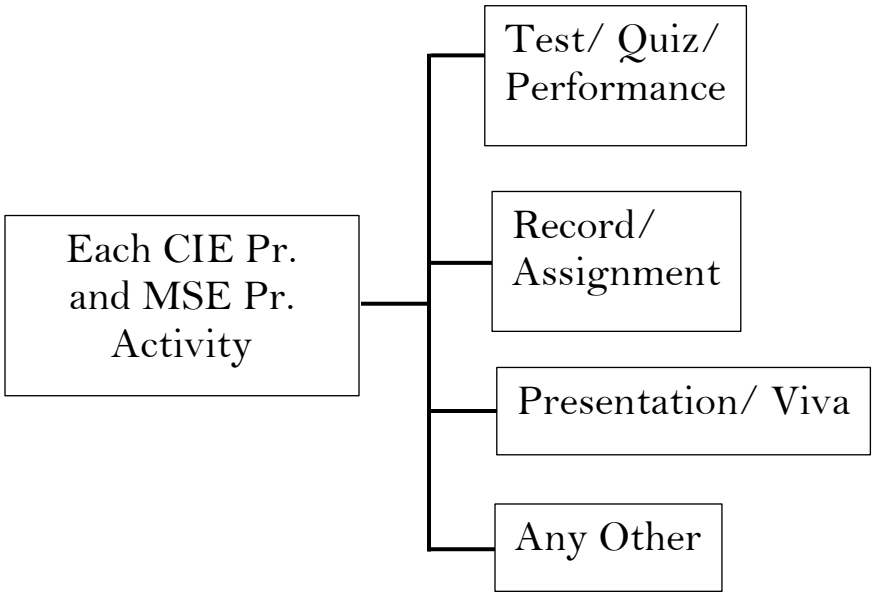
## Minimum Passing Percentage in All Exams:

| S. No. | Program | Minimum Passing Percentage in All Exam | |
|---|---|---|---|
| | | ESE Component | Total Component |
| 1 | Course Work for Ph. D Registration | ---------- | **50 %** |
| 2 | B. Arch. | 45 % | **50 %** |
| 3 | MBA, MHA, MPH, MCA, M. Tech., M. Plan. and M. Des. | 40 % | 40 % |
| 4 | B. Tech., B. Des., BCA, B.Sc., BVA, B. Voc., BBA, B.Com., B.A. and Diploma | 35 % | 40 % |
| 5 | B. Sc. (Hospitality & Hotel Administration) | 35 % | 40 % (Theory) & 50 % (Practical) |

## Break-up of Internal Exam (Theory):



**Break-up of Internal Exam (Practical):**




**Assessment & Grade Point Average: SGPA, CGPA:**

**SGPA Calculation**

$$\textbf{SGPA} = \frac{C_1G_1+C_2G_2+\cdots\ldots\ldots\ldots\ldots C_nG_n}{C_1+C_2+\cdots\ldots\ldots\ldots\ldots C_n}$$

| | |
|---|---|
| $\textbf{SGPA} = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$ | Where ( as per teaching Scheme & Syllabus) :<br>$C_i$ is the number of Credits of Courses i,<br>$G_i$ is the Grade Point for the Course i and i = 1, 2…….n<br>n = number of courses in a programme in the Semester |

**CGPA Calculation**

$$\textbf{CGPA} = \frac{C_1G_1+C_2G_2+\cdots\ldots\ldots\ldots\ldots C_nG_n}{C_1+C_2+\cdots\ldots\ldots\ldots\ldots C_n}$$

| | |
|---|---|
| $\textbf{CGPA} = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$ | Where ( as per teaching Scheme & Syllabus) :<br>$C_i$ is the number of Credits of Courses i,<br>$G_i$ is the Grade Point for the Course i and i = 1, 2…….n<br>n = number of courses in a programme of all the Semester up to which CGPA is computed. |

## Grading Table:

**Grading Table-A: For B.Arch. and course work for Ph.D. Registration**

| Academic Performance | Grade | Grade Point | Marks Range ( in %) |
|---|---|---|---|
| Outstanding | A+ | 10 | $90 \le x \le 100$ |
| Excellent | A | 9 | $80 \le x < 90$ |
| Very good | B+ | 8 | $70 \le x < 80$ |
| Good | B | 7 | $60 \le x < 70$ |
| Average | C | 6 | $50 \le x < 60$ |
| Fail | F | 0 | $x<50$ |

**Grading Table-B: For all courses except B.Arch. and course work for Ph.D. Registration**

| Academic Performance | Grade | Grade Point | Marks Range ( in %) |
|---|---|---|---|
| Outstanding | A+ | 10 | $90 \le x \le 100$ |
| Excellent | A | 9 | $80 \le x < 90$ |
| Very good | B+ | 8 | $70 \le x < 80$ |
| Good | B | 7 | $60 \le x < 70$ |
| Average | C | 6 | $50 \le x < 60$ |
| Satisfactory | D | 5 | $40 \le x < 50$ |
| Fail | F | 0 | $x<40$ |

| Calculation of SGPA | $SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$ |
|---|---|
| $SGPA = \frac{C_1G_1 + C_2G_2 + \ldots\ldots\ldots + C_nG_n}{C_1 + C_2 + \ldots\ldots + C_n}$ | |

| Calculation of CGPA | $CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$ |
|---|---|
| $CGPA = \frac{C_1G_1 + C_2G_2 + \ldots\ldots\ldots + C_nG_n}{C_1 + C_2 + \ldots\ldots + C_n}$ | |

where (as per teaching scheme & syllabus): $C_i$ is the number of credits of subject i,
$G_i$ is the Grade Point for the subject I and i = 1 to n, n = number of subjects in a course in the semester

## Award of Class:

| CGPA | Equivalent Division |
|---|---|
| **7.50 ≤ CGPA** | First Division with Distinction |
| **6.50 ≤ CGPA < 7.50** | First Division |
| **5.50 ≤ CGPA < 6.50** | Second Division |
| **4.50 ≤ CGPA < 5.50** | Pass Class |

The multiplication factor for conversion of CGPA to percentage is Equivalent % of Marks = (CGPA-0.5) x 10.

**For Example if CGPA = 5.5 then % is (5.5-0.5) x 10 = 50%.**

## Guidelines for MOOC COURSES:

1. Applicable from the session 2020 – 21 onwords, for students aspiring for HONOURS Degree.
2. The UGC has issued UGC (Credit Framework for Online Learning Courses) Regulation, 2016. These shall apply to all universities established or incorporated by or under a Central Act, a Provincial Act, or a State/Union Territory Act and all institutions recognized by or affiliated to such Universities and all institutions deemed to be universities under Section 3 of the UGC Act, 1956.
3. All India Council for Technical Education (AICTE) has introduced Model Curriculum for Bachelor programs of 4 years/ 3 Years, and additional credits will be required to be done for the degree of Bachelor program with Honours. These additional credits will have to be acquired with online courses (MOOCs) as per AICTE.
4. This creates an excellent opportunity for students to acquire the necessary skill set for employability through massive online courses where the rare expertise of world famous experts from academics and industry are available.
5. Students are required to complete additional credits through MOOCs within 4 years/ 3years of time (whatever be applicable time for the completion of registered program) so as to become eligible for Honours degree as per norms.
6. It is necessary to complete minimum MOOCs credit course as mentioned below for becoming eligible for the Honours degree in the registered program.
7. MOOC Course Credits shall be calculated as per details given below:
8. Student are required to give the prior information about MOOCs courses to his respective HOD and COE, in which he/she wants to register for online certification.
9. After getting permission from respective HOD, a student can register for the MOOC certification courses.
10. After successful completion of the said MOOC course, the student shall submit the certificate of completion to the respective department. If he/ she fails to provide the certificates of MOOC courses before last teaching day of the semester then these certificates will not be considered later.

**Required credits for Honours :**

| S.No | Program Duration | Required credits for Honours |
|---|---|---|
| 1. | 2- Year | 10- Credits |
| 2. | 3- Year | 15- Credits |
| 3. | 4-Year | 20- Credits |

| S. No | NPTEL/ SWAYAM<br>Course duration (in weeks) | Equivalent Credits |
|---|---|---|
| 1 | 4 | 2 |
| 2 | 8 | 3 |
| 3 | 12 | 4 |

**Attached Items:**

| | |
|---|---|
| Open Elective Booklet | Annexure-1 |
| Soft Skills Booklet | Annexure-2 |
| Value Added Course Booklet | Annexure-3 |

# Bachelor of Computer Applications

**with specialization**

# Cyber Security

# Scheme

# Batch 2022-25

| POORNIMA UNIVERSITY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Faculty of Computer Science and Engineering** | | | | | | | | |
| **Department of Computer Applications** | | | | | | | | |
| **Name of Program: BCA ( With Specialization in Cyber Security )** | | | | | | | | |
| **Teaching Scheme for Year I Semester I** | | | | | | | | **Batch:2022-25** |
| **Course Code** | **Course Name** | **Teaching Scheme(Hrs per Week)** | | | **Marks Distribution** | | | **Credits** |
| | | **Lecture (L)** | **Tutorials (T)** | **Practical (P)** | **IE** | **ESE** | **Total** | |
| **A.** | **University Core Courses** | | | | | | | |
| **A.1** | **Theory** | | | | | | | |
| BULCSA1101 | Environmental Studies | **2** | **-** | **-** | **40** | **60** | **100** | **2** |
| **B.** | **Department Core Courses** | | | | | | | |
| **B.1** | **Theory** | | | | | | | |
| BCACSA1101 | Computer Oriented Numerical & Statistical Method | **3** | | **-** | **40** | **60** | **100** | **3** |
| BCACCA1102 | Programming Fundamentals of C | **3** | **-** | **-** | **40** | **60** | **100** | **3** |
| BCACCA1103 | Web Designing | **3** | **-** | **-** | **40** | **60** | **100** | **3** |
| BCACCA1104 | Computer Organization and Architecture | **3** | **-** | **-** | **40** | **60** | **100** | **3** |
| BCYCCA1105 | Fundamentals of Cyber Security | **3** | **-** | **-** | **40** | **60** | **100** | **3** |
| **B.2** | **Practical** | | | | | | | |
| BCACCA1201 | Programming Fundamentals of C Lab | **-** | **-** | **2** | **60** | **40** | **100** | **1** |
| BCACCA1202 | Web Designing Lab | **-** | **-** | **2** | **60** | **40** | **100** | **1** |
| BCACCA1203 | Office Automation Lab | **-** | **-** | **2** | **60** | **40** | **100** | **1** |
| BCACCA1204 | Information Technology lab | | | **2** | **60** | **40** | **100** | **1** |
| **C.** | **Department Elective** | | | | | | | |
| | NIL | | | | | | | |
| **D.** | **Open Elective** | **-** | **-** | **-** | | | | |
| | NIL | | | | | | | |
| **E.** | **Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC)** | | | | | | | |
| BULCHU1201 | Foundation English | **-** | **-** | **2** | **60** | **40** | **100** | **1** |
| **F.** | **Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere** | | | | | | | |
| | NIL | | | | | | | |
| **G.** | **Discipline, VAC & Social Outreach** | | | | | | | |
| BCACCA1601 | Talent Enrichment Programme (TEP) | **-** | **-** | **2** | **50** | **-** | **50** | **1** |
| | Library / MOOC / Online Certificate Courses | **-** | **-** | **2** | | | | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | **-** | - | **2** | | | | |
| | **Total** | **17** | - | **16** | | | | |
| | **Total Teaching Hours** | **33** | | | | | | **23** |

| POORNIMA UNIVERSITY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Faculty of Computer Science and Engineering | | | | | | | | |
| Department of Computer Applications | | | | | | | | |
| Name of Program: BCA ( With Specialization in Cyber Security ) | | | | | | | | |
| Teaching Scheme for Year I Semester II | | | | | | | | Batch:2022-25 |
| Course Code | Course Name | Teaching Scheme(Hrs per Week) | | | Marks Distribution | | | Credits |
| | | Lecture (L) | Tutorials (T) | Practical (P) | IE | ESE | Total | |
| A. | University Core Courses | | | | | | | |
| | NIL | | | | | | | |
| A.1 | Theory | | | | | | | |
| B. | Department Core Courses | | | | | | | |
| B.1 | Theory | | | | | | | |
| BCACCA2101 | Computer Networks | 3 | | - | 40 | 60 | 100 | 3 |
| BCACCA2102 | OOPS with Java | 3 | - | - | 40 | 60 | 100 | 3 |
| BCACCA2103 | Data Structure and Algorithm | 3 | - | - | 40 | 60 | 100 | 3 |
| BCACCA2104 | Operating System | 3 | - | - | 40 | 60 | 100 | 3 |
| BCYCCA2105 | Network Defense for Cyber Security | 3 | - | - | 40 | 60 | 100 | 3 |
| B.2 | Practical | | | | | | | |
| BCACCA2201 | Operating System Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| BCACCA2202 | OOPS with Java Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| BCACCA2203 | Data Structure and Algorithm Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| BCACCA2204 | Computer Network Lab | | | 2 | 60 | 40 | 100 | 1 |
| C. | Department Elective | | | | | | | |
| | NIL | | | | | | | |
| D. | Open Elective | - | - | - | | | | |
| | As Per Annexure-I | 2 | | | | | | 2 |
| E. | Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC) | | | | | | | |
| BULCHU2201 | Language Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| F. | Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere | | | | | | | |
| | NIL | | | | | | | |
| G. | Discipline, VAC & Social Outreach | | | | | | | |
| BCACCA2601 | Talent Enrichment Programme (TEP) | - | - | 2 | 50 | - | 50 | 1 |
| | Library / MOOC / Online Certificate Courses | - | - | 2 | | | | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | - | - | 2 | | | | |
| | Total | 17 | - | 16 | | | | |
| | Total Teaching Hours | 33 | | | | | | 23 |

| POORNIMA UNIVERSITY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Faculty of Computer Science and Engineering | | | | | | | | |
| Department of Computer Applications | | | | | | | | |
| Name of Program: BCA ( With Specialization in Cyber Security ) | | | | | | | | |
| Teaching Scheme for Year II Semester III | | | | | | | | Batch:2022-25 |
| Course Code | Course Name | Teaching Scheme(Hrs per Week) | | | Marks Distribution | | | Credits |
| | | Lecture (L) | Tutorials (T) | Practical (P) | IE | ESE | Total | |
| A. | University Core Courses | | | | | | | |
| A.1 | Theory | NIL | | | | | | |
| B. | Department Core Courses | | | | | | | |
| B.1 | Theory | | | | | | | |
| BCACCA3101 | Relational Database Management System | 3 | | - | 40 | 60 | 100 | 3 |
| BCACCA3102 | Python Programming | 3 | - | - | 40 | 60 | 100 | 3 |
| BCACCA3103 | Linux and Shell Script | 3 | - | - | 40 | 60 | 100 | 3 |
| BCYCCA3104 | Ethical Hacking | 3 | - | - | 40 | 60 | 100 | 3 |
| B.2 | Practical | | | | | | | |
| BCACCA3201 | Relational Database Management System Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| BCACCA3202 | Python Programming Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| BCACCA3203 | Linux and Shell Script Lab | | | 2 | 60 | 40 | 100 | 1 |
| BCYCCA3204 | Ethical Hacking Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| C. | Department Elective | | | | | | | |
| BCAECA3111 | Digital Marketing | 3 | - | - | 40 | 60 | 100 | 3 |
| BCAECA3112 | Software Engineering | | | | | | | |
| BCAECA3113 | Management Information System | | | | | | | |
| D. | Open Elective | - | - | - | | | | |
| | As Per Annexure-I | 2 | | | | | | 2 |
| E. | Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC) | | | | | | | |
| BULCHU3201 | Communication Skills-I | - | - | 2 | 60 | 40 | 100 | 1 |
| F. | Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere | | | | | | | |
| | NIL | | | | | | | |
| G. | Discipline, VAC & Social Outreach | | | | | | | |
| BCACCA3601 | Talent Enrichment Programme (TEP) | - | - | 2 | 50 | - | 50 | 1 |
| | Library / MOOC / Online Certificate Courses | - | - | 2 | | | | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | - | - | 2 | | | | |
| | Total | 17 | - | 16 | | | | |
| | Total Teaching Hours | 33 | | | | | | 23 |

| POORNIMA UNIVERSITY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Faculty of Computer Science and Engineering | | | | | | | | |
| Department of Computer Applications | | | | | | | | |
| Name of Program: BCA ( With Specialization in Cyber Security ) | | | | | | | | |
| Teaching Scheme for Year II Semester IV | | | | | | | | Batch:2022-25 |
| Course Code | Course Name | Teaching Scheme(Hrs per Week) | | | Marks Distribution | | | Credits |
| | | Lecture (L) | Tutorials (T) | Practical (P) | IE | ESE | Total | |
| A. | University Core Courses | | | | | | | |
| A.1 | Theory | NIL | | | | | | |
| B. | Department Core Courses | | | | | | | |
| B.1 | Theory | | | | | | | |
| BCACCA4101 | Big Data Analysis | 3 | | - | 40 | 60 | 100 | 3 |
| BCACCA4102 | Design and Analysis of Algorithm | 3 | - | - | 40 | 60 | 100 | 3 |
| BCYCCA4103 | Cyber Forensics | 3 | - | - | 40 | 60 | 100 | 3 |
| BCYCCA4104 | Application Security | 3 | - | - | 40 | 60 | 100 | 3 |
| B.2 | Practical | | | | | | | |
| BCACCA4201 | Big Data Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| BCACCA4202 | Design and Analysis of Algorithm Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| BCYCCA4203 | Cyber Forensics Lab | | | 2 | 60 | 40 | 100 | 1 |
| BCYCCA4204 | Application Security Lab | - | - | 2 | 60 | 40 | 100 | 1 |
| C. | Department Elective | | | | | | | |
| BCAECA4111 | Information Security Fundamental | 3 | - | - | 40 | 60 | 100 | 3 |
| BCAECA4112 | Software Project Management | | | | | | | |
| BCAECA4113 | E-Commerce | | | | | | | |
| D. | Open Elective | - | - | - | | | | |
| | As Per Annexure-I | 2 | | | | | | 2 |
| E. | Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC) | | | | | | | |
| BULCHU4201 | Communication Skills-II | - | - | 2 | 60 | 40 | 100 | 1 |
| F. | Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere | | | | | | | |
| BCACCA4401 | IndustrialTrainingSeminar-1 | | | 2 | 60 | 40 | 100 | 1 |
| G. | Discipline, VAC & Social Outreach | | | | | | | |
| BCACCA4601 | Talent Enrichment Programme (TEP) | - | - | 4 | 50 | - | 50 | 1 |
| | Library / MOOC / Online Certificate Courses | - | - | | | | | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | - | - | | | | | |
| | Total | 17 | - | 16 | | | | |
| | Total Teaching Hours | 33 | | | | | | 24 |

| POORNIMA UNIVERSITY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Faculty of Computer Science and Engineering** | | | | | | | | |
| **Department of Computer Applications** | | | | | | | | |
| **Name of Program: BCA ( With Specialization in Cyber Security )** | | | | | | | | |
| **Teaching Scheme for Year III Semester V** | | | | | | | **Batch:2022-25** | |
| **Course Code** | **Course Name** | **Teaching Scheme(Hrs per Week)** | | | **Marks Distribution** | | | **Credits** |
| | | **Lecture (L)** | **Tutorials (T)** | **Practical (P)** | **IE** | **ESE** | **Total** | |
| **A.** | **University Core Courses** | | | | | | | |
| **A.1** | **Theory** | NIL | | | | | | |
| **B.** | **Department Core Courses** | | | | | | | |
| **B.1** | **Theory** | | | | | | | |
| BCYCCA5101 | Security Operations | **3** | | **-** | **40** | **60** | **100** | **3** |
| BCYCCA5102 | Computer Hacking Forensic Investigation | **3** | **-** | **-** | **40** | **60** | **100** | **3** |
| BCYCCA5103 | Vulnerability Analysis and Penetration Testing | **3** | **-** | **-** | **40** | **60** | **100** | **3** |
| BCYCCA5104 | Cryptography and Network Security | **3** | **-** | **-** | **40** | **60** | **100** | **3** |
| **B.2** | **Practical** | | | | | | | |
| BCYCCA5201 | Security OperationsLab | **-** | **-** | **2** | **60** | **40** | **100** | **1** |
| BCYCCA5202 | Computer Hacking Forensic Investigation Lab | **-** | **-** | **2** | **60** | **40** | **100** | **1** |
| BCYCCA5203 | Vulnerability Analysis and Penetration Testing Lab | | | **2** | **60** | **40** | **100** | **1** |
| **C.** | **Department Elective** | | | | | | | |
| BCAECA5111 | Advance Cloud Technology | **3** | **-** | **-** | **40** | **60** | **100** | **3** |
| BCAECA5112 | Advanced Data Structure | | | | | | | |
| BCAECA5113 | Data Mining & Warehousing | | | | | | | |
| **D.** | **Open Elective** | **-** | **-** | **-** | | | | |
| | As Per Annexure-I | **2** | | | | | | **2** |
| **E.** | **Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC)** | | | | | | | |
| BULCHU5201 | Human Values & Professional Ethics | **-** | **-** | **2** | **60** | **40** | **100** | **1** |
| BULCHM5202 | Leadership & Management Skills | **-** | **-** | **2** | **60** | **40** | **100** | **1** |
| **F.** | **Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere** | | | | | | | |
| BCACCA5401 | IndustrialTrainingSeminar-II | | | **2** | **60** | **40** | **100** | **1** |
| **G.** | **Discipline, VAC & Social Outreach** | | | | | | | |
| BCACCA5601 | Talent Enrichment Programme (TEP) | **-** | **-** | **4** | **50** | **-** | **50** | **1** |
| | Library / MOOC / Online Certificate Courses | **-** | **-** | | | | | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | **-** | **-** | | | | | |
| | **Total** | **17** | **-** | **16** | | | | |
| | **Total Teaching Hours** | **33** | | | | | | **24** |

| POORNIMA UNIVERSITY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Faculty of Computer Science and Engineering | | | | | | | | |
| Department of Computer Applications | | | | | | | | |
| Name of Program: BCA ( With Specialization in Cyber Security ) | | | | | | | | |
| Teaching Scheme for Year III Semester VI | | | | | | | Batch:2022-25 | |
| **Course Code** | **Course Name** | **Teaching Scheme(Hrs per Week)** | | | **Marks Distribution** | | | **Credits** |
| | | **Lecture (L)** | **Tutorials (T)** | **Practical (P)** | **IE** | **ESE** | **Total** | |
| **A.** | **University Core Courses** | | | | | | | |
| **B.** | **Department Core Courses** | | | | | | | |
| BCACCA6501 | Project/Internship | **-** | **-** | **22** | **60** | **40** | **100** | **11** |
| **C.** | **Department Elective: Anyone** | | | | | | | |
| | NIL | | | | | | | |
| **D.** | **Open Elective: Anyone** | | | | | | | |
| | ***NIL*** | | | | | | | |
| **E.** | **Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course(AECC))** | | | | | | | |
| **F.** | **Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere** | | | | | | | |
| | NIL | | | | | | | |
| **G.** | **Discipline, VAC & Social Outreach** | | | | | | | |
| BCACCA6601 | Talent Enrichment Programme (TEP) | **-** | **-** | **3** | **50** | **-** | **50** | **1** |
| | Library / MOOC / Online Certificate Courses | **-** | **-** | **4** | | **-** | | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | **-** | **-** | **4** | | | | |
| | **Total** | | | **33** | | | | |
| | **Total Teaching Hours** | **33** | | | | | | **12** |

# Semester-I

# SEMESTER I

## DEPARTMENT CORE COURSES

| Code: BULCSA1101 | Environmental Studies | 2 Credits [LTP: 2-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Explain the concept of ecology, ecosystem and biodiversity.
- Implement innovative ideas of controlling different categories of Environmental Pollution.
- Explain different environmental issues together with various Environmental Acts, regulations and International Agreements.
- Summarize social issues related to population, resettlement and rehabilitation of project affected persons and demonstrate disaster management with special reference to floods, earthquakes, cyclones, landslides.
- Determine the local environmental assets with simple ecosystems and identify local flora and fauna.

### A. OUTLINE OF THE COURSE

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Environmental Studies** | 05 |
| 2. | **Environmental Pollution and its Controls** | 05 |
| 3. | **Environmental Policies & Practices** | 05 |
| 4. | **Human Communities and the Environment** | 05 |
| 5. | **Field Work** | 04 |

### B. DETAILED SYLLABUS

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Environmental Studies** |
| | • Introduction of Unit<br>• Multidisciplinary nature of environmental studies<br>• Concept of sustainability and sustainable development.<br>• Ecosystem: Structure and function of ecosystem<br>• Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies\<br>• Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem<br>• Aquatic ecosystems<br>• Biodiversity and Conservation<br>• Conclusion &Real Life Application |
| 2. | **Environmental Pollution and its Controls** |
| | • Introduction of Unit<br>• Environmental pollution: types, causes, effects and controls, Air, water, soil and noise pollution<br>• Nuclear hazards and human health risks<br>• Solid waste management: Control measures of urban and industrial waste.<br>• Pollution case studies<br>• Conclusion &Real Life Application |
| 3. | **Environmental Policies & Practices** |

| | |
|---|---|
| | • Introduction of Unit<br>• Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture<br>• Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.<br>• Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act.<br>• International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)<br>• Conclusion &Real Life Application |
| **4.** | **Human Communities and the Environment** |
| | • Introduction of Unit<br>• Human population growth: Impacts on environment, human health and welfare.<br>• Resettlement and rehabilitation of project affected persons; case studies.<br>• Disaster management: floods, earthquake, cyclones and landslides.<br>• Conclusion &Real Life Application |
| **5.** | **Field Work** |
| | • Introduction of Unit<br>• Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.<br>• Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.<br>• Study of common plants, insects, birds and basic principles of identification.<br>• Study of simple ecosystems-pond, river, Delhi Ridge, etc.<br>• Conclusion &Real Life Application |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Environmental Studies | ErachBarucha | Latest | UGC |
| 2. | Environmental Studies | Benny Joseph | Latest | Tata McgrawHill |
| 3. | Environmental Studies | R. Rajagopalan | Latest | Oxford University Press |
| **Reference Books** | | | | |
| 1. | Principles of Environmental Science and Engineering | P. Venugoplan Rao | Latest | Prentice Hall of India. |
| 2. | Environmental Science and Engineering | Meenakshi | Latest | Prentice Hall India. |
| **Online Resources** | | | | |
| 1. | https://www.coursera.org/browse/physical-science-and-engineering/environmental-science-and-sustainability | | | |
| 2. | https://www.edx.org/learn/environmental-science | | | |
| 3. | https://nptel.ac.in/courses/127105018 | | | |

| Code: BCACSA1101 | Computer Oriented Numerical & Statistical Method | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Explain and represent to the various forms of data using statistics.
- Analyse the correlation and regression with their properties
- Explain and determine the basic concepts of probability and their properties.
- Analyse the equal and unequal intervals for Interpolation problem
- Analyse the numerical methods to solve differential equations

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Data representation and Analysis** | 08 |
| 2. | **Regression and Correlation** | 08 |
| 3. | **Random variable and Probability distribution** | 08 |
| 4. | **Interpolation Methods** | 08 |
| 5. | **Numerical integration and differentiation** | 08 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Data representation and Analysis** |
| | • Introduction of Unit<br>• Statistical diagram: scattered diagram, histogram, ogie curve, pai chart, Use of EXCEL software to compute statistical measures and diagrammatic representation<br>• Measure of Central Tendency, Mean, Median, Mode.<br>• Measure of Dispersion: Range, Quartile Deviation, mean deviation, Coefficient of mean<br>• Deviation, Standard Deviation<br>• Conclusion &Real Life Application |
| 2. | **Regression and Correlation** |
| | • Introduction of Unit<br>• Measure of association between two variables Types of correlation, Karl Pearson's Coefficient of correlation<br>• Spearman's Rank correlation and its interpretations<br>• Regression Analysis: Concept and difference between correlation and regression, linear regression equations,<br>• properties of regression coefficients<br>• Conclusion &Real Life Application |
| 3. | **Random variable and Probability Distribution** |
| | • Introduction of Unit<br>• Introduction to basic Probability theory<br>• Probability Addition, Multiplication, Conditional Probability,<br>• Baye's Theorem and examples,<br>• Discrete and continuous random variable,<br>• Introduction of Standard probability distributions: Binomial, Poisson<br>• Conclusion &Real Life Application |
| 4. | **Interpolation Methods** |
| | • Introduction of Unit |

| | |
|---|---|
| | • Finite difference, Forward and backward differences, Interpolation and Extrapolation,<br>• Newton's forward interpolation formula, Newton's backward interpolation formula,<br>• Lagrange's interpolation formula<br>• Newton's divided difference formula<br>• Conclusion &Real Life Application |
| **5.** | **Numerical Integration and differentiation** |
| | • Introduction of Unit<br>• Numerical integration, Gaussian integration Trapezoidal Method, Simpson's rule (1/3, 3/8),<br>• Numerical differentiation Euler's method, Modified Euler's method, RungeKutta 2nd order method, Runge Kutta 4th order method,.<br>• Conclusion &Real Life Application |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Probability and Statistics for Engineers | Richard A Johnson | Latest | Prentice Hall of India. |
| 2. | Introductory Methods of Numerical Analysis | S.S. Sastry | Latest | Prentice Hall of India |
| 3. | Computer Oriented Numerical Methods | V. Rajaraman | Latest | Prentice Hall of India |
| **Reference Book** | | | | |
| 1. | Higher Engineering Mathematics, Grewal B. S. and Grewal J. S, Khanna Publishers, New Delhi, Latest Edition | | | |
| 2. | A textbook of Computer based numerical and Statistical Techniques: A. K. Jaiswal&AnjuKhandelwal, New Age International Publishers | | | |
| **Online Resources** | | | | |
| 1. | https://www.udemy.com/course/computer-oriented-numerical-techniques/ | | | |
| 2. | https://onlinecourses.swayam2.ac.in/cec22_ma02/preview | | | |

| Code: BCACCA1102 | Programming Fundamentals of C | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Learn data types, loops, functions, array, pointers, string, structures and files.
- Develop conditional and iterative statements to write C programs.
- Implement concept of string using array.
- Allocate memory dynamically using pointers.
- Apply C Programming to solve real time problems.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to C Programming** | 6 |
| 2. | **Decision Making & Looping** | 6 |
| 3. | **Array and string** | 8 |
| 4. | **Advance programming in C** | 8 |
| 5. | **File handling & Additional features** | 8 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to C Programming** |
| | • Introduction of Unit<br>• Introduction to computer-based problem solving, Program design and implementation issues- Flowcharts & Algorithms.<br>• Types of Languages – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters.<br>• Overview of C, Data Types, Constants & Variables, Literals, Operators & Expressions<br>• Conclusion & Real Life Application |
| 2. | **Decision Making & Looping** |
| | • Introduction of Unit<br>• Decision making in C- if statement, if-else statement, Nested if statement, if else if Ladder, Switch case<br>• Loop control in C – for loop, while loop, do-while loop<br>• Control flow in C- break, continue and goto statement.<br>• Conclusion & Real Life Application |
| 3. | **Array and string** |
| | • Introduction of Unit<br>• Array- 1D array, 2D array and dynamic array<br>• Scope rules- Local & global variables.<br>• Functions-parameter passing, call by value and call by reference, calling functions with arrays, command line argument, recursion- basic concepts.<br>• String – String in-build functions.<br>• Conclusion of the Unit |
| 4. | **Advance programming in C** |
| | • Introduction of Unit<br>• Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers.<br>• Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to |

| | |
|---|---|
| | functions, structure pointers, arrays and structures within structures, typedef.<br>• Unions – Declaration, uses<br>• Enumerated data-types<br>• Conclusion of the Unit |
| **5.** | **File handling &Additional features** |
| | • Introduction of Unit<br>• File Handling – The file pointer, file accessing functions-fopen, fclose, putc, getc, fprintf, reading and writing into a file<br>• Advance features- storage classes and dynamic memory allocation<br>• C Preprocessor- #define, #include, #undef, Conditional compilation directives.<br>• C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions.<br>• Conclusion of the Unit |

## C. RECOMMENDED STUDY MATERIAL

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
|---|---|---|---|---|
| 1. | Let us C, 6th Edition | Yashwant Kanitkar | 6th Edition | PBP Publication |
| 2. | The C programming Language | Richieand Kenninghan | 2004 | BPB Publication, |
| 3. | Programming in ANSI C 3rdEdition, 2005 | E.Balagurusamy | 3rd Edition, 2005 | Programming in ANSI C |
| **Reference Book** | | | | |
| 1. | The C programming Language Richie and Kenninghan PBP Publication,2004 | | | |
| 2. | Programming in ANSI C 3rd Edition, 2005 Balaguruswmy Tata McGraw Hill | | | |
| **Online Resources** | | | | |
| 1. | https://www.programiz.com/c-programming/examples | | | |
| 2. | https://www.w3resource.com/c-programming-exercises | | | |

| Code: BCACCA1103 | Web Designing | 3Credits[LTP:3-0-0] |
|---|---|---|

**COURSEOUTCOME:**

Students will be able to:

- Create an effective web page, including an in-depth consideration of information architecture.
- Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
- Develop skills in analyzing the usability of a web site.
- Plan and conduct user research related to web usability.
- Apply HTML & CSS to solve real time web problems.

## A. OUTLINE OF THE COURSE

| Unit No. | Title of the unit | Time required for the Unit(Hours) |
|---|---|---|
| 1. | **Introduction to HTML And Internet** | 8 |
| 2. | **HTML & CSS** | 8 |
| 3. | **HTML5, CSS3** | 8 |
| 4. | **XML** | 6 |
| 5. | **Practical Website Development** | 6 |

## B. DETAILED SYLLABUS

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to HTML And Internet** |
| | • Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP,TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture<br>• Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back end web development.<br>• HTML, CSS, JS, XML; HTTP, secure HTTP, etc; URL, Web Services – SOAP, REST<br>• Conclusion of the Unit |
| 2. | **HTML & CSS** |
| | • Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag;<br>• More HTML Tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images.<br>• Introduction to CSS, Syntax, Selectors ,Embedding CSS to Html, Formatting fonts, Text & background color, Inline styles, External and Internal Style Sheets, Borders & boxing<br>• Conclusion of the Unit |
| 3. | **HTML5, CSS3** |
| | • Introduction to HTML5.<br>• Introduction to CSS3, New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geolocation, Microdata, Drag and Drop. Browser life cycle and browser rendering stages. Service workers<br>• Conclusion of the Unit |

| | |
|---|---|
| **4.** | **XML** |
| | • Introduction to XML<br>• Difference b/w Html & XML, XML editors.<br>• XML Elements & Attributes XML DTD.<br>• XML Schema, XML Parser.<br>• Document Object Model (DOM), XML DOM.<br>• Conclusion of the Unit |
| **5.** | **Practical website development** |
| | • Commonly used Web Servers and browsers, Setting up a server and domain name, website types and structures,<br>• Web authoring tools, Web hosting, website maintenance, generating traffic to your website.<br>• Conclusion of the Unit |

**C. RECOMMENDEDSTUDYMATERIAL:**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
|---|---|---|---|---|
| **1** | Practical Web Design for Absolute Beginners | AdrianW. West | 2016 | Apress 2016 |
| **2** | Introducing Web Development | Jorg Krause | 2017 | Apress2017 |
| **3** | HTML & CSS:The Complete Reference | Thomas Powell | 2010 Fifth Edition | McGrawHill |
| **Reference Book** | | | | |
| 1 | HTML and CSS: Design and Build Websites – by Jon Duckett | | | |
| 2 | Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages – by Elisabeth Robson & Eric Freeman Publisher- ORELLY | | | |
| **Online Resources** | | | | |
| 1 | https://www.w3schools.com/html/html_links.asp | | | |
| 2 | https://www.tutorialrepublic.com/html-tutorial/html-links.php | | | |

| Code: BCACCA1104 | Computer Organization and Architecture | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Explain the organization of basic computer, its design and the design of control unit.
- Demonstrate the working of central processing.
- Describe the operations and language f the register transfer, micro-operations and input- output organization.
- Organize memory and memory management hardware.
- Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Basics Of Digital Logics** | 8 |
| 2. | **Register Transfer and Micro-operation** | 8 |
| 3. | **Basic Computer Organization** | 8 |
| 4. | **Modes of Data Transfer and Memory Organization** | 6 |
| 5. | **Computer Arithmetic.** | 6 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Basics of Digital Logics** |
| | • Introduction of Unit<br>• Number systems **:** Binary number system, Octal &Hexa-decimal number system, Conversion of Number System, r's & (r-1)'s, Binary arithmetic Operations,<br>• Logic Gates**:** AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates.<br>• Boolean algebra**:** AND, OR, Inversion, Basic Boolean Law's, DE Morgan's theorem, Minimization techniques: K -Map, Sum of Product & Product of Sum,.<br>• Conclusion &Real Life Application |
| 2. | **Register Transfer and Micro-operation** |
| | • Introduction of Unit<br>• Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer.<br>• Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit.<br>• Conclusion &Real Life Application |
| 3. | **Basic Computer Organization** |
| | • Introduction of Unit<br>• Instruction Codes, Computer Registers: Common bus system, Computer Instructions<br>• Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions.<br>• Conclusion &Real Life Application |
| 4. | **Micro Programmed Control Unit.** |
| | • Introduction of Unit<br>• Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines. |

| | |
|---|---|
| | • Central Processing unit: Introduction of CPU.<br>• Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory,<br>• Associative Memory, Cache Memory, Virtual Memory<br>• Conclusion &Real Life Application |
| **5.** | **Computer Arithmetic.** |
| | • Introduction of Unit<br>• Modes of Data Transfer: Priority Interrupt, Direct Memory Access,<br>• Introduction, Addition and Subtraction,<br>• Multiplication Algorithms (Booth algorithm), Division Algorithms,<br>• Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors.<br>• Conclusion & Real Life Application |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Computer System Architecture | Morris Mano | Latest | PHI |
| 2. | Computer Organization and Architecture | William Stallings | Latest | PHI |
| 3. | Digital Computer Electronics: | Malvino | Latest | TMH |
| **Reference Book** | | | | |
| 1. | Computer Fundamentals Architecture and Organization by Ram B | | | |
| 2. | Fundamental of Computer Organization and Design by Sivarama P Dandamudi | | | |
| **Online Resources** | | | | |
| 1. | http://nptel.iitm.ac.in/video.php?subjectId=106102062 | | | |
| 2. | https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/ | | | |

| Code: : BCYCCA1105 | Fundamentals of Cyber Security | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Explain basic concepts and importance of information security
- Identify threats to information security, analyze their impact and propose suitable countermeasures
- Describe various aspects of securing network infrastructure and importance of classifying information
- To enable student to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures.
- And to get familiarize with Asset management along with the objective to create awareness in Digital Rights Management.

A. **OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Information Security** | 07 |
| 2. | **The importance of Cryptography** | 08 |
| 3. | **Threats and vulnerabilities** | 08 |
| 4. | **Network and email security** | 07 |
| 5. | **Database Security** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Information Security** |
| | • Introduction to the unit<br>• Definition of Information Security, Evolution of Information Security, Basics Principles of Information Security (CIA triad), Terminologies in information security<br>• Latest news in information security<br>• Conclusion |
| 2. | **The importance of Cryptography** |
| | • Introduction of Unit<br>• Overview of Cryptography & Steganography<br>• Understanding the AES and DSA (overview)<br>• Private key and Public key Cryptography<br>• RSA and Digital Signature<br>• Conclusion of Unit |
| 3. | **Threats and vulnerabilities** |
| | • Introduction of Unit<br>• Types of Hackers, Hacktivism<br>• Common Threats to the data<br>• Vulnerability and Penetration testing and its tools<br>• Malicious Codes, Back Doors, Spoofing, sniffing, Spam, Social Engineering<br>• Denial of Service and Distributed Denial of Service,<br>• Conclusion of Unit |
| 4. | **Network and email security** |
| | • Introduction of Unit<br>• Planning for Network Security, TCP/IP and OSI models<br>• Firewalls and its types, VPNs, and Wireless security<br>• Intrusion Detection and Prevention Systems and Other Security Tools<br>• Email security and PGP<br>• Conclusion of Unit |

| 5. | **Database Security** |
|---|---|
| | • Introduction of Unit<br>• Describe the structures and vulnerabilities of key databases for cybersecurity including SQL, Oracle and MongoDB<br>• Common database Vulnerabilities and Owasp top 10<br>• SQL injection<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Cryptography and Network Security | William stallings | Fourth Edition | McGraw Hill India, 2017 |
| 2. | Information security: Principles and Practice | Mark Stamp | Second Edition | John Wiley & Sons, Inc., 2011 |
| **Reference Book** | | | | |
| 1. | Cryptography and Network Security, Ferouzan, Behrouz A. | | | |
| 2. | Data and Computer Communication, Pearson Education , Stallings William | | | |
| 3. | Cryptography and Network Security, S. Bose | | | |
| **Online Resources** | | | | |
| 1. | https://onlinecourses.swayam2.ac.in/nou19_cs08 | | | |
| 2. | https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks | | | |
| 3. | https://www.codecademy.com/learn/introduction-to-cybersecurity | | | |

# PRACTICAL

| Code: BCACCA1201 | Programming Fundamentals of C Lab | 1Credit [LTP: 0-0-2] |
|---|---|---|

**Course Outcome: -**

Students will be able to:

- Gain concept of functional hierarchical code organization.
- Work with textual information, characters and strings
- Implement file handling concepts
- Implement real time applications using the power of C language features.
- Overcome and solve possible errors during program execution.

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x |
| **2** | Write a program that reads a floating point number and then displays the right-most digit of the integral part of the number. |
| **3** | Write a C program to calculate the sum of digits of given number. |
| **4** | Program to find largest and smallest number from four given number. |
| **5** | Program to find whether a year is leap or not |
| **6** | Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number. |
| **7** | Write a C Program to convert Decimal number to Binary number |
| **8** | Find the sum of this series upto n terms<br>1+2+3+4+5+6+…….. |
| **9** | Program to print Armstrong's numbers from 1 to 100. |
| **10** | Write a program to convert years into Minute, Hours, Days, Months, Seconds using switch () statements |
| **11** | Write a C menu driven program |
| **12** | Write a program to generate the various pattern of numbers |
| **13** | Write a C Program to print the reverse of an integer number |
| **14** | Write a C program to perform the factorial of given number |
| **15** | Write a C program in which a function prime that returns 1 if its argument is a prime and return zero otherwise. |
| **16** | Write a C program to calculate factorial of a number using recursion. |
| **17** | Write a C program in which enter 10 elements by the user and perform the operation of sorting in ascending order |
| **18** | Write a C program to perform to perform Matrix addition and multiplication operations. |

| | |
|---|---|
| **19** | Write a program to determine the length of the string and find its equivalent ASCII codes. |
| **20** | Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line |
| **21** | Write a program to maintain the library record for 100 books with book name, author's name, and edition, year of publishing and price of the book. |

## B. RECOMMENDED STUDY MATERIAL

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
|---|---|---|---|---|
| 1. | Let us C | Yashwant Kanetkar | 6th Edition | PBP Publication |
| 2. | The C programming Language | Richie and Kenninghan | 2nd Edition 2004 | PBP Publication,2004 |
| 3. | Programming in ANSI C | E Balaguruswamy | 3rd Edition, 2005 | Tata McGraw Hill |
| **Reference Book** | | | | |
| 1. | The C programming Language by Richie and Kenninghan, PBP Publication,2004 | | | |
| 2. | Programming in ANSI C 3rd Edition, 2005 byE.Balagurusamy, Tata McGraw Hill | | | |
| **Online Resources** | | | | |
| 1. | https://www.programiz.com/c-programming/examples | | | |
| 2. | https://www.w3resource.com/c-programming-exercises | | | |

| Code: BCACCA1202 | Web Designing Lab | 1Credit [LTP: 0-0-2] |
|---|---|---|

**Course Outcome: -**

Students will be able to:

- Apply the principles of creating an effective web page, including an in-depth consideration of information architecture.
- Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
- Develop skills in analyzing the usability of a web site.
- Evaluate how to plan and conduct user research related to web usability.
- Learn the language of the web: HTML and CSS.

## A. LIST OF EXPERIMENTS:

| | |
|---|---|
| **1** | Hello World Web Page<br>a) Create a web page using basic HTML features like tags, attributes, elements and page title.<br>b) How to install and configure a web server |
| **2** | Create a My Profile Page<br>a) Using text boxes, check boxes, radio buttons and submit buttons.<br>b) Design a web page using CSS include the following:<br>i. Control the repetition of image with back ground-repeat property.<br>ii. Define style for links asa: link, b:active,c:hover,d:visited.<br>iii. Add customized cursors for links. |
| **3** | Create a My Profile Page<br>a) A more functional web page by making use of headings, paragraphs, lists, images and links.<br>b) Design a web page using CSS include the following:<br>i. Use different font styles.<br>ii. Set back ground image for both the page and single elements on the page. |
| **4** | Create XML Http Request and retrieve data from a text file and an XML file. |
| **5** | Create the following webpage:<br>a) Show the class time table in a tabular format.<br>b) Create a web page using HTML to show your geolocation. |
| **6** | Create a webpage using HTML for audio and video player. |
| **7** | Create a log in registration form using PHP. |
| **8** | Develop a PHP web page to manipulating files such as creating ,writing, reading and uploading. |
| **9** | Create a dynamic web page by using PHP conditional operators, loops and strings to create an dynamic time table page. |
| **10** | Develop a PHPweb application track the user as how many times visited and last visited time |
| **11** | Develop a static website–I. |
| **12** | Develop a static website–II. |

## B. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Practical Web Design for Absolute Beginners | AdrianW. West | 2016 | Apress 2016 |
| 2. | Introducing Web Development | Jorg Krause | 2017 | Apress2017 |
| 3. | HTML & CSS: The Complete Reference | Thomas Powell | 2010, FifthEdition | McGrawHill, |
| **Reference Book** | | | | |

| | |
|---|---|
| 1. | HTML and CSS: Design and Build Websites – by Jon Duckett |
| 2. | Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages – by Elisabeth Robson & Eric Freeman Publisher- ORELLY |
| **Online Resources** | |
| 1. | https://www.w3schools.com/html/html_links.asp |
| 2. | https://www.tutorialrepublic.com/html-tutorial/html-links.php |

| Code: BULCSA1203 | Office Automation Lab | 1 Credit [LTP: 0-0-2] |
|---|---|---|

**Course Outcome: -**
Students will be able to:

- Prepare document in MS word using pictures and editing properly.
- Construct forms in MS. Word
- Protect a document from unauthorized access by assigning password
- Prepare worksheet to keep records and how to use mathematical formula in same
- Present a Presentation using MS Power point

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | **MS Word**<br>Prepare a document about any tourist destination of your choice with appropriate pictures and editing features. |
| **2** | Prepare a News Paper Layout. Insert appropriate pictures wherever necessary. Use the following Features:<br>• Three Column and Four Column setting<br>• Set One or Two Advertisements<br>• Use Bullets and Numbering. |
| **3** | Create a Document consisting of Bio-data. It includes<br>• A table giving your qualification and /or experience of work. Table should be Bordered and Shaded.<br>• A Multilevel list giving your areas of interest and further areas of interest. The sub areas should be numbered as 'a','b', etc while the area should be numbered as '1','2',etc.<br>• The information should be divided in "General" and "Academic" sections.<br>• The header should contain "BIO-DATA "while the footer should have page numbers in the format Page1of 10.<br>• Assign a password for the document to protect it from unauthorized access. |
| **4** | Assume that you are coordinating a seminar in your organization. Write a letter to 10 different IT companies asking them to participate in the seminar using mail merge facility. |
| **5** | Prepare a document which contains template of marks card of students. Assume that there are 10 students. The footer for the document should be 'Poornima University Jaipur'. |
| **6** | Prepare a document about any topic In mathematics which uses mathematical symbols. (At least 5 mathematical symbols should be used). Assign a password for the document to protect it from unauthorized access. Demonstrate the use of Hyperlink Option. Sets margins to your document, a font of size and double spaced document |
| **7** | **MS-Excel**<br>Open a new work book, save it as JavaCoffeeBar.xls. In sheet 1 write following sales data for JavaCoffee bar to show their first 6 months sales.<br>• Select cell B4:D4 and change the horizontal alignment to center and text to 90degree.<br>• All titles should be in bold<br>• Format all cells numbers to currency style and adjust width as necessary.<br>• Add border to data.. |
| **8** | Prepare a worksheet to maintain student information. The work sheet should Contain Roll Number, Name and marks in 5 subjects. (Max Marks is 100).Validate the marks. Calculate the total marks. Assign the grade according to the following. Assign grade 'A' if the total marks is above 450. From 401 to 449 assign the grade as 'B'. From 351 to 400 assign the Grade as 'C'. From 300 to 350 the grade to be assigned is 'D'. For the total marks less than 300 No grade is assigned. A student is eligible to get a grade only when he gets 40 and above in all the subjects. In such cases the grade is"FAIL".(Assume that there are 10 students) |
| **9** | Prepare a pay-bill using a worksheet. The work sheet should contain Employee Id, Name ,Designation, |

| | |
|---|---|
| | Experience and Basic Salary and Job ID. If Job Id is 1 then DA is 40% of the basic salary. HRA is Rs. 4500. If Job Id is 2 then DA is 35% of the basic salary. HRA is Rs.3500. If Job Id is 3 then DA is 30% of the basic salary. HRA is Rs. 2500. If Job Id is 4 then DA is 25% of the basic salary and HRA is RS.2500. For all the other Job ids DA is 20% of the basic salary and HRA is Rs. 1500. For all the above Job ids PF to be deducted is 4%. For the job ids between1-4 Rs.100 to be deducted as Professional Tax. Find the netpay. |
| **10** | For the above employee worksheet perform the following operations<br>• Use filter to display the details of employees whose salary is greater than 10,000.<br>• Sort the employees on the basis of their net pay<br>• Use advance filter to display the details of employees whose designation is "Programmer" and Net Pay is greater than 20,000 with experience greater than 2yrs |
| **11** | Using Excel project the Products ales for any five products for five years.<br>• Compute the total sales of each product in the five years.<br>• Compute the total sales of all the products in five year.<br>• Compute the total sales of all products for each year.<br>• Represent annual sale of all the products using Pie-Chart.<br>• Represent annual sales of all products using Bar Chart.<br>• Represent sale of a product for five years using Pie-Chart.<br>• Label and format the graphs |
| **12** | Create a statement of Telephone Bill Charge for a customer.<br>• Telephone Calls<br>• Up to150calls- free<br>• 151to500calls-0.80percall<br>• 501 to1000calls-1.00percall<br>• 1001to2000-1.25percall<br>• Above2000- 1.40percall |
| **13** | Perform Following:<br>• Using Excel write sales data with columns product, month and sales. Write at least 5 records. Create Pivot Table chart and Report for the data.<br>• Create a macro to change the name of worksheet as Macro Example, merge first three columns of first row and write heading as DATA in green color with yellow background<br>• Link word document in excel worksheet to show the usage of linking and embedding. |
| **14** | MS Power Point<br>Assume that you are going to give a presentation about Information Technology. (Choose some latest technologies). The presentation should have minimum 10 slides. Insert appropriate images wherever necessary. Use proper formatting, Diagrams and tables. Show the usage of action buttons, hyperlinks, and animations. |

| Code: BCACCA1204 | Information Technology Lab | 1 Credit [LTP: 0-0-2] |
|---|---|---|

**Course Outcome: -**

Students will be able to:

- Identify the peripherals of a computer, components in a CPU and its functions.
- Install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.
- Trouble Shoot software/Hardware and Identify defective peripherals
- Configure the TCP/IP setting. Get connected to local area network and access internet
- Surfing the Web and customize the web browser according to their need.

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Peripherals of a computer, System unit, CPU, Mother Board, FDD, CD ROM Drive,<br>HDD, Ethernet Card, Monitor, Keyboard, Mouse & Speakers. And there connecting slots with name |
| **2** | Different Slots of motherboard and there connections. |
| **3** | Installing operating system like Linux or MS windows on the personal computer. |
| **4** | Configured system as dual boot with both windows and Linux |
| **5** | Disk formatting, partitioning and Disk operating system commands |
| **6** | Part1. Identify the hardware/ software problem and fix it . |
| **7** | Part2. Identify the hardware/ software problem and fix it to get the computer back to function. |
| **8** | Configure the TCP/IP setting in local area network and access the internet. |
| **9** | Customize their web browsers with the LAN proxy settings,<br>• bookmarks, search toolbars and pop up blockers.<br>• Also, plug-ins like Macromedia Flash and JRE for applets should be configured. |
| **10** | Search Engines & Netiquette<br>How to use the search engines. Effective use of search engines like Google, Yahoo, ask.com |
| **11** | Cyber Hygiene: viruses on the internet and install antivirus software<br>customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms |

| Code: BULCHU1201 | Foundation English | 1Credit [LTP: 0-0-2] |
|---|---|---|

**Course Outcome: -**

Students will be able to:

- Demonstrate the grammar skills involved in writing sentences and short paragraphs.
- Build up a good command over English grammar and vocabulary to be able to ace error spotting.
- Define unknown words in sentence level context using a picture dictionary or by creating a memory link for support.
- Analyze and effectively use the conventions of the English language.
- Develop their interest in reading and enhance their oral and silent reading skills along with sharpen their critical and analytical thinking.

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Parts of Speech: Theory & Practice through various Exercises |
| **2** | Sentence Structures: Theory & Practice through various Exercises |
| **3** | Tenses: Theory & Practice through various Exercises |
| **4** | Spotting the Errors: Applying the rules and Practice Questions |
| **5** | Vocabulary Building-I: Practice by sentence formation |
| **6** | Vocabulary Building-II: Practice by sentence formation |
| **7** | Paragraph Writing |
| **8** | Article Writing |
| **9** | Précis Writing |
| **10** | Formal & Informal Letter Writing |
| **11** | Reading Comprehension- I: Beginner's level reading and Answering the Questions (Competitive Exams) |
| **12** | Reading Comprehension- II: Intermediate's level reading and Answering the Questions (Competitive Exams) |

| Code: BCACCA1601 | Discipline, VAC & Social Outreach | 1 Credit [LTP: 0-0-6] |
|---|---|---|

**Course Outcome: -**

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participate on in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -I, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programme, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a back log subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the FIRST Semester are as follows:

| Code | Activity | Hours | Credits |
|---|---|---|---|
| BCACCA1601 | Talent Enrichment Programme(TEP)-I | 2 | 1 |
| | Library / MOOC / Online Certificate Courses | 2 | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | 2 | |

# Semester-II

# SEMESTER II

## DEPARTMENT CORE COURSES

| Code: BCACCA2101 | Computer Networks | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Gain the knowledge of the basic computer network technology and become familiar with layered communication architectures (OSI and TCP/IP).
- Acquire basics of Framing and Error detection including parity, checksums, and CRC.
- Gain the knowledge of the basic IP configuration used for Networking. Also clear the concept of Logical and Physical Addressing
- Know the concepts of reliable data transfer and how TCP implements these concepts.
- Learn the principles of WAN routing and the semantics.

### A. OUTLINE OF THE COURSE

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Networking Fundamentals & Internet** | 09 |
| 2. | **Basics Presentation &Application Layer** | 07 |
| 3. | **BasicsofTransport layer &Network,Layer** | 08 |
| 4. | **Basicsof Data Link Layer** | 07 |
| 5. | **Basics of WAN Technology** | 07 |

### B. DETAILED SYLLABUS

| Unit | Unit Details |
|---|---|
| 1. | **Networking Fundamentals & Internet** |
| | • Basics of Network & Networking, Types of Networks: LAN, MAN, WAN, Peer-to-Peer & Client/Server, Workgroup V/S. Domain, Network Topologies. The Internet, Network Devices- NIC, Hub, Switch, Bridge, Router, Gateways, Firewall, Repeater, CSU/DSU, and modem, Introduction of OSI model, and TCP/IP Model, Comparison between OSI model & TCP/IP model. Physical Layer: Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, Media connectors (Fiber optic, Coaxial, and TP etc.) Switching Methods (Circuit/Packet Switching) Uni-cast, Multicast, Broadcast<br>• Conclusion &Real Life Application |
| 2. | **Basics Presentation &Application Layer** |
| | • Presentation Layer protocols:-TLS, SSL, MIME<br>• Application Layer: Functions and support, Application Layer Protocols: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP.<br>• Conclusion &Real Life Application |
| 3. | **BasicsofTransport layer &Network,Layer** |
| | • Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets<br>• Network Layer: Internet Protocol (IP), IP standards, versions, functions, The IPv4 Datagram Format, IPv4 addressing, IPv4 address Classes, IPv4 address types, Default Gateway, Public & Private IP Address, methods of assigning IP address, Subnet Mask and sub-neting, IPv6 address, types, assignment, Data encapsulation, Introduction to Routing and Switching concepts.<br>• Conclusion &Real Life Application |

| 4. | **Basicsof Data Link Layer** |
|---|---|
| | • Application of Data Link Layer: Framing and Error detection and correction. Stop and Wait protocol, Sliding Window protocols Go-Back-N Protocol, Channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols. Wireless Networking, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless security Protocols: WEP,WPA, 802.1X.<br>• Conclusion &Real Life Application |
| **5.** | **Basics of WAN Technology** |
| | • What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fibre, Cellular Technologies<br>• Connecting LANs: Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual LAN, Virtual Private Networking<br>• Conclusion &Real Life Application |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| **1.** | Computer Network | AndrewS. Tanenbaum | 2013 | Pearson |
| **2.** | Computer Networking: Top Down Approach | Kurose. Ross | 2017 | Pearson |
| **Reference Book** | | | | |
| 1. | Networking All in One – Doug Lowe 7th edition Publisher- Wiley | | | |
| **Online Resources** | | | | |
| 1. | https://www.edx.org/learn/computer-networking | | | |
| 2. | https://www.youtube.com/watch?v=VwN91x5i25g | | | |

| Code:BCACCA2102 | OOPs with Java | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Acquire the concepts and features of object oriented programming
- Learn java's exception handling mechanism, multithreading, packages and interfaces.
- Implement object oriented programming concepts using java
- Apply object oriented programming features and concepts for solving given problem
- Implement the concept of class and objects with access control to represent real world entities.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Java** | 08 |
| 2. | **Working with classes ,objects and Inheritance** | 09 |
| 3. | **Packages, Interfaces & Exception Handling** | 09 |
| 4. | **Multithreaded Programming & Applet** | 07 |
| 5. | **JAVA Database Connectivity (JDBC) and Java 8 Features** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Java** |
| | • Introduction to Unit<br>• History and Overview of Java<br>• Object Oriented Programming features.<br>• Class Fundamentals<br>• Declaring objects, Assigning object reference variables.<br>• Literals, variables comments, separators,<br>• Scope and Life Time of Variables<br>• Data types - Integers, Floating point, characters, Boolean,<br>• Type conversion and casting<br>• Operators - Arithmetic operators, Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence.<br>• Conclusion of unit |
| 2. | **Working with classes, objects and Inheritance** |
| | • Introduction to Unit<br>• Control Statements – Selection Statements - if, Switch, Iteration Statements - While, Do-while, for Nested loops, Jump statements.<br>• Methods - constructors, “this” keyword, finalize ( ) method A stack class, Over loading methods. Using objects as parameters, Argument passing, Returning objects.<br>• Recursion, Access control, introducing final, understanding static.<br>• Introducing Nested and Inner classes.<br>• Command line arguments.<br>• Inheritance – Basics, Using super, method overriding, and Dynamic method Dispatch, Using abstract classes and final with Inheritance.<br>• Conclusion of Unit |
| 3. | **Packages, Interfaces & Exception Handling** |

| | |
|---|---|
| | • Introduction to Unit<br>• Definition and Implementation, Access protection importing packages.<br>• Interfaces: Definition and implementation.<br>• Exception Handling – Fundamentals, types, Using try and catch<br>• Multiple catch clauses<br>• Nested try Statements,Throw, finally.<br>• User Defined Exception<br>• Conclusion of Unit |
| **4.** | **Multithreaded Programming & Applet** |
| | • Introduction of Unit<br>• Java thread model – main thread, creating single Multithreading<br>• Is alive ( ) and join ( ) Methods<br>• Thread – Priorities, Synchronization<br>• Inter thread communication, suspending, resuming and stopping threads<br>• Reading control input, writing control output, Reading and Writing files.<br>• Applet Fundamentals – AWT package<br>• AWT Event handling concepts.<br>• Conclusion of Unit |
| **5.** | **JAVA Database Connectivity (JDBC) and Java 8 Features** |
| | • Introduction to Unit<br>• Database connectivity – JDBC architecture and Drivers.<br>• JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements<br>• Handling SQL exceptions.<br>• Accessing result sets: types and methods.<br>• JDBC application to query a database.<br>• Introduction to java 8 features :-Functional Interfaces And Lambda Expressions<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | The complete reference Java –2 | Herbert Schildt | V Edition, | TMH. |
| 2. | SAMS teach yourself Java – 2 | Rogers Cedenhead and Leura Lemay | 3rd Edition, | Pearson Education |
| **Reference Book** | | | | |
| 4. | Object Oriented Programming with Java PUBLISHER PHI by M.T. Somashekara (Author), D.S. Guru (Author), K.S. Manjunatha (Author) | | | |
| 5. | "Head First Java" by Kathy Sierra | | | |
| **Online Resources** | | | | |
| 1. | https://www.programiz.com/java-programming/online-compiler/ | | | |
| 2. | https://www.tutorialspoint.com/compile_java_online.php | | | |
| 3. | https://onecompiler.com/java | | | |

| Code:BCACCA2103 | Data Structures and Algorithms | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyse worst-case running times of algorithms using asymptotic analysis.
- Analyse time complexities of various searching, sorting.
- Create various applications using stack, queue, tree and graph.
- Able to select relevant data structure to solve the problem.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Data structures** | 8 |
| 2. | **Searching and Sorting** | 8 |
| 3. | **Stack and Queue** | 8 |
| 4. | **Linked List** | 9 |
| 5. | **Tree Graphs and their Applications** | 7 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Data structures** |
| | • Introduction to Unit<br>• Definition,<br>• Classification of data structures: primitive and non-primitive<br>• Elementary data organization<br>• Time and space complexity of an algorithm (Examples), String processing.<br>• Definition of dynamic memory allocation<br>• Accessing the address of a variable<br>• Declaring and initializing pointers -<br>• Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc().<br>• Recursion – Definition, advantages, Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.<br>• Conclusion and Real Life Applications of unit |
| 2. | **Searching and Sorting** |
| | • Introduction to Unit<br>• Basic Search Techniques - Sequential search, Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search.<br>• Sorting: General background and definition-Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort<br>• Conclusion and Real Life Applications of unit |
| 3. | **Stack and Queue** |
| | • Introduction to Unit<br>• Stack – Definition<br>• Array representation of stack<br>• Operations on stack: Infix, prefix and postfix notations<br>• Conversion of an arithmetic expression from Infix to postfix |

| | |
|---|---|
| | • Applications of stacks.<br>• Definition of queue<br>• Array representation of queue<br>• Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue,<br>• Operations on all types of Queues<br>• Conclusion and Real Life Applications of Unit |
| **4.** | **Linked List** |
| | • Introduction of Unit<br>• Definition of linked list<br>• Components of linked list<br>• Representation of linked list<br>• Advantages and Disadvantages of linked list<br>• Types of linked list: Singly linked list, doubly linked list, Circular linked list<br>• Operations on singly linked list: creation, insertion, deletion, search and display<br>• Conclusion and Real Life Applications of Unit |
| **5.** | **Tree Graphs and their Applications** |
| | • Introduction to Unit<br>• Definition : Tree<br>• Binary tree, Complete binary tree, Binary search tree<br>• Heap<br>• Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node<br>• Binary tree: Array representation of tree, Creation of binary tree.<br>• Traversal of Binary Tree: Preorder, Inorder and postorder.<br>• Graphs<br>• Application of Graphs<br>• Depth First search, Breadth First search.<br>• Conclusion and Real Life Applications of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Schaum's outline series Data structures | Lipschutz | Latest | TMH. |
| 2. | Data Structures and program designing using 'C' | Robert Kruse | Latest | Pearson Education |
| **Reference Book** | | | | |
| 1. | Introduction to Data Structures in C by-Kamthane PearsonEducation2005 | | | |
| 2. | Data Structures Using C by-Bandyo Padhyay Pearson Education | | | |
| **Online Resources** | | | | |
| 1. | https://www.gatevidyalay.com/data-structures/ | | | |
| 2. | https://www.youtube.com/watch?v=QBrDsG3MTkw | | | |
| 3. | https://www.tutorialspoint.com/data_structures_algorithms/index.htm | | | |

| Code: BCACCA02104 | Operating System | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Know structure and organization of the file system.
- Get concept what a process is and how processes are synchronized and scheduled.
- Acquire different approaches to memory management.
- Use system calls for managing processes, memory and the file system.
- Know the data structures and algorithms used to implement an OS.

## A. OUTLINE OF THE COURSE

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Operating System Overview** | **08** |
| 2. | **Process Management** | **08** |
| 3. | **Process Deadlocks** | **08** |
| 4. | **Memory Management** | **09** |
| 5. | **File Management** | **07** |

## B. DETAILED SYLLABUS

| Unit | Unit Details |
|---|---|
| 1. | **Operating System Overview** |
| | • Introduction of Unit<br>• Definition, Two views of operating system, Evolution of operating system, Types of OS.<br>• System Call, Handling System Calls, System Programs, Operating System Structures,<br>• The Shell, Open Source Operating Systems<br>• Conclusion of Unit |
| 2. | **Process Management** |
| | • Introduction of Unit<br>• Process v/s Program, Multi-programming, Process Model, Process States, Process Control Block.<br>• Threads, Thread v/s Process, User and Kernel Space Threads.<br>• Inter Process Communication, Race Condition, Critical Section<br>• Implementing Mutual Exclusion: Mutual Exclusion with Busy Waiting<br>• Interrupts, Lock Variables, Strict Alteration, Peterson's Solution, Test and Set Lock.<br>• Sleep and Wake-up, Semaphore, Monitors, Message Passing.<br>• Classical IPC problems: Producer Consumer, Sleeping Barber, Dining Philosopher Problem<br>• Process Scheduling: Goals, Batch System Scheduling (First-Come First-Served, Shortest Job First, Shortest Remaining Time Next), Interactive System Scheduling (Round-Robin Scheduling, Priority Scheduling, Multiple Queues), Overview of Real Time System Scheduling<br>• Conclusion of Unit |
| 3. | **Process Deadlocks** |
| | • Introduction of Unit<br>• Introduction, Deadlock Characterization, Preempt able and Non-preempt able Resources<br>• Resource – Allocation Graph, Conditions for Deadlock. |

| | |
|---|---|
| | • Handling Deadlocks: Ostrich Algorithm, Deadlock prevention, Deadlock Avoidance.<br>• Deadlock Detection (For Single and Multiple Resource Instances), Recovery From<br>• Deadlock (Through Preemption and Rollback)<br>• Conclusion of Unit |
| **4.** | **Memory Management** |
| | • Introduction of Unit<br>• Introduction, Monoprogramming vs. Multi-programming, Modeling Multiprogramming, Multiprogramming with fixed and variable partitions, Relocation and Protection.<br>• Memory management (Bitmaps & Linked-list), Memory Allocation Strategies<br>• Virtual memory: Paging, Page Table, Page Table Structure, Handling Page Faults, TLB's<br>• Page Replacement Algorithms: FIFO, Second Chance, LRU, Optimal, LFU, Clock, WS- Clock, Concept of Locality of Reference, Belady's Anomaly<br>• Segmentation: Need of Segmentation, its Drawbacks, Segmentation with Paging(MULTICS)<br>• Conclusion of Unit |
| **5.** | **File Management** |
| | • Introduction of Unit<br>• File Overview: File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Single Level, two Level and Hierarchical Directory Systems, File System Layout.<br>• Implementing Files: Contiguous allocation, Linked List Allocation, Linked List<br>• Allocation using Table in Memory, Inodes.<br>• Directory Operations, Path Names, Directory Implementation, Shared Files<br>• Free Space Management: Bitmaps, Linked List<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1 | Operating system concepts | Silberschatz, Galvin, Gagne | 8th edition | John Wiley and Sons |
| 2 | Modern Operating System | A.S.Tanenbaum | 2nd Edition | Pearson |
| **Reference Books** | | | | |
| 1. | Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016. | | | |
| **Online Resources** | | | | |
| 1. | https://www.coursera.org/courses?query=operating%20system | | | |
| 2. | https://hackr.io › tutorials › learn-operating-systems | | | |

| Code:BCYCCA2105 | Network Defense For Cyber Security | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Gain knowledge of basic concepts and importance of information security
- Evaluate threats to information security, analyze their impact and propose suitable countermeasures
- Synthesize student to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control
- Evaluate a penetration test using standard hacking tools in an ethical manner.
- Remember the strengths and vulnerabilities of the tested network.
- Apply legal and ethical issues related to vulnerability and penetration testingapplications

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Networks** | 07 |
| 2. | **Computer Networks** | 08 |
| 3. | **Network Security** | 08 |
| 4. | **Tools for Network defense** | 07 |
| 5. | **Network Monitoring** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Networks** |
| | • Introduction of Unit<br>• Importance of Networks<br>• LAN,WAN,MAN<br>• Types of cables in computer networks<br>• Network Topologies<br>• Conclusion of Unit |
| 2. | **Computer Networks** |
| | • Introduction to Unit<br>• OSI and TCP/IP model<br>• Protocols and Port, IPv4, IPv6, MAC address<br>• Attacks on CIA triad<br>• Conclusion of the Unit |
| 3. | **Network Security** |
| | • Introduction of Unit<br>• Access Rights Management<br>• End Point Security<br>• Firewalls<br>• Intrusion Prevention/Detection<br>• Network Access Control<br>• Security Monitoring<br>• Wireless Security<br>• Conclusion of Unit |
| 4. | **Tools for Network defense** |

| | |
|---|---|
| | • Introduction of Unit<br>• Open source tools for Network defense<br>• Wireshark, Sort, Nessus<br>• Air-crack, Wi-Fi pumpkin, Cain & Abel<br>• TCP dump, Splunk<br>• Conclusion of Unit |
| **5.** | **Network Monitoring** |
| | • Introduction of Unit<br>• Network Breach<br>• Firewalls and its types<br>• DMZ and its importance<br>• Malware analysis, SSL/ TLS, UTM/SIEM<br>• Software Defined Networking ( SDN ) vulnerabilities<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Basic of Hacking and Penetration | Patrick Engerbrestson | First Edition | 2010 |
| 2. | Certified Ethical Hacker All-in-One | Matt Walker | First Edition | 2011 |
| **Reference Book** | | | | |
| 1. | Hacking Exposed- Stuart McClure, Joel Scambray, George Kurtz | | | |
| 2. | Gray Hat Hacking: The Ethical Hacker's Handbook, Fifth Edition (NETWORKING & COMM - OMG) | | | |
| **Online Resources** | | | | |
| 1. | https://www.javatpoint.com/ethical-hacking-tutorial | | | |
| 2. | https://www.guru99.com/ethical-hacking-tutorials.html | | | |
| 3. | https://www.youtube.com/watch?v=dz7Ntp7KQGA | | | |

# PRACTICAL

| Code: BCACCA02201 | Operating System Lab | 1 Credit [LTP: 0-0-2] |
|---|---|---|

**Course Outcome: -**

Students will be able to:

- Implement basic Scheduling algorithms and memory allocation techniques.
- Implement memory management techniques like MVT and MFT
- Implement memory allocation algorithms.
- Detect deadlocks and avoid them.
- Implement different page replacement algorithms

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| 1. | Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin d) Priority |
| 2. | Write a C program to simulate the following file allocation strategies. a) Sequential b) Indexed c) Linked |
| 3. | Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue |
| 4. | Write a C program to simulate the MVT and MFT memory management techniques. |
| 5. | Write a C program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit |
| 6. | Write a C program to simulate paging technique of memory management |
| 7. | Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. |
| 8. | Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN |
| 9. | Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU |
| 10. | Write a C program to simulate page replacement algorithms |
| 11. | Write a C program to simulate producer-consumer problem using semaphores. |
| 12. | Write a C program to simulate the concept of Dining-Philosophers problem. |

**B. RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Operating system concepts | Silberschatz, Galvin, Gagne | 8th Edition | John Wiley and Sons |
| 2. | Modern Operating System | A.S.Tanenbaum | 2nd Edition | Pearson |
| **Reference Book** | | | | |
| 1. | Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016. | | | |
| **Online Resources** | | | | |
| 1. | *https://www.coursera.org › courses › query=operating s...* | | | |

| Code: BCACCA2202 | OOPS With JAVA Lab | 1 Credit[LTP: 0-0-2] |
|---|---|---|

**Course Outcome:-**

Students will be able to:

- Implement object oriented programming concepts to solve real world problems
- Implement the concept of class and objects with access control to represent real world entities.
- Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).
- Create concepts on file streams and operations in java programming for a given application programs
- Create the backend connectivity process in java program by using JDBC drivers

## A. LIST OF EXPERIMENTS:

| | |
|---|---|
| 1 | A. Write a program to print "Hello World" in Java.<br>B. Write a program to add two numbers<br>C. Write a program to demonstrate the different access specifiers<br>D. Write a program which uses different packages |
| 2 | A. Write a program to demonstrate inheritance, abstraction, encapsulation and Polymorphism.<br>B. Write a program to find the factorial of n numbers<br>C. Write a program to calculate Fibonacci series<br>D. Write a program to add n numbers and series |
| 3 | A. Write a program to create an array and store elements into the array.<br>B. Write a program to find the sum of elements in an array<br>C. Write a program to demonstrate switch case, if, if-else and for loop |
| 4 | A. Write a program to demonstrate the working of methods.<br>B. Write a program which has four methods – add(), subtract(), multiply() and divide()<br>and demonstrate a simple console calculator.<br>C. Write a program to accept command line arguments and display them to the user |
| 5 | A. Write a program to create a package.<br>B. Write a program to handle different exceptions |
| 6 | A.Write a program to demonstrate try-catch, throw and throws.<br>B. Write a program for user defined exception |
| 7 | A. Write a program to read a file<br>Write a program to write into a file |
| 8 | Write a program to demonstrate client server communication (socket programming) |
| 9 | Write a program to create threads and manipulate them |
| 10 | Write a program to create a user interface to check user authentication. |
| 11 | Write a program to create a registration form and save the details into a file |
| 12 | Write a program to save and fetch the details from database |

## B. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1 | The complete reference Java –2 | Herbert Schildt | 5th Edition, | TMH. |
| 2 | SAMS teach yourself Java – 2 | Rogers Cedenhead and Leura Lemay | 3rd Edition, | Pearson Education |
| Reference Book | | | | |
| 1 | Object Oriented Programming with Java PUBLISHER PHI by M.T. Somashekara (Author), D.S. Guru (Author), K.S. Manjunatha (Author) | | | |
| 2 | "Head First Java" by Kathy Sierra | | | |
| Online Resources | | | | |
| 1 | https://www.programiz.com/java-programming/online-compiler/ | | | |
| 2 | https://www.tutorialspoint.com/compile_java_online.php | | | |
| 3 | https://onecompiler.com/java | | | |

| Code: BCACCA2203 | Data Structures and Algorithms Lab | 1 Credit [LTP: 0-0-2] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyse worst-case running times of algorithms using asymptotic analysis.
- Implement various searching, sorting.
- Create various applications using stack , queue, tree and graph.
- Implement relevant data structure to solve the problem.

**A. List of Programs:**

| | |
|---|---|
| **1** | Use a recursive function to find<br>a) GCD of two numbers.<br>b) Use a recursive function to find the Fibonacci series.<br>c) Factorial<br>d) Binomial Coefficient |
| **2** | Perform the following:<br>a) Insert an integer into a given position in an array.<br>b) Deleting an integer from an array. |
| **3** | Perform the following:<br>a) Write a program for linear search<br>b) Write a program for Binary search<br>c) Write a program to sort N numbers using bubble sort. |
| **4** | Perform the following:<br>a) Write a program to sort N numbers using insertion sort.<br>b) Write a program to sort N numbers using selection sort.<br>c) Write a program to sort N numbers using bubble sort. |
| **5** | Write a program to sort N numbers using quick sort. |
| **6** | Write a program to sort N numbers using merge sort. |
| **7** | Write a C program to create Stack using array. |
| **8** | Write a C program to create queue using array. |
| **9** | Write a program to create a linked list and to display it. |
| **10** | Inserting a node into a singly linked list on various position beginning, after given location and end. |
| **11** | Deleting a node into a singly linked list on various position beginning, after given location and end. |
| **12** | Write a C program to create stack and queue using linked list. |
| **13** | Creating a binary search tree and traversing it using in order, preorder and postorder. |
| **14** | Write a C program to implement graph. |

**B. RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Schaum's outline series Datastructures | Lipschutz | Latest | TMH. |
| 2. | Data Structures and program designing using'C' | Robert Kruse | Latest | Pearson Education |
| 3. | Programmingin ANSI C. | E. Balaguruswamy | Latest | TataMcGraw Hill |
| 4. | Data Structures Using C | Bandyo padhyay | Latest | Pearson Education,1999 |
| 5. | Data Structures Using C | Tenenbaum | Latest | PearsonEducation,200 |
| 6. | Introduction to Data Structures in C | Kamthane | Latest | PearsonEducation2005 |

| Code:BCACCA2204 | Computer Network Lab | 1 Credits [LTP: 0-0-2] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Use the clamping tool for making Cross and Straight cable and identify network IP
- Create local area network and do file sharing activity
- Configure switch and routers
- Configure WEP and Ethernet.
- Recognize static and dynamic routing

**A. List of Programs:**

| | |
|---|---|
| **1** | Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool |
| **2** | Study/Demonstration of Network Devices and network IP in Detail. |
| **3** | Troubleshooting Scenarios Network -I (Basic network command and Network configuration commands. |
| **4** | Connect the computers with file sharing in Local Area Network. |
| **5** | Creating LAN using different topology using Cisco Packet Tracer |
| **6** | Configure DHCP Server using Cisco PacketTracer |
| **7** | Performing an Initial Switch Configuration. |
| **8** | Performing an Initial Router Configuration |
| **9** | Configuring WEP on a Wireless Router |
| **10** | Configuring Ethernet and Serial Interfaces. |
| **11** | Observing Static and Dynamic Routing |
| **12** | Configuring Static and Default Routes. |

**B. RECOMMENDED STUDY MATERIAL**

| | | | | |
|---|---|---|---|---|
| 1. | Computer Network | AndrewS. Tanenbaum | 2013 | Pearson |
| 2. | Computer Networking: Top Down Approach | Kurose. Ross | 2017 | Pearson |
| **Reference Book** | | | | |
| 1. | Networking All in One – Doug Lowe 7th edition Publisher- Wiley | | | |

| Code:BULCHU2201 | Language Lab | 1 Credits [LTP: 0-0-2] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Know the nuances of language through audio- visual experience and group activities.
- Neutralize the accent for intelligibility and develop confidence in speaking with clarity enhancing their employability skills.
- Demonstrate an understanding of grammatical structures in conversations and discussions.
- Utilize the knowledge of confidence building strategies to manage one's own thoughts and emotions. Identify the requirements of skills development and apply their learning to sharpen the same.

| UNIT NO. | UNIT NAME | Hours |
|---|---|---|
| **1** | Introduction to Communication Skills on Learning Software | 6 |
| **2** | Concepts of Phonetics | 4 |
| **3** | Grammar Practice | 6 |
| **4** | Confidence Enhancement Activities | 4 |
| **5** | Skills Enhancement Activities | 5 |

A. List of Programs:

| | |
|---|---|
| 1. | Listening Skills |
| 2. | Reading Comprehension |
| 3. | Writing Skills |
| 4. | Phonetics I |
| 5. | Phonetics II |
| 6. | Grammar and Common Errors Usage |
| 7. | Conversation |
| 8. | Role Plays |
| 9. | Presentation Skills I |
| 10. | Presentation Skills II |
| 11. | Group Discussion |
| 12. | Interview Skills |

| Code: BCACCA2601 | Discipline, VAC & Social Outreach | 1 Credit [LTP: 0-0-6] |
|---|---|---|

**COURSE OUTCOME**:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students throughactiveparticipationinvariousactivitiesfallinginTechnicalandnon-technicalcategories.

Social outreach, Discipline, TEP -II, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programmes, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Second Semester are as follows:

| Code | Activity | Hours | Credits |
|---|---|---|---|
| BCACCA2601 | Talent Enrichment Programme(TEP)-II | 2 | 1 |
| | Library / MOOC / Online Certificate Courses | 2 | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | 2 | |

# Semester-III

# SEMESTER III

# DEPARTMENT CORE COURSES

| Code:BCACCA3101 | Relational Database Management System | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
- Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.
- Learn and apply structured query language (SQL) for database definition and database manipulation.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- Identify various transaction processing, concurrency control mechanisms and database protection mechanisms.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of the unit | Time required for the Unit (Hours) |
|---|---|---|
| 1 | **Introduction to Database Management System** | 7 |
| 2 | **RDBMS** | 7 |
| 3 | **SQL** | 7 |
| 4 | **PL/SQL** | 8 |
| 5 | **Oracle, Trigger and wrapping** | 7 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Database Management System** |
| | • Introduction to Database Management System<br>• Characteristics of database approach<br>• Advantages of DBMS<br>• Schemas: Three schema architecture - The external level, the conceptual level and the internal level.<br>• Data Independence<br>• Database languages and Interfaces<br>• Roles of Database Administrator<br>• Introduction to Data Models (Hierarchical, Network and Relation)<br>• Entity type, Entity sets, Attributes and keys.<br>• The ER Model: ER Diagram & Database design with the ER Model<br>• Conclusion of the Unit |
| 2. | **RDBMS** |
| | • Introduction to Distributed Database<br>• Classification of DBMS<br>• Introduction to RDBMS<br>• Relational Model –Concepts<br>• Relational operations (Insert, delete, update, select, project, rename, union, intersection, minus, Join, division)<br>• Transactions and ER mapping Examples<br>• Normalization of RDBMS (1NF, 2NF, 3NF and 4NF) and inference rules. |

| | |
|---|---|
| | • Conclusion of the Unit |
| **3.** | **SQL** |
| | • Introduction to Unit<br>• DBMS v/s RDBMS<br>• Introduction to SQL: Data types, Constraints<br>• Commands in SQL: Create table, Drop command, Alter Queries in SQL<br>• Statements in SQL (Insert, delete and update)<br>• Features of SQL<br>• Manipulation of data<br>• Tables in SQL<br>• Conclusion of the Unit |
| **4.** | **PL/SQL** |
| | • Introduction to PL/SQL<br>• Approaches to database programming: with function calls, Embedded SQL using CURSORs, Dynamic SQL, SQL commands in Java, Retrieving multiple triples using Iterators<br>• Advantages of PL/SQL<br>• Features of PL/SQL :Blocks structure, Error handling, Input and output designing, variables and constant, data abstraction, control structures and subprogram<br>• Fundamentals of PL/SQL : character sets, lexical, delimeters, identifiers, declarations, scope and visibility, Static and dynamic and static SQL, Implicit and explicit locking<br>• Conclusion of the Unit |
| **5.** | **Oracle, Trigger and wrapping** |
| | • Introduction to Oracle, Trigger and wrapping<br>• Functions/responsibilities of DBA<br>• Oracle product details<br>• Oracle files, System and User process<br>• Oracle Memory<br>• Protecting data: Oracle backup & recovery<br>• Triggers - types, uses, data access for triggers<br>• PL/SQL Packages and Wrapping<br>• Conclusion of the Unit |

### C. RECOMMENDED STUDY MATERIAL:

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Database System Concepts | S. Sudarshan, Henry F. Korth, Avi-Silberschatz | 6th Edition | McGraw Hill |
| 2. | SQL, PL/SQL | Ivan Bayross | Latest | BPB |
| 3. | Oracle Complete Reference | Kevin Loney | Latest | BPB |
| **Reference Book** | | | | |
| 1. | PL/SQL, best practices, BPB Publications, Steven Feuerstein | | | |
| 2. | The Oracle Cook Book, BPB Publications, Liebschuty | | | |
| 3. | Oracle A Beginners Guide, TMH Publication, Michael Abbey, Michael J.Corey | | | |

| Online Resources | |
|---|---|
| 1. | https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm |
| 2. | https://nptel.ac.in/courses/106106093 |
| 3. | https://www.coursera.org/learn/introduction-to-relational-databases |

| Code:BCACCA3102 | Python Programming | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Acquire the basic terminology used in computer programming to write, compile and debug programs in Python programming language.
- Use different data types to design programs involving decisions, loops, and functions for problem solving
- Apply various object oriented programming
- Handle the exceptions which are raised during the execution of Python scripts
- Implement files and classes in the Python programming environment

## A. OUTLINE OF THE COURSE

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1 | **Introduction to Python Programming** | 07 |
| 2 | **Python Operators and Control Flow statements** | 09 |
| 3 | **Data Structures, Python Functions and Packages** | 09 |
| 4 | **Object Oriented Programming** | 08 |
| 5 | **File I/O Handling and Exception Handling** | 09 |

## B. DETAILED SYLLABUS

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Python Programming** |
| | • Introduction to Unit<br>• What is Python,<br>• Uses of Python Programming Language / Python Applications<br>• Features of Python Programming Language<br>• Python-2 and Python-3 differences<br>• Python environment setup — Installation and working of IDE<br>• Running Simple Python scripts to display 'welcome' message.<br>• Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of data types<br>• Python building blocks — Identifiers, Keywords, Indention, Variables, Comments<br>• Conclusion of unit |
| 2. | **Python Operators and Control Flow statements** |
| | • Introduction to Unit<br>• Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence<br>• Control Flow:<br>• Conditional Statements (if, if ... else, nested if)<br>• Looping in python (while loop, for loop, nested loops)<br>• loop manipulation using continue, pass, break, else.<br>• .Conclusion of Unit |
| 3. | **Data Structures, Python Functions and Packages** |
| | • Introduction to Unit<br>• Lists, Tuple, Sets, Dictionaries<br>• String and Slicing<br>• Use of Python built |

| | |
|---|---|
| | • User defined functions and its types<br>• Command-line Arguments<br>• Python Packages: Introduction, Writing Python packages<br>• Using standard packages (e.g. math, scipy, Numpy, matplotlib, pandas etc.)<br>• user defined packages<br>• Conclusion of Unit |
| **4.** | **Object Oriented Programming** |
| | • Introduction of Unit<br>• Creating Classes and Objects<br>• Inheritance<br>• Method Overloading and Overriding<br>• Data Hiding<br>• Data abstraction, Abstract classes<br>• Types of Methods : Instance Methods , Static Methods , Class Methods<br>• Accessing attributes , Built-In Class Attributes<br>• Destroying Objects<br>• Conclusion of Unit |
| **5.** | **File I/O Handling and Exception Handling** |
| | • Introduction of Unit<br>• Types of File<br>• File Objects, File Built-in Function, File Built-in Methods<br>• File Built-in Attributes<br>• Read/write operations Reading Text<br>• Moving cursor in file inbuilt -functions<br>• Errors in Python : Compile-Time Errors ,Runtime Errors , Logical Errors<br>• What is Exception?<br>• try….except…else, try-finally clause<br>• Regular expressions<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Core Python Programming | Chun, JWesley | 2007 | Pear son, |
| 2. | Head First Python | Barry,Paul | 2010 | ORielly, |

| **Reference Book** | |
|---|---|
| 1 | Learning Python Lutz, Mark O Rielly, 2009 |
| **Online Resources** | |
| 1 | https://www.learnpython.org/ |
| 2 | https://realpython.com/start-here/ |
| 3 | https://www.programiz.com/python-programming |

| Code:BCACCA3103 | Linux and Shell Script | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.
- Write Shell Programming using Linux commands.
- Design and write application to manipulate internal kernel level Linux File System.
- Develop IPC-API's that can be used to control various processes for synchronization.
- Develop Network Programming that allows applications to make efficient use of resources available on different machines in a network.

## A. OUTLINE OF THE COURSE

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Linux and Linux utilities** | 07 |
| 2. | **Introduction to shells** | 08 |
| 3. | **Unix file structure** | 08 |
| 4. | **Process and signals** | 07 |
| 5. | **Inter process communication** | 07 |

## B. DETAILED SYLLABUS

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Linux and Linux utilities** |
| | • Introduction of Unit<br>• INTRODUCTION TO LINUX AND LINUX UTILITIES: A brief history of LINUX, architecture of LINUX,<br>• features of LINUX, introduction to vi editor.<br>• Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir,<br>• rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions,<br>• process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask,<br>• ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head ,<br>• sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio<br>• Conclusion of Unit |
| 2. | **Introduction to shells** |
| | • Introduction of Unit<br>• Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command,<br>• Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases,<br>• Variables, Predefined Variables, Options, Shell/Environment Customization.<br>• Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste,<br>• Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines,<br>• Comparing Files.<br>• Conclusion of Unit |
| 3. | **Unix file structure** |
| | • Introduction of Unit<br>• Grep: Operation, grep Family, Searching for File Content.<br>• Sed :Scripts, Operation, Addresses, commands, Applications, grep and sed.<br>• UNIX FILE STRUCTURE: Introduction to UNIX file system, inode (Index Node), file descriptors,<br>• system calls and device drivers.<br>• Conclusion of Unit |
| 4. | **Process and signals** |

| | |
|---|---|
| | • Introduction of Unit<br>• PROCESS AND SIGNALS: Process, process identifiers, process structure: process table, viewing<br>• processes, system processes, process scheduling, starting new processes: waiting for a process,<br>• zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable<br>• signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets.<br>• File locking: creating lock files, locking regions, use of read and write with locking, competing locks,other lock commands, deadlocks.<br>• Conclusion of Unit |
| **5.** | **Inter process communication** |
| | • Introduction of Unit<br>• INTER PROCESS COMMUNICATION: Pipe, process pipes, the pipe call, parent and child<br>• processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget,<br>• msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands.<br>• INTRODUCTION TO SOCKETS: Socket, socket connections - socket attributes, socket addresses,<br>• socket, connect, bind, listen, accept, socket communications.<br>• Awk and perl Programming: Awk pattern scanning and processing language, BEGIN and END patterns, Awk arithmetic and variables, Awk built in variable names and operators, arrays, strings,<br>• functions, perl; the chop() function, variable and operators, $_ and $. , Lists, arrays, regular expression and substitution, file handling, subroutines, formatted printing.<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | *Advanced Programming in the UNIX Environment* | *W. Richard. Stevens* | 3rd edition | Pearson Education |
| 2. | Unix and shell Programming | *Stephen Kochan, Patrick Wood* | Latest | Sams |
| **Reference Book** | | | | |
| 1. | Linux System Programming, *Robert Love, O'Reilly*, SPD. | | | |
| 2. | Advanced Programming in the UNIX environment, 2nd Edition, *W.R.Stevens*, Pearson Education. | | | |
| 3. | UNIX Network Programming, *W.R. Stevens*, PHI.<br>UNIX for Programmers and Users, 3rd Edition, *Graham Glass, King Ables*, Pearson Education | | | |
| **Online Resources** | | | | |
| 1. | https://www.tutorialspoint.com/unix/shell_scripting.htm | | | |
| 2. | https://www.javatpoint.com/shell-scripting-tutorial | | | |

| Code:BCYCCA3104 | Ethical Hacking | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSEOUTCOME:**

Students will be able to:

- know basic concepts and importance of information security
- Evaluate threats to information security, analyze their impact and propose suitable countermeasures
- Apply various aspects of securing network infrastructure and importance of classifying information
- Synthesize and understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures.
- Create asset management along with the objective to create awareness in Digital Rights Management

## A. OUTLINEOFTHECOURSE

| *Unit No.* | *Title of The Unit* | *Time required for the Unit (Hours)* |
|---|---|---|
| *1.* | **Introduction to Ethical Hacking** | **07** |
| *2.* | **Hacking methodologies** | **08** |
| *3.* | **Web Application hacking** | **08** |
| *4.* | **Database and Network hacking** | **07** |
| *5.* | **Report writing & Mitigation** | **07** |

## B. DETAILEDSYLLABUS

| Unit | Unit Details |
|---|---|
| **1.** | **Introduction to Ethical Hacking** |
| | • Introduction of Unit<br>• Hacking vs. Ethical Hacking<br>• Hacking Methodologies<br>• Footprinting and Scanning<br>• Trojans and Viruses<br>• Black Box vs. White Box Techniques<br>• Conclusion of Unit |
| **2.** | **Hacking methodologies** |
| | • Introduction to Unit<br>• Denial of Service and DDOS<br>• Sniffers, Session Hijacking and Hacking Web Servers<br>• Attacks on CIA triad<br>• Conclusion of the Unit |
| **3.** | **Web Application hacking** |
| | • Introduction of Unit<br>• Web Application Vulnerabilities<br>• Web Techniques Based Password Cracking<br>• Web Jacking and its tools<br>• Phishing and its tools<br>• Conclusion of Unit |
| **4.** | **Database and Network hacking** |
| | • Introduction of Unit<br>• SQL Injection<br>• Hacking Wireless Networking |

| | |
|---|---|
| | • Worms and Physical Security<br>• Evading IDS and Firewalls<br>• Conclusion of Unit |
| **5.** | **Report writing & Mitigation** |
| | • Introduction of Unit<br>• Introduction to Report Writing & Mitigation<br>• Requirements for low level reporting & high level reporting of Penetration testing results<br>• Demonstration of vulnerabilities and Mitigation of issues identified including tracking<br>• Conclusion of Unit |

**C. RECOMMENDED STUDYMATERIAL:**

**A.**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
|---|---|---|---|---|
| 1. | Basic of Hacking and Penetration | Patrick Engerbrestson | First Edition | 2010 |
| 2. | Certified Ethical Hacker All-in-One | Matt Walker | First Edition | 2011 |
| **Reference Book** | | | | |
| 1. | Hacking Exposed - Stuart McClure, Joel Scambray, George Kurtz | | | |
| 2. | Gray Hat Hacking: The Ethical Hacker's Handbook, Fifth Edition (NETWORKING & COMM - OMG) | | | |
| **Online Resources** | | | | |
| 1. | https://www.javatpoint.com/ethical-hacking-tutorial | | | |
| 2. | https://www.guru99.com/ethical-hacking-tutorials.html | | | |
| 3. | https://www.youtube.com/watch?v=dz7Ntp7KQGA | | | |

# PRACTICAL

| Code:BCACCA3201 | Relational Database Management System Lab | 1 Credits [LTP: 0-0-2] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Effectively explain the underlying concepts of database technologies.
- Design and implement a database schema for a given problem-domain.
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
- Programming PL/SQL including stored procedures, stored functions, cursors, packages

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| 1 | To setup and removal phases of a Student database using the basic Data Definition Language (DDL) commands:<br>1. CREATE<br>2. ALTER<br>3. DROP<br>4. RENAME<br>5. TRUNCATE |
| 2 | The routine operation of the Employee database like retrieve, insert and modify by basic Data Manipulation Language (DML) commands:<br>1. INSERT<br>2. UPDATE<br>3. DELETE |
| 3 | To Retrieve data from one or more tables using DATA RETRIEVAL LANGUAGE (DRL) commands<br>• SELECT FROM<br>• SELECT - FROM –WHERE<br>• SELECT - FROM -GROUP BY<br>• SELECT - FROM -ORDER BY<br>• JOIN using SELECT - FROM - ORDER BY<br>• JOIN using SELECT - FROM - GROUP BY<br>• UNION<br>• INTERSET<br>• MINUS |
| 4 | DATA CONTROL LANGUAGE (DCL) and TRANSATIONAL CONTROL LANGUAGE (TCL) commands.<br>i. Creating objects: tables, views, users, sequences, Collections etc.<br>ii. Privilege management through the Grant and Revoke commands<br>iii. Transaction processing using Commit and Rollback<br>iv. Save points. |
| 5 | Queries for following functions<br>i. Conversion functions (to_char, to_number and to_date)<br>ii. string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr),<br>iii. date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date) |
| 6 | Simple queries: selection, projection, sorting on a simple table for employee database<br>i. Small-large number of attributes<br>ii. Distinct output values<br>iii. Renaming attributes<br>iv. Computed attributes<br>v. Simple-complex conditions (AND, OR, NOT)<br>vi. Partial Matching operators (LIKE, %, _, *, ?)<br>vii. ASC-DESC ordering combinations<br>viii. Checking for Nulls |

| | |
|---|---|
| 7 | To manipulate data items and returning the results using Group functions or Aggregate functions and Single Row or scalar functions:<br>i. Group functions or Aggregate functions: Sum(), Avg(), Min(), Max() and Count()<br>ii. Single Row or scalar function:Abs(), Power(), Sqrt(), Round(), Exp(), Greastest(), Least(), Mod(), Floor(), Sign() and Log(). |
| 8 | Multi-table queries(JOIN OPERATIONS)<br>i. Simple joins (no INNER JOIN)<br>ii. Aliasing tables – Full/Partial name qualification<br>iii. Inner-joins (two and more (different) tables)<br>iv. Inner-recursive-joins (joining to itself)<br>v. Outer-joins (restrictions as part of the WHERE and ON clauses)<br>vi. Using where & having clauses |
| 9 | Write Nested queries to retrieve the name of each employee who has a dependent with the same first name and same sex as the employee using following Nested queries.<br>i. In, Not In<br>ii. Exists, Not Exists<br>iii. Dynamic relations (as part of SELECT, FROM, and WHERE clauses) |
| 10 | Write a query to make a list of all project numbers for projects that involve an employee whose last name is 'Smith', either as a worker or as a manager of the department that controls the project using the following Set Oriented Operations<br>i. Union<br>ii. Difference<br>iii. Intersection<br>iv. Division |
| 11 | PL/SQL Programming using the following<br>i. Programs using named and unnamed blocks<br>ii. Programs using Cursors, Cursor loops and records |
| 12 | PL/SQL Programming using<br>i. Creating stored procedures, functions and packages<br>ii. Error handling and Exception<br>iii. Triggers and auditing triggers |

### B. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1 | Database System Concepts | S. Sudarshan, Henry F. Korth, AviSilberschatz | 6th Edition | McGraw Hill |
| 2 | SQL, PL/SQL | Ivan Bayross | Latest | Bpb |
| 3 | Oracle Complete Reference | Kevin Loney | Latest | Bpb |

| Reference Book | |
|---|---|
| 1 | PL/SQL-Best practices,BPB Publications, Steven Feuerstein |
| 2 | The Oracle Cook Book,BPB Publications, Liebschuty |
| **Online Resources** | |
| 1 | https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm |
| 2 | https://nptel.ac.in/courses/106106093 |
| 3 | https://www.coursera.org/learn/introduction-to-relational-databases |

| Code:BCACCA3202 | Python Programming Lab | 1 Credits [LTP: 0-0-2] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Write Python code, develop medium-difficulty applications in Python
- Implement Python programs with conditionals and loops
- Apply the concept of List and Dictionary.
- Implement Read and write data from/to files in Python
- Develop Python programs step-wise by defining functions

### A. LIST OF EXPERIMENTS:

| | |
|---|---|
| **1** | Write a python program to compute the GCD and LCM of two numbers. |
| **2** | Write python program to perform following operations on Lists:<br>a) Create list<br>b) Access list<br>c) Update list (Add item, Remove item)<br>d) Delete list |
| **3** | Write a Python program to remove the "i" th occurrence of the given word in a list where words repeat |
| **4** | Write a Python program to count the frequency of words appearing in a string using a dictionary. |
| **5** | Write Python program to create a dictionary with key as first character and value as words starting With that character. |
| **6** | Write a Python program to check if a substring is present in a given string. |
| **7** | Write a Python program to find the intersection and union of two lists. |
| **8** | Write a Python program to find the length of a list using recursion. |
| **9** | Writer a Python program to read a file and capitalize the first letter of every word in the file. |
| **10** | Write a Python program to read the contents of a file in reverse order |
| **11** | Write a python program to create a package (Engg), sub -package( years),modules (sem) and create staff and student function to module |
| **12** | Write a python program to read 3 subject marks and display pass or failed using class and object |

### B. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1 | Core Python Programming | Chun, JWesley | 2007 | Pearson, |
| 2 | Head First Python | Barry,Paul | 2010 | ORielly, |

| Reference Book | |
|---|---|
| 1 | Learning Python Lutz, Mark, O Rielly, 2009 |
| **Online Resources** | |
| 1 | https://www.learnpython.org/ |
| 2 | https://realpython.com/start-here/ |

| Code:BCACCA3203 | Linux and Shell Script Lab | 1 Credits [LTP: 0-0-2] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Use shell script to create files and handle text documents
- Create child processes, background process and zombies
- Familiarize basic concepts of shell programming
- Demonstrate use of system calls
- Demonstrate Inter process communication

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| 1 | Study and Practice on various commands like man, passwd, tty, script, clear, date, cal, cp, mv,ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who, w. |
| 2 | Study and Practice on various commands like cat, tail, head , sort, nl, uniq, grep, egrep,fgrep,cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio. |
| 3 | a) Write a Shell Program to print all .txt files and .c files.<br>b) Write a Shell program to move a set of files to a specified directory. |
| 4 | c) Write a Shell program to display all the users who are currently logged in after a specified time.<br>d) Write a Shell Program to wish the user based on the login time. |
| 5 | a) Simulate cat command. b) Simulate cp command. |
| 6 | a) Simulate head command. b) Simulate tail command. |
| 7 | a) Simulate mv command. b) Simulate nl command. |
| 8 | Write a program to handle the signals like SIGINT, SIGQUIT, SIGFPE. |
| 9 | Implement the following IPC forms<br>a) FIFO b) PIPE |
| 10 | Implement message queue form of IPC. |
| 11 | Implement shared memory form of IPC. |
| 12 | Write a Socket program to print system date and time (Using TCP/IP). |

**B. RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | UNIX Shell Scripting | Randal Michael | 2003 | Wiley |
| 2. | Bash Cookbook | Carl Albing, JP Vossen | 2017 | O'Reilly |
| 3. | Linux Command Line and Shell Scripting Bible | Richard Blum , Christine Bresnahan | 2015 | Wiley |
| **Reference Book** | | | | |
| 1. | Linux Command Line and Shell Scripting Bible 4th Edition by Richard Blum | | | |
| **Online Resources** | | | | |
| 1. | https://www.tutorialspoint.com/unix/shell_scripting.htm | | | |
| 2. | https://www.javatpoint.com/shell-scripting-tutorial | | | |

| Code:BCYCCA3204 | Ethical Hacking Lab | 1 Credits [LTP: 0-0-2] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Translate end-user requirements into system and software requirements
- Generate a high-level design of the system from the software requirements
- Get experience and/or awareness of testing problems and will be able to develop a simple testing report
- Know about Trojans Creating and Analyzing
- Use different Data recovery and password protecting tool's for network security and analysis .

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Passive Reconnaissance using "Who is" and Online tools |
| **2** | Active Reconnaissance using "Sampad" and web site details |
| **3** | Full Scan, Half Open Scan and Stealth scan using "nmap" |
| **4** | UDP and Ping Scanning using "Advance Lan Scanner" and "Superscan" |
| **5** | Packet crafting using "Packet creator" tools |
| **6** | Exploiting NetBIOS vulnerability |
| **7** | Password Revelation from browsers and social networking application |
| **8** | Creating and Analyzing spoofed emails |
| **9** | Creating and Analyzing Trojans I |
| **10** | Creating and Analyzing Trojans II |
| **11** | OS password cracking |
| **12** | Data recovery and password protecting techniques for Pen drive and CD |

B. **RECOMMENDED STUDY MATERIAL:**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Hacking: The Art of Exploitation | Jon Erickson | 1st | Cengage, 2010 BBS |
| 2. | Basics of Hacking and Penetration | Patrick Engebretson | 1st | Testing McGraw Hill-2011 |
| **Reference Book** | | | | |
| 1. | Introduction to Computer Forensics and Digital Investigation, Rauf gauney | | | |

| | |
|---|---|
| 2. | MariE-Helen Maras, “Computer Forensics: Cybercriminals, Laws, and Evidence”, Jones & Bartlett Learning; 2nd Edition, 2014 |
| **Online Resources** | |
| 1. | https://www.javatpoint.com/ethical-hacking-tutorial |
| 2. | https://www.guru99.com/ethical-hacking-tutorials.html |
| 3. | https://www.youtube.com/watch?v=dz7Ntp7KQGA |

# DEPARTMENTAL ELECTIVE

| Code:BCAECA3111 | Digital Marketing | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Analyze Digital Marketing, its scope, objectives, opportunities and it challenges To help students develop create toward the commands of file system.
- Develop and create toward Digital Strategy building & its effectiveness.
- Know alternatives for Dynamic organization to ensure their success in highly competitive sale environment and to analyze the concept of Internet marketing and its application.
- Analyze the digital tools effectively for Social Media Marketing
- Develop an understanding toward E-mail marketing and its various application

### A. OUTLINE OF THE COURSE

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1 | **An overview of Digital Marketing** | 08 |
| 2 | **Digital Marketing Planning and Structure** | 07 |
| 3 | **Internet Marketing** | 08 |
| 4 | **Social Media Marketing** | 07 |
| 5 | **E-mail marketing and Applications** | 07 |

### B. DETAILED SYLLABUS

| Unit | Unit Details |
|---|---|
| 1. | **An overview of Digital Marketing** |
| | • Introduction to Digital Marketing<br>• Different Ways to Market Your Business Online<br>• Evaluation of Digital Marketing<br>• Status of Digital Marketing in India<br>• How Digital Marketing Works<br>• Traditional vs. Digital Marketing<br>• New Trends for Online Marketers<br>• Digital Marketing Strategies<br>• Impact of Digital Marketing on Business<br>• Benefits of Digital Marketing<br>• Drawbacks of Digital Marketing<br>• Internet Marketing in India – Challenges<br>• Conclusion of Unit |
| 2. | **Digital Marketing Planning and Structure** |
| | • Creating initial digital marketing plan<br>• Target group analysis, In bound vs Outbound Marketing,<br>• Content Marketing, Understanding Traffic, Understanding Leads<br>• Strategic Flow for Marketing Activities.<br>• WWW, Domains, Buying a Domain, Website Language & Technology, Core Objective of Website and Flow<br>• One Page Website, Strategic Design of Home Page, Optimization of Web sites, |

| | |
|---|---|
| | • Application of Word Press in Digital Marketing, Application of CSS, HTML & Java Script for web page design<br>• Conclusion of Unit |
| **3.** | **Internet Marketing** |
| | • Introduction of Unit<br>• Marketing and Internet<br>• Market place to Marketspace<br>• Online buyer behavior, suppliers, Intermediaries Websites<br>• Types of Websites, Web portals like: B2B, B2C,C2B,C2C, B2E(Business to Employee)<br>• Social Networking<br>• The promise and challenges of online marketing<br>• The Indian Internet Marketing Mix.<br>• Significance of Internet marketing.<br>• Traditional vs. Online Marketing<br>• Conclusion of Unit |
| **4.** | **Social media Marketing** |
| | • Introduction of Social Media Marketing<br>• How Social media marketing works<br>• Different components or Tools for Social Media Marketing<br>• Facebook Marketing, Google Ad Words<br>• YouTube Marketing, Content Marketing<br>• Meme marketing, Affiliate Marketing<br>• LinkedIn, Twitter, Instagram<br>• Keywords with SEO marketing- On page Search Engine Optimisation, Off page SEO, why search<br>• Engine marketing.<br>• SEM and its application, Benefits of SEM<br>• Blogging as a marketing strategy, Types of Blogs, What is Blogging? Benefits of Blogging. Pitfalls of Blogging.<br>• Conclusion of Unit |
| **5.** | **E-mail Marketing and Applications** |
| | • Introduction of E-mail marketing<br>• E-mail Marketing - What is it? Why do it and How?<br>• Types of E-mail Marketing<br>• Comparison to Traditional Mail<br>• Opt-in E-mail Advertising<br>• How to deal with Spam Filter<br>• Choosing your metrics<br>• Tracking Landing Pages<br>• Topl0 Benefits of E-mail Marketing<br>• E-mail-Marketing Strategy Checklist<br>• Effective E-mail Marketing Techniques<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Digital Marketing | Dave Chaffey | 7th | Pearson |
| 2. | Marketing 4.0: Moving from Traditional to Digital Hardcover | Philip Kotler | Latest | Pearson |

| Reference Book | |
|---|---|
| 1 | Digital Marketing, Dave Chaffey/Fiona Ellis, Pearson |
| 2 | Social Media Marketing All-In-One For Dummies, JanZimmerman and Deborah |
| 3 | Digital Marketing Strategy, Simon Kingsnorth, KoganPage |
| **Online Resources** | |
| 1 | https://ejournal.lucp.net/index.php/ijrtbt/article/view/191 |
| 2 | https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3638929 |
| 3 | https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3308684 |

| Code: BCAECA3112 | Software Engineering | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Gather and specify requirements of the software projects.
- Analyze software requirements with existing tools.
- Differentiate different testing methodologies.
- Apply the basic project management practices in real life projects.
- Work in a team as well as independently on software projects

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1 | **Software Process Models** | 8 |
| 2 | **Software Design** | 8 |
| 3 | **Introduction to Software Testing** | 10 |
| 4 | **Software Quality Management** | 8 |
| 5 | **Software Project Management** | 8 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Software Process Models** |
| | • Introduction to Unit<br>• How to develop software?<br>• Different models - Water fall model – Prototyping – evolutionary model- Spiral model– RAD model - Agile models: Extreme Programming, and Scrum-pros and cons of each model<br>• Requirements Analysis-Functional and Non-functional requirements,<br>• Software Requirement Specification(SRS)–Decision tables–DecisionTrees<br>• Conclusion of the Unit |
| 2. | **Software Design** |
| | • Introduction to Unit<br>• Overview of design process: High-level and detailed design<br>• Cohesion and Coupling Design Methodologies<br>• Function–Oriented software design: Structured Analysis using DFD Structured Design using Structure<br>• Architectural Design, Interface design, Component Leve ldesign<br>• Software Reuse and Software Maintenance issues<br>• Conclusion of the Unit |
| 3. | **Introduction to Software Testing** |
| | • Coding, Code Review, documentation.<br>• Testing: - Unit testing, Black-box Testing, White-box testing,<br>• Cyclomatic complexity measure, coverage analysis, mutation testing,<br>• Debugging techniques, Integration testing, System testing,<br>• Regression testing.<br>• Conclusion of theUnit |
| 4. | **Software Quality Management** |
| | • Introduction to Unit<br>• Overview of SQA Planning<br>• Software configuration management |

| | |
|---|---|
| | • Study of ISO9000 &CMM<br>• Software reverse engineering<br>• Software reengineering<br>• Conclusion of the Unit |
| **5.** | **Software Project Management** |
| | • Introduction toUnit<br>• Various phases of Project Management –Planning– Organizing– Staffing– Directing and Controlling, Metrics for project size estimation<br>• Software Project Cost Estimation–COCOMO models<br>• Software Project Scheduling<br>• CASEtools:CASEdefinitions–CASEClassifications–AnalysisandDesignWorkbenches,Testing Workbenches<br>• Conclusion of the Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Fundamentals of Software Engineering, | RajibMall | PHI | 2018 |
| 2. | Software Engineering | I.Sommerville | Pearson Education | Asia |

| Reference Book | |
|---|---|
| 1 | Software engineering, Roger SPressman |
| 2 | An Integrated Approach to Software Engineering, Pankaj Jalote |
| **Online Resources** | |
| 1 | https://www.javatpoint.com/software-engineering-tutorial |
| 2 | https://www.geeksforgeeks.org/software-engineering/ |
| 3 | https://www.tutorialandexample.com/software-engineering-tutorial |

| Code:BCAECA3113 | Management Information System | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Describe the major technological, organizational, behavioral, and ethical issues facing today's information systems professional.
- Describe IT strategy formulation and explain its alignment with organizational strategy.
- Conduct research on and describe, several current and emerging technologies and explain their impact on corporate performance.
- Explain the difference between supporting a business with technology and driving a business with technology.
- Describe ways in which technology can provide an organization with competitive advantages

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1 | **Introduction to MIS** | 07 |
| 2 | **Information and Managerial Effectiveness** | 08 |
| 3 | **Information Systems** | 08 |
| 4 | **Information System for Functional Areas and Issues** | 07 |
| 5 | **New Trends in MIS** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to MIS** |
| | • Introduction to unit<br>• Concept, evolution and meaning of MIS;<br>• Information system for competitive advantage;<br>• Systems approach to problem solving;<br>• Challenges in the development of MIS<br>• MIS function in an organization.<br>• Conclusion of Unit |
| 2. | **Information and Managerial Effectiveness** |
| | • Introduction of Unit<br>• Information and Managerial Effectiveness, Information as a corporate resource,<br>• pervasiveness of information, types of information – operational, tactical and strategic;<br>• Levels of management and information needs of management; Process of generation of information;<br>• Quality of information; information systems for finance, marketing, manufacturing,<br>• research and development and human resource areas.<br>• Conclusion of Unit |
| 3. | **Information Systems** |
| | • Introduction of Unit<br>• Information Systems – Information systems and their role in Business systems,<br>• changing role of information systems, users of information systems;<br>• Types of information systems – transaction processing systems,<br>• MIS decision support systems, executive support system;<br>• Enterprise Resource Planning (ERP) system,<br>• Business expert system.<br>• Conclusion of Unit |
| 4. | **Information System for Functional Areas and Issues** |
| | • Introduction of Unit |

| | |
|---|---|
| | • Information System for Functional Areas – Information for Financial – Marketing Inventory Control – Production and HR Functions,<br>• Security Issues Relating to Information Systems,<br>• threats to information systems, Vulnerability, risk and control measures.<br>• Conclusion of Unit |
| **5.** | **New Trends in MIS** |
| | • Introduction of Unit<br>• Cloud computing, Big data, CRM technology for Business,<br>• Data ware housing and artificial intelligence,<br>• Near field Communication, Super Beam (Only concepts)<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | "Management Information Systems: Managerial Perspectives" | D P Goyal | Second Edition | Macmillan |
| 2. | "Management Information System: Conceptual Foundations – Structure and Development" | Gordon Davis and Margrethe Olson | Fourth Edition | Pearson |
| 3. | "Management Information Systems: Managerial Perspectives" | D P Goyal | Second Edition | Macmillan |

| **Reference Book** | |
|---|---|
| 1 | Management Information Systems DANTES/DSST Test Study Guide, Breely Crush Publishing, kindle edition. |
| 2 | Management Information Systems<br>Author(s):Jawadekar, W. S. Edition: 2nd edition Publisher: Tata McGraw Hill (TMH) |
| **Online Resources** | |
| 1 | https://www.coursera.org› courses |
| 2 | https://www.tutorialspoint.com› mis_tutorial |
| 3 | https://www.javatpoint.com/mis |

| Code:BULCHU3201 | Communication Skill-1 | 1 Credits [LTP: 2-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Demonstrate depth of understanding, observing complexity, improve insight and develop independent thought and persuasiveness
- Determine the main ideas of the text by using key details and compare & contrast the most important points with the help of their perspective
- Practice the qualities of writing style by applying the concepts of sentence conciseness, accuracy, readability, coherence and by avoiding wordiness or ambiguity.
- Distinguish words and phrases as per their intonation patterns and interpret the audios based on different situations
- Demonstrate the understanding of impactful conversational skills, presentation skills & telephonic conversation by considering the need of the audience

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| **1** | Intrapersonal/Interpersonal Skills | 6 |
| **2** | Reading Skills | 4 |
| **3** | Writing Skills | 6 |
| **4** | Listening Skills | 4 |
| **5** | Speaking Skills | 5 |

| LIST OF ACTIVITIES | |
|---|---|
| 1. | Self – Awareness & Self-Introduction |
| 2. | Goal Setting: Ambition induced, interest induced or environment conditioned |
| 3. | Cultivating Conversational Skills |
| 4. | Role Plays : Selection of varied plots, characters & settings |
| 5. | Reading skills I: Newspaper Reading & General Article Reading |
| 6. | Writing Skills I: Story Making by jumbled words |
| 7. | Understanding and Applying Vocabulary |
| 8. | Listening Skills I: Types and practice by analyzing situational listening |
| 9. | Speaking Skills I: JAM |
| 10. | PowerPoint Presentation Skills-I |
| 11. | Telephonic Etiquettes and Communication |
| 12. | Recognizing, understanding and applying communication style (Verbal/Non-Verbal) |

| Code: BCACCA3601 | Discipline, VAC, Social Oureach | 1 Credit [LTP: 0-0-6] |
|---|---|---|

**COURSE OUTCOME**:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students throughactiveparticipationinvariousactivitiesfallinginTechnicalandnon-technicalcategories.

Social outreach, Discipline, TEP -III, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programmes, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Third Semester are as follows:

:

| Code | Activity | Hours | Credits |
|---|---|---|---|
| BCACCA3601 | Talent Enrichment Programme(TEP)-III | 2 | 1 |
| | Library / MOOC / Online Certificate Courses | 2 | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | 2 | |

# Semester-IV

# SEMESTER IV

## DEPARTMENT CORE COURSES

| Code: BCACCA4101 | Big Data Analysis | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Provide HDFS Concepts and Interfacing with HDFS
- Access and Process Data on Distributed File System
- Manage Job Execution in Hadoop Environment
- Recognize the components of Hadoop and Hadoop Eco-System
- Apply Machine Learning Techniques using R

.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Big Data And Hadoop** | 07 |
| 2. | **HDFS(Hadoop Distributed File System)** | 08 |
| 3. | **Map Reduce** | 08 |
| 4. | **Hadoop Eco System** | 07 |
| 5. | **Introduction to Big Data and Hadoop** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Big Data** |
| | • Introduction of Unit<br>• Introduction to Big Data ,Big Data Characteristics<br>• Types of Digital Data, Introduction to Big Data, Big Data Analytics,<br>• Relationships and Representations, Graph Databases.<br>• History of Hadoop, Apache Hadoop, Analysing Data with Unix tools,<br>• Analysing Data with Hadoop, Hadoop Streaming,<br>• Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.<br>• Conclusion of Unit |
| 2. | **HDFS(Hadoop Distributed File System)** |
| | • Introduction of Unit<br>• The Design of HDFS, HDFS Concepts, Command Line Interface,<br>• Hadoop file system interfaces, Data flow,<br>• Data Ingest with Flume and Scoop and Hadoop archives,<br>• Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures<br>• Conclusion of Unit |
| 3. | **Map Reduce** |
| | • Introduction of Unit<br>• Anatomy of a Map Reduce Job Run, Failures,<br>• Job Scheduling, Shuffle and Sort,<br>• Task Execution, Map Reduce Types and Formats, Map Reduce Features.<br>• Conclusion of Unit |
| 4. | **Hadoop Eco System** |

| | |
|---|---|
| | • Introduction of Unit<br>• Pig : Introduction to PIG, Execution Modes of Pig,<br>• Comparison of Pig with Databases, Grunt, Pig Latin,<br>• User Defined Functions, Data Processing operators. Hive : Hive Shell,<br>• Hive Services, Hive Metastore, Comparison with Traditional Databases,<br>• HiveQL, Tables, Querying Data and User Defined Functions. Hbase:HBasics, Concepts, Clients, Example, Hbase V/S RDBMS.<br>• Big SQL : Introduction<br>• Conclusion of Unit |
| **5.** | **Data Analytics with R** |
| | • Introduction of Unit<br>• Machine Learning : Introduction, Supervised Learning,<br>• Unsupervised Learning, Collaborative Filtering.<br>• Big Data Analytics with BigR.<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Hadoop: The Definitive Guide | Tom White | Third Editon | O'reily |
| 2. | Big Data Analytics | Seema Acharya, Subhasini Chellappan | 2015 | Wiley |
| **Reference Book** | | | | |
| 1. | Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. | | | |
| 2. | Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013) | | | |
| 3. | Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R | | | |
| **Online Resources** | | | | |
| 1. | http://www.bdbanalytics.ir/media/1121/big-data-analytics_turning-big-data-into-big-money.pdf | | | |
| 2. | https://www.techtarget.com/searchbusinessanalytics/definition/big-data-analytics | | | |
| 3. | https://www.tutorialspoint.com/hadoop/hadoop_big_data_overview.htm | | | |

| Code: BCACCA4102 | Design and Analysis of Algorithm | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Apply Divide and conquer. Greedy algorithm design techniques.
- Know the dynamic programming concept with solving real word problem
- Work on Pattern matching algorithms.
- Apply randomize algorithms
- Wok for different class of algorithms and difference between them.

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**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction** | 06 |
| 2. | **Dynamic Programming, Branch and Bound** | 06 |
| 3. | **Pattern Matching and Assignment Problem** | 08 |
| 4. | **Randomized Algorithm** | 08 |
| 5. | **NP-Hard and NP-Complete Problem** | 08 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction** |
| | • Introduction to Unit<br>• Algorithm Specification, Algorithm Complexity and Order Notations.<br>• Divide and Conquer Method: General Method , Binary Search, Merge Sort, Quick sort and stresses' matrix multiplication algorithm.<br>• Greedy Method: General method, Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spaning Tree, Krushkal Algorithm, Prims Algorithm<br>• Conclusion of Unit |
| 2. | **Dynamic Programming, Branch and Bound** |
| | • Introduction to Unit<br>• Dynamic Programming: Matrix Chain Multiplication,Longest Common subsequence<br>• Subseuenceand0/1KnapsackProblem,Allpairs shortest path, Flow shop scheduling<br>• Branch And Bound: Traveling Salesman Problem, Bounding, FIFO Branch and Bound,<br>• Backtracking:The8-queensproblem,Hamiltonian cycles Comparison between Dynamic, Backtracking and Branch Bound<br>• Conclusion of Unit |
| 3. | **Pattern Matching and Assignment Problem** |
| | • Introduction toUnit<br>• Pattern Matching Algorithms: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms.<br>• Assignment Problems: Formulation of Assignment and Quadratic assignment Problem.<br>• Conclusion of Unit. |
| 4. | **Randomized Algorithm** |
| | • Introduction of Unit.<br>• ProbabilisticAnalysis&RandomizedAlgorithms:LasVegas algorithm,MonteCarlo algorithms for Min-Cut, randomized algorithm for 2- SAT.<br>• Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity |

| | |
|---|---|
| | • Assignment problems.<br>• Conclusion of Unit |
| **5.** | **NP-Hard and NP-Complete Problem** |
| | • Introduction of Unit.<br>• Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Proving NP- Complete Problems - Satisfiability problem and Vertex Cover Problem.<br>• Approximation Algorithms for Vertex Cover and Set Cover Problem<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Fundamentals of Computer Algorithms | E.Horowitz & S.Sahani | Latest | Galgotia Publications |
| 2. | Introduction to Algorithms | Corman, Leiserson & Rivest | Latest | MIT Press |
| 3 | Algorithm Analysis & Design | Goodrich, Tamassia | Latest | Wiley |
| 4. | Introduction To The Design & Analysis of Algorithm | Anany Levitin | Latest | Pearson Education |
| **Reference Book** | | | | |
| 1. | The Algorithm Design Manual by Steve S. Skiena | | | |
| 2. | Algorithms by Robert Sedgewick & Kevin Wayne | | | |
| **Online Resources** | | | | |
| 1. | http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms | | | |
| 2. | http://courses.csail.mit.edu/6.006/spring11/notes.shtml | | | |

| Code: BCYCCA4103 | Cyber Forensics | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Apply various aspects of securing network infrastructure and importance of classifying information
- Evaluate threats to information security, analyze their impact and propose suitable countermeasures
- Create asset management along with the objective to create awareness in Digital Rights Management.
- Comprehend basic concepts and importance of information security
- Synthesize student to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures.

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**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Cyber Forensics** | **07** |
| 2. | **Storage Devices & Data Recover Methods** | **08** |
| 3. | **Forensics Techniques I** | **08** |
| 4. | **Forensics Techniques II** | **07** |
| 5. | **Cyber Law** | **07** |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Cyber Forensics** |
| | • Introduction of Unit Introduction to Computer Forensics<br>• Forms of Cyber Crime<br>• First Responder Procedure- Non-technical staff, Technical Staff,<br>• Forensics Expert and Computer Investigation procedure<br>• Conclusion of Unit |
| 2. | **Storage Devices & Data Recovery Methods** |
| | • Introduction of Unit<br>• Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium.<br>• Working of Storage devices-Platter, Head assembly, spindle motor.<br>• Data Acquisition<br>• Data deletion and data recovery method and techniques<br>• Conclusion of Unit |
| 3. | **Forensics Techniques I** |
| | • Introduction of Unit<br>• Windows forensic<br>• Linux Forensics<br>• Mobile Forensics<br>• Steganography, Application<br>• Password cracking-Brute force<br>• Conclusion of Unit |
| 4. | **Forensics Techniques II** |
| | • Introduction of Unit<br>• Dictionary attack |

| | |
|---|---|
| | • Rainbow attack<br>• Email Tacking – Header option of SMTP, POP3, IMAP<br>• Arsenal – Surveillance Tools<br>• Conclusion of Unit |
| **5.** | **Cyber Law** |
| | • Introduction of UnitCorporate espionage<br>• Evidence handling procedure<br>• Chain of custody<br>• Main features of Indian IT Act 2008 (Amendment)<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Guide to Computer Forensics and Investigations | B. Nelson | First Edition | Cengage, 2010 BBS |
| 2. | Hacking Exposed Computer Forensics | Aaron Philipp, David Cowen, Chris Davis | First Edition | McGraw Hill-2011 |
| **Reference Book** | | | | |
| 1. | Introduction to Computer Forensics and Digital Investigation, Rauf gauney | | | |
| 2. | MariE-Helen Maras, "Computer Forensics: Cybercriminals, Laws, andEvidence", Jones & Bartlett Learning; 2nd Edition, 2014 | | | |
| **Online Resources** | | | | |
| 1. | https://www.techtarget.com/searchsecurity/definition/computer-forensics | | | |
| 2. | https://intellipaat.com/blog/what-is-cyber-forensics/ | | | |
| 3. | https://www.educba.com/cyber-forensics/ | | | |

| Code: BCYCCA4104 | Application Security | 3Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Know security of Development life cycle model
- Describe how security is integrated into software development.
- Articulate the importance of security principles in protecting web applications from vulnerabilities, exploits and attacks.
- Comprehend and handle Web Security
- Recognize Current trends in Application Security

A. **OUTLINE OF THE COURS**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| **1.** | **Secure SDLC** | **07** |
| **2.** | **Overview of Java Security** | **08** |
| **3.** | **Introduction to Web Security** | **08** |
| **4.** | **Web application vulnerabilities, attacks and mitigation** | **08** |
| **5.** | **Current Trends in Application Security** | **08** |

B. **DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| **1.** | **Secure SDLC** |
| | • Introduction of Unit<br>• SDLC models, integrating Security into SDLC, SSDLC, security requirements, design and architecture,<br>• Applying 3 important security principles in software development, threat modeling, application security risk matrix,<br>• Secure coding, security testing, tools and techniques, Overview of OWASP Software Security Assurance Process and Microsoft Security Development Lifecycle<br>• Conclusion of the Unit |
| **2.** | **Overview of Java Security** |
| | • Introduction of Unit<br>• Java Security, platform security, cryptography, authentication and access control, secure communications,<br>• PKI, secure coding<br>• guidelines in Java SE,<br>• Active X and Component Object Model (COM), Security issues resulting from Logic Bombs,<br>• Malware & Trojan Horses and their impact on Applications<br>• Conclusion of Unit |
| **3.** | **Introduction to Web Security** |
| | • Introduction of Unit<br>• Different environments demand different security, Environment versus Application controls,Complexity of Functionality,<br>• Data Types, formats and Length, Implementation and Default Issues, Failure states, commonweb security vulnerabilities,<br>• OWASP top 10 threats and counter measures, differences between manual and automatedsecurity testing<br>• Conclusion of Unit |
| **4.** | **Web application vulnerabilities, attacks and mitigation** |
| | • Introduction of Unit |

| | |
|---|---|
| | • Introduction to Web application vulnerabilities and attacks, URL Interpretation attacks, Authentication vulnerabilities, Authorization vulnerabilities, Application Coding vulnerabilities, Input Validation attacks,<br>• SQL Injection attacks, Impersonation attacks & Buffer Overflow attacks, their effects and thet echnical & managerial mitigation controls;<br>• Overview of automated tools for web vulnerability scanning, DNS rebinding; Flash security; Java applet security; Single-sign-on solution and security;<br>• Conclusion of Unit |
| **5.** | **Current Trends in Application Security** |
| | • Introduction of Unit<br>• Overview of Agile Security and DevSec Ops, trends in static and dynamic application security testing (SAST and DAST)<br>• Understanding how application security is approached in Open Source, Cloud SaaS, mobile app development, Container Security,<br>• Conclusion of Unit |

C. **RECOMMENDED STUDY MATERIAL**

| **S. No** | **Text Books:** | **Author** | **Edition** | **Publication** |
|---|---|---|---|---|
| 1. | NIST SP 800-64 rev2 SecurityConsiderations inSystem DevelopmentLifecycle , | Richard Kissel, Kevin Stine, andMatthew Scholl | | National Institute of Standards and Technology |
| 2. | Information Systems Security:Security Management, Metrics,Frameworks and Best Practices | Nina Godbole | 1st Edition | Wiley, 2008 |
| **Reference Book** | | | | |
| 1. | Web ApplicationSecurity, A Beginner'sGuide Bryan Sullivan and Vincent Liu,McGraw Hill; 2012 | | | |
| **Online Resources** | | | | |
| 1. | https://www.edx.org/learn/computer_Security | | | |

# PRACTICAL

| Code: BCACCA4201 | Big Data Lab | 1Credit | [LTP: 0-0-2] |
|---|---|---|---|

**Course Outcome:-**

Students will be able:

- Identify the key issues in big data management and experiment with Hadoop framework.
- Develop problem solving and critical thinking skills in fundamental enabletechniques like Hadoop&MapReduce.
- Construct and Explain with structure and unstructured data by using NoSQLcommands.
- Implement fundamental enabling techniques and scalable algorithms for data streaming.

## A. LIST OF EXPERIMENTS:

| | |
|---|---|
| **1** | **Hadoop Installation: Ubuntu & THEL 9 Operating System in stand-alone mode** |
| **2** | **File Management tasks in Hadoop** |
| **3** | **Implement the following Data structures in Java:**<br>• Linked Lists<br>• Stacks<br>• Queues<br>• Set<br>• Map |
| **4** | **Word Count Map Reduce program to understand Map Reduce** |
| **5** | **Implement the following file management tasks in Hadoop:**<br>• Adding files and directories<br>• Retrieving files<br>• Deleting files |
| **6** | **Implement Matrix Multiplication with Hadoop Map Reduce** |
| **7** | **Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.** |
| **8** | **Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes** |
| **9** | **Weather Report POC-Map Reduce Program to analyses time-temperature statistics and generate report with max/min temperature.** |
| **10** | **Implementing Matrix Multiplication with Hadoop Map Reduce** |
| **11** | **Pig Latin scripts to sort,group,join,project, and filter your data.** |
| **12** | **Hive Databases: Tables,Views,Functions and Indexes** |

## B. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Hadoop in Practice | Alex Holmes | 2014 | Wiley India |
| 2. | Big Data | Black Book | 2016 | DT Editorial Services |
| 3. | Big Data and Hadoop | V.K. Jain | 2017 | Khanna Publishers |
| **Reference Book** | | | | |
| 1. | Hadoop Practice Guide,"Jisha Mariam Jose**"** | | | |
| 2. | Hadoop: The Definitive Guide ,"Tom White",O'Relly | | | |
| **Online Resources** | | | | |
| 1. | https://ia600201.us.archive.org/7/items/HadoopInPractice/Hadoop%20in%20Practice.pdf | | | |

| Code:BCACCA4202 | Design and Analysis of Algorithm Lab | 1Credit | [LTP: 0-0-2] |
|---|---|---|---|

**Course Outcome: -**

Students will be able to:

- Applydivide and conquer method to implement quick sort, merge sort, linear search,and Binary search in C.
- Implement job sequencing using greedy method.
- Find the minimum cost of spanning tree.
- Implement the dynamic programming using branch and bound method.
- Implement the NP-Hard, NP-.Complete problem.

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Write a C program to implement the Stack using arrays. WritePush(),Pop(),and Display() methods to demonstrate its working. |
| **2** | Write a C program to sort a list of elements using the quick sort algorithm. The elements can be read from a file. |
| **3** | Write a C program to implement a Merge sort algorithm to a list of elements for different values of n and determine the time required to sort the elements. |
| **4** | Find the minimum cost of spanning tree in C using Prim's algorithms. |
| **5** | Find the minimum cost of spanning tree in C using Kruskal's algorithm. |
| **6** | Implement 0/1 Knapsack problem using Dynamic Programming in C. |
| **7** | Write a C program to find the shortest paths between nodes in a graph using Dijkstra's algorithm. |
| **8** | Write a C program to Print all the nodes reachable from a starting node in a digraph using BFS method. Check whether a graph is connected or not using DFS method. |
| **9** | Write a C program to implement all pairs shortest paths problem using Floyd's algorithm. |
| **10** | Write a C program to implement N Queen's problem using Back Tracking. |

**B. RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Mastering Algorithms with C | Kyle Loudon | Latest | O'Reilly |
| 2. | Algorithms Illuminated (Part 3): Greedy Algorithms and Dynamic Programming | Tim Roughgarden | 2014 | Kindle |
| **Reference Book** | | | | |
| 1. | Data Structures and Algorithms, Made Easy by NarasimhaKarumanchi, Kindle Edition | | | |
| **Online Resources** | | | | |
| 1. | https://www.sanfoundry.com/c-program | | | |
| 2. | https://www.thecrazyprogrammer.com/2015/03/c-program-for-n-queens-problem-using-backtracking.html | | | |

| Code:BCYCCA4203 | Cyber Forensics Lab | 1 Credits [LTP: 0-0-2] |
|---|---|---|

**Course Outcome: -**

Students will be able to:

- Describe various algorithms and processes used in cryptography for authenticating users, securing information and communication
- Analyze and design hash and MAC algorithms, and digital signatures
- Knowledge about Intruders and Intruder Detection mechanisms, Types of Malicious software
- Understand and analyze data encryption standard
- Apply various algorithms and techniques for future enhancements

### A. LIST OF EXPERIMENTS:

| | |
|---|---|
| 1 | Physical Collection of electronic evidence using forensic standards |
| 2 | Dismantling and re-building PCs in order to access the storage media safely |
| 3 | sequence and Power On Self-Test mode analysis. |
| 4 | Examination of File systems of Windows |
| 5 | Examination of File systems of Linux |
| 6 | Examination of File systems of Mac |
| 7 | Analysing Word processing and Graphic file format |
| 8 | Network data sniffing and analysing |
| 9 | word and encryption techniques |
| 10 | Internet forensic and Malware analysis |
| 11 | Recovery techniques for hard drive |
| 12 | Recovery techniques for Pen drive and CD |

### B. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Computer Forensics: Cybercriminals , Laws, and Evidence | MariE-Helen Maras, | 2nd | Jones & Bartlett Learning |
| 2. | Cybercrime and Society | Majid Yar | 2nd | Majid Yar |
| **Reference Book** | | | | |
| 1. | MariE-Helen Maras, “Computer Forensics: Cybercriminals, Laws, and Evidence”, Jones & Bartlett Learning; 2nd Edition, 2014. | | | |
| 2. | Majid Yar, “Cybercrime and Society”, SAGE Publications Ltd, Hardcover, 2nd Edition, 2013. | | | |
| **Online Resources** | | | | |
| 1. | https://www.infosecinstitute.com/skills/learning-paths/computer-forensics/ | | | |
| 2. | https://www.edx.org/learn/computer-forensics | | | |

| Code: BCYCCA4204 | Application Security Lab | 1 Credit | [LTP: 0-0-2] |
|---|---|---|---|

**Course Outcome:-**

Students will be able to:

- Realize security of Development life cycle model
- Describe how security is integrated into software development.
- Articulate the importance of security principles in protecting web applications from vulnerabilities, exploits and attacks.
- Apprehend and handle Web Security
- Recognize Current trends in Application Security

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**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Enumeration Responses, Intro to OWASP |
| **2** | Security Misconfiguration Responses |
| **3** | Using Components with Known Vulnerabilities Responses |
| **4** | Broken Authentication Responses |
| **5** | Broken Access Control Responses |
| **6** | Injections Responses |
| **7** | CTF Responses |
| **8** | XXE and XSS Responses |
| **9** | Insecure Deserialization Responses |
| **10** | Sensitive Data Exposure Responses |
| **11** | CTF Responses |

B. **RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | NIST SP 800-64 rev2 Security Considerations in System Development Lifecycle | Richard Kissel, Kevin Stine, and Matthew Scholl | | National Institute of Standards and Technology |
| 2. | Information Systems Security: Security Management, Metrics,Frameworks and Best Practices | Nina Godbole | 1st Edition | Wiley, 2008 |
| **Reference Book** | | | | |
| 1. | Web Application Security, A Beginner's Guide Bryan Sullivan and Vincent Liu,McGraw Hill; 2012 | | | |
| **Online Resources** | | | | |
| 1. | https://web-app.usc.edu/soc/syllabus/20203/32008.pdf | | | |

# DEPARTMENT ELECTIVE

**Code:BCAECA4111 Information Security Fundamental 3Credit[LTP:3-0-0]**

**COURSE OUTCOME**

Students will be able to:

- Identify and analyze security problems in computer systems and networks.
- Explain how standard security mechanisms work.
- Develop security mechanisms to protect computer systems and networks.
- Write programs that are more secure.
- Use cryptography algorithms and protocols to achieve computer security

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Information Security** | 07 |
| 2. | **Encryption and Authentication Techniques.** | 08 |
| 3. | **Risk Management** | 08 |
| 4. | **Internet Security.** | 07 |
| 5. | **Network Security** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Information Security** |
| | • Introduction to Information Security: Attacks, Vulnerability, Security Goals, Security Services and mechanisms, Conventional Cryptographic Techniques: Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Steganography .<br>• Conclusion of the Unit |
| 2. | **Encryption and Authentication Techniques.** |
| | • Symmetric and Asymmetric Cryptographic Techniques : DES, AES, RSA algorithms, International Data Encryption Algorithm (IDEA), Digital Certificates, Private Key Management, The PKIX Model Authentication and Digital Signatures<br>• Conclusion of the Unit |
| 3. | **Risk Management** |
| | • Key management – Kerberos, Program Security : Non-malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels<br>• Conclusion of the Unit |
| 4. | **Internet Security.** |
| | • Internet Security Protocols: Introduction, Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), SSL Versus SET, 3D Secure Protocol, Electronic Money, Email Security Wireless Application Protocol (WAP) Security<br>• Conclusion of the Unit |
| 5. | **Network Security** |
| | • Security in Networks : Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP,S/MIME |

| | |
|---|---|
| | • Conclusion of theUnit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Information Security Risk Analysis | Thomas R.Peltier | 3rd | Auerbach |
| 2. | Mark Stamp's Information Security: Principles and Practice(WIND) | DevenN.Shah, | Latest | Wiley |
| 3. | InformationSystemsSecurity:SecurityManagement,Metrics,FrameworksandBestPractices | NinaGodbole | 1st | Wiley |
| **Reference Book** | | | | |
| 1. | Security in Computing, Fourth Edition, by Charles P. P fleeger, Pearson Education | | | |
| 2. | Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson | | | |
| 3 | Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall. | | | |
| **Online Resources** | | | | |
| 1. | https://www.sans.org/cyber-security-courses/introduction-cyber-security/ | | | |
| 2. | https://nptel.ac.in/courses/106106129 | | | |

| Code: BCAECA4112 | Software Project Management | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Identify the different project contexts and suggest an appropriate management strategy.
- Practice the role of professional ethics in successful software development.
- Identify and describe the key phases of project management.
- Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Software Project Management** | 07 |
| 2. | **Project Analysis** | 08 |
| 3. | **Activity Planning and Scheduling** | 08 |
| 4. | **Risk Management, Resource allocation &Monitoring and control** | 07 |
| 5. | **Managing Contracts and people** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Software Project Management** |
| | • Introduction of Unit<br>• Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM,<br>• categorizing SPs, Project management cycle, SPM framework, types of project plan.<br>• Conclusion of Unit |
| 2. | **Project Analysis** |
| | • Introduction of Unit<br>• strategic assessment, technical assessment, economic analysis: Present worth,<br>• future worth, annual worth, internal rate of return (IRR) method,<br>• benefit-cost ratio analysis, including uniform gradient cash flow and comparison of mutually exclusive alternatives.<br>• Conclusion of Unit |
| 3. | **Activity Planning and Scheduling** |
| | • Introduction of Unit<br>• Objectives of activity planning, Work breakdown structure, Bar chart, Network planning model: Critical path method (CPM)<br>• Program evaluation and review technique (PERT)<br>• Precedence diagramming method (PDM), Shortening project duration, Identifying critical activities.<br>• Conclusion of Unit |
| 4. | **Risk Management, Resource allocation &Monitoring and control** |
| | • Introduction of Unit<br>• Nature and identification of risk, risk analysis, evaluation of risk to the schedule using Z-values<br>• Identifying resource requirements, resource allocation, resource smoothing and resource balancing<br>• Collecting data, visualizing progress, cost monitoring, earned value analysis, project control<br>• Conclusion of Unit |
| 5. | **Managing Contracts and people** |
| | • Introduction of Unit |

| | |
|---|---|
| | • Types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance<br>• Managing people and organizing terms: Introduction, understanding behavior,<br>• Organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods,<br>• Motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises,<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Software Project Management | Rajiv Mall | 5th | SE |
| 2. | Software Project Management | Barry Boehm | 3rd | Pearson |
| **Reference Book** | | | | |
| 1. | Software Project Management, Bob Hughes and mike cotterel, 5thedition | | | |
| **Online Resources** | | | | |
| 1. | https://mrcet.com | | | |
| 2. | https://www.edutechlearners.com | | | |
| 3. | https://www.e-booksdirectory.com | | | |

| Code: BCAECA4113 | E-Commerce | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Describe the impact of E-commerce on business models and strategy.
- Describe the major types of E-commerce.
- Explain the process that should be followed in building an E-commerce presence.
- Identify the key security threats in the E-commerce environment.
- Describe how procurement and supply chains relate to B2B E-commerce.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to E-Commerce** | 07 |
| 2. | **The Network Infrastructure for E-Commerce** | 08 |
| 3. | **E-Commerce Security and Fraud Issues and Protection** | 08 |
| 4. | **E-payment systems** | 07 |
| 5. | **Introduction to Management Information System** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to E-Commerce** |
| | • Introduction of Unit<br>• Definitions and Concepts; Defining E-Business; Pure Versus Partial EC;EC Framework<br>• Classification of EC; Benefits of E-Commerce; Electronic Markets<br>• Role of Internet and Web in E-Commerce;<br>• The Limitations and Barriers of EC; Social Networks and Social Network Services;<br>• Conclusion of Unit |
| 2. | **The Network Infrastructure for E-Commerce** |
| | • Introduction of Unit<br>• The Network Infrastructure for E-Commerce: Introduction to Information Superhighway (I-Way)<br>• Components of the I-Way, Internet as a network infrastructure. Wireless Application Protocol: Wireless Application Protocol (WAP);<br>• Architecture of WAP; Working of WAP; Wireless Technologies: ADSL,<br>• WiMAX, WLAN, WMAN Wi-Fi, UMTS (3G), LTE (4G), (5G NR)<br>• Security Issues related to Wireless Communications.<br>• Conclusion of Unit |
| 3. | **E-Commerce Security and Fraud Issues and Protection** |
| | • Introduction of Unit<br>• Basic Ec Security Terminology, The Threats, Attacks, and Attackers, EC Security Requirements: Confidentiality, Integrity and Availability, Authentication, Authorization and Nonrepudiation;<br>• Technical Malware attack: Viruses, Worms, and Trojan Horses, Heartbleed, Distributed Denial of Service, Cryptblocker, Page hijacking, Botnets, Malvertising, ransom ware, sniffing, Non-Technical malware attack: Social Phishing, Pharming, Identity Theft and Identify Fraud, Spam attacks;<br>• EC defense Strategy: access control(Authorization and Authentication, Biometric Systems), encryption and PKI (Symmetric Key Encryption, Asymmetric Key Encryption, Certificate Authority(CA), Secure Socket Layer(SSL)<br>• Securing e-commerce networks: Firewalls, Virtual Private Networks, Intrusion Detection Systems(IDS), intrusion prevention System(IPS).<br>• Conclusion of Unit |

| 4. | **E-payment systems** |
|---|---|
| | • Introduction of Unit<br>• Online payment cards (credit cards, charge cards, debit cards, smart cards), processing cards in online, credit card payment procedure<br>• e-micro payments, e-checking and its processing in online. Automated clearing house (ACH) network, mobile payments (Digital wallet)<br>• mobile payment participants and issues, international payments,<br>• Emerging EC payment systems and issues: crypto currency, virtual currency. A case study of emerging trends in online payment system in Nepal.<br>• Conclusion of Unit |
| **5.** | **Introduction to Management Information System** |
| | • Introduction of Unit<br>• Data, information, computer based information system (CBIS), Information System Resources, Management information system, Transaction processing (TPS) system,<br>• decision support system (DSS), and executive information system (EIS), SCM, CRMS and International Systems: Introduction,<br>• Supply Chain Management Systems, Customer Relationships Management Systems,<br>• Enterprise systems and Challenges of Enterprise Systems Implementations- Managing the implementation, International Information Systems-Outsourcing and off-shoring.<br>• Conclusion of Unit |

### C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | E-Commerce-Strategy, Technologies &Applications | by David Whitley, | | TMH |
| 2. | E-Commerce- The cutting edge of business | by Kamlesh K. Bajaj, | | TMH |
| **Reference Book** | | | | |
| 1. | E-Commerce through ASP by W Clarke- BPB | | | |
| **Online Resources** | | | | |
| 1. | https://ecommerceguide.com | | | |
| 2. | https://ecommerce-platforms.com | | | |

| **Code:** BULCHU4201 | **COMMUNICATION SKILLS-II** | **1 Credit [LTP: 0-0-2]** |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Develop the ability to identify difficult sounds, words and phrases to strengthen listening and applying these improved skills in spoken communication.
- Cultivating knack for reading and writing by understanding the nuances of sentence structure and presentation style.
- Comprehend negotiation and Identify steps for proper negotiation preparation & learn bargaining techniques and strategies of inventing options for mutual gain.
- Develop a heightened awareness of the potential of digital communication and apply their knowledge in creating documents considering the needs of the netizens.
- Propose their outlook through exposure to new and different experiences and ideas and enrich their understanding of the issues under discussion.

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| **1.** | **Introduction to E-Commerce** | **07** |
| **2.** | **The Network Infrastructure for E-Commerce** | **08** |
| **3.** | **E-Commerce Security and Fraud Issues and Protection** | **08** |
| **4.** | **E-payment systems** | **07** |
| **5.** | **Introduction to Management Information System** | **07** |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| **1.** | **Introduction to E-Commerce** |
| | • Introduction of Unit<br>• Advanced Listening & Speaking Skills<br>• Conclusion of Unit |
| **2.** | **The Network Infrastructure for E-Commerce** |
| | • Introduction of Unit<br>• Advanced Reading & Writing Skills<br>• Conclusion of Unit |
| **3.** | **E-Commerce Security and Fraud Issues and Protection** |
| | • Introduction of Unit<br>• Art of Negotiation Skills<br>• Conclusion of Unit |
| **4.** | **E-payment systems** |
| | • Introduction of Unit<br>• Email Etiquettes<br>• Conclusion of Unit |
| **5.** | **Introduction to Management Information System** |
| | • Introduction of Unit<br>• Group Discussion<br>• Conclusion of Unit |

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Listening Skills II: Analysis of videos/audios by famous personalities |
| **2** | Speaking Skills II: Extempore, Debate etc. |
| **3** | Public Speaking: Key Concepts, Overcoming Stage Fear |
| **4** | Story-Telling Skills: Techniques of Story Telling, Prompts for story creation |
| **5** | Situational Conversational Skills |
| **6** | PowerPoint Presentation Skills-II |
| **7** | Reading Skills II: Technical Writings, Research Papers& Articles |
| **8** | Writing Skills II: Blog Writing &Review Writing |
| **9** | Picture Perception & Discussion |
| **10** | Art of Negotiation: Identify the qualities of successful and unsuccessful negotiators. Identify different negotiation situations to practice during class. |
| **11** | Email Etiquettes |
| **12** | Group Discussion: Dos &Don'ts, Informal GD |

| Code: BCACCA4601 | Discipline, VAC, Social Outreach | 1 Credit [LTP: 0-0-4] |
|---|---|---|

**COURSE OUTCOME**:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -IV, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programmes, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Fourth Semester are as follows:

:

| Code | Activity | Hours | Credits |
|---|---|---|---|
| BCACCA3601 | Talent Enrichment Programme(TEP)-IV | 4 | 1 |
| | Library / MOOC / Online Certificate Courses | | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | | |

# Semester-V

# SEMESTER V

## DEPARTMENT CORE COURSES

| Code:BCYCCA5101 | Security Operations | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Recognize penetration test using standard hacking tools in an ethical manner.
- Remember the strengths and vulnerabilities of the tested network.
- Evaluate the security and group infrastructure to enhance the capabilities and trust towards an organization
- Create the modern tools to defend the latest and updated trends towards hacking and security of computer systems
- Apply legal and ethical issues related to vulnerability and penetration testing

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Security Operations** | 07 |
| 2. | **Log Management** | 08 |
| 3. | **Security Information & Event Management** | 08 |
| 4. | **Incident Response** | 07 |
| 5. | **Server fundamentals & security** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Security Operations** |
| | • Introduction of Unit<br>• Importance of SOC<br>• Profiles of SOC<br>• SOC Infrastructure<br>• Importance of Logs & its Types<br>• Details about SOC and its management, How to enter in a job of SOC, Experience<br>• Conclusion of Unit |
| 2. | **Log Management** |
| | • Introduction to Unit<br>• Computer Security Log Management<br>• Log Management Infrastructure<br>• Log Management Planning<br>• Log Management Operational Process<br>• Tools for Log Management<br>• Conclusion of the Unit |
| 3. | **Security Information & Event Management** |
| | • Introduction of Unit<br>• SIEM Architecture<br>• Logs and Events<br>• Understanding logs, various formats<br>• Log Base lining, Aggregation and normalization<br>• Event Collection and Event Correlation, Correlation Rules |

| | |
|---|---|
| | • IBM- Qradar<br>• Security Monitoring<br>• Conclusion of Unit |
| **4.** | **Incident Response** |
| | • Introduction of Unit<br>• Incident Response Plan<br>• Purpose of Incident Response Plan<br>• Requirements of Incident Response Plan<br>• Incident Response and Handling Steps- Identification, Incident Recording, Initial Response<br>• Eradication, Systems Recovery<br>• Incident Documentation, Incident Damage and Cost Assessment Review and Update the Response Policies<br>• Defining the Relationship between Incident Response, Incident Handling, and Incident Management<br>• Conclusion of Unit |
| **5.** | **Server fundamentals & security** |
| | • Introduction of Unit<br>• Windows OS Security- BIOS Security, Screen saver password, Security policy, Event log, Windows General Security Practices<br>• Linux OS Security- Boot Security, Security Commands, Patching Linux Kernel, Strong password Policy, Users and groups<br>• Apache Security, Apache Hardening<br>• File Server, Email Server<br>• Databases – Oracle, MSSQL<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Security Operations Centre: Building, Operating, and Maintaining your SOC | Joseph Muniz | First Edition | 2015 |
| 2. | The Modern Security Operations Center | Joseph Muniz | First Edition | 2017 |
| **Reference Book** | | | | |
| 1. | Hacking Exposed- Stuart McClure, Joel Scambray, George Kurtz | | | |
| 2. | Gray Hat Hacking: The Ethical Hacker's Handbook, Fifth Edition (NETWORKING & COMM - OMG) | | | |
| **Online Resources** | | | | |
| 1. | https://www.javatpoint.com/ethical-hacking-tutorial | | | |
| 2. | https://www.guru99.com/ethical-hacking-tutorials.html | | | |
| 3. | https://www.youtube.com/watch?v=dz7Ntp7KQGA | | | |

| Code: BCYCCA5102 | Computer Hacking Forensic Investigation | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Identify the process in taking digital evidence
- Describe how to conduct an investigation using methods of memory, operating system, network and email forensics
- Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics.
- Differentiate among different types of security attacks
- Comprehend acquisition procedures for cell phones and mobile devices along with forensic equipments

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Computer forensics analysis** | 8 |
| 2. | **Recovering graphics files** | 8 |
| 3. | **Virtual Machines, Network forensics, and Live Acquit ions** | 8 |
| 4. | **E-Mail Investigation** | 8 |
| 5. | **Cell phone and mobile device forensics** | 7 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Computer forensics analysis** |
| | • Introduction of unit<br>• Determining what data to collect and analyze<br>• Addressing data hiding techniques<br>• Hiding partitions<br>• Marking bad cluster<br>• Bit –shifting<br>• using steganography to hide data<br>• Examining encrypted files.<br>• Recovering Passwords<br>• Conclusion of unit |
| 2. | **Recovering graphics files** |
| | • Introduction of unit<br>• Understanding vector Graphics<br>• Understanding graphics file formats<br>• Lossless and lossy<br>• compression<br>• Identifying graphics file fragments |

| | |
|---|---|
| | • Repairing Damaged Headers<br>• Searching<br>• for and carving data from unallocated space<br>• Conclusion of unit |
| **3.** | **Virtual Machines, Network forensics, and Live Acquit ions** |
| | • Introduction of unit<br>• Virtual Machines<br>• Network forensics<br>• Developing standard procedures for network forensics<br>• Reviewing network logs<br>• Using network tools<br>• Using Unix/Linux tools<br>• Using packet sniffers<br>• Examining the honey net projects.<br>• Conclusion of unit |
| **4.** | **E-Mail Investigation** |
| | • Introduction of unit<br>• Exploring the role of email investigation<br>• Exploring the role of client and server in email<br>• Investigating E-mail crimes and violations<br>• Examining E-mail Messages<br>• Viewing E-mail headers<br>• Examine E-mail headers<br>• Tracing an e-mail message<br>• Using network E-mail logs<br>• Conclusion of unit |
| **5.** | **Cell phone and mobile device forensics** |
| | • Introduction of Unit<br>• Understanding mobile device forensics<br>• Mobile phone basics<br>• Inside mobile devices<br>• Inside PDAs<br>• Understanding acquisition procedures for cell phones and mobile devices<br>• Mobile<br>• forensics equipment<br>• Conclusion of unit |

**C. RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Digital Forensics with Open Source Tools | C. Altheide& H. Carvey | 2011 | Syngress |
| 2. | Digital forensics: Digital evidence in criminal investigation | Angus M.Marshall | 2008 | John – Wiley and Sons |

| | | | | |
|---|---|---|---|---|
| **Reference Book** | | | | |
| 1. | Bill Nelson,Amelia Phillips,Christopher Steuart, “Guide to Computer Forensics and<br><br>Investigations”, Fourth Edition,Course Technology. | | | |
| **Online Resources** | | | | |
| 1. | https://www.tutorialspoint.com/python_digital_forensics/python_digital_forensics_investigation_using_emails.htm | | | |
| 2. | https://www.utc.edu/sites/default/files/2021-04/4680-ch10.pdf | | | |
| 3. | https://ijcsit.com/docs/Volume%206/vol6issue05/ijcsit20150605150.pdf | | | |

| Code: BCYCCA5103 | Vulnerability Analysis and Penetration Testing | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Explain fundamental concepts involved in cryptography and how they help in achieving the goals of information security
- Describe various algorithms and processes used in cryptography for authenticating users, securing information and communication
- Various encoding formats used in a web environment
- Knowledge and understanding of virtual machines and their operation
- HTTP Protocol including verbs, status codes and parameters

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Vulnerability assessment** | 07 |
| 2. | **Information Gathering and Open source tools** | 08 |
| 3. | **Vulnerability Assessment -I** | 08 |
| 4. | **Vulnerability Assessment -II** | 07 |
| 5. | **Penetration Testing** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Vulnerability assessment** |
| | • Introduction to Unit<br>• Overview of penetration testing<br>• Difference between Vulnerability assessment & Penetration Testing<br>• Testing Scoping / Ethics / Basics<br>• Passive reconnaissance - ways to obtain data on a target without ever hitting the target.<br>• Active reconnaissance and building theoverall picture<br>• Conclusion of the Unit |
| 2. | **Information Gathering and Open source tools** |
| | • Introduction to Unit<br>• Active reconnaissance. The art of active reconnaissance. Students will use nmap, nikto and other open-source tools to actively scan a target<br>• Establishing a target list. Students will take gathered information from their reconnaissance and build a target list that is focused<br>• Vulnerability assessment.<br>• Open source / free tools to assess the weakness and vulnerabilities of the systems on the target list.<br>• Tools - Openvas, Nessus<br>• Conclusion of the Unit |
| 3. | **Vulnerability Assessment -I** |
| | • Introduction of Unit<br>• Utilize open source tools to tamper with HTTP Headers and parameters.<br>• Building upon skills learned from the brute force lecture, attempt to brute force headers to learn about the system they are attacking. |

| | |
|---|---|
| | • Cross site scripting, Learn what cross site scripting is, and how XSS can be used to further the attack process. Students will learn the difference how to gain further access into systems with XSS.<br>• File Inclusion: Students will learn what file inclusion is, and how to perform advanced attacks utilizing file inclusion, including uploading web shells, backdoors, etc.<br>• -Session hijacking. Students will utilize open source tools to perform MITM attacks and session hijacking. Students will learn how session fixation and hijacking can occur and how it can be used to bypass authentication systems<br>• Conclusion of Unit |
| **4.** | **Vulnerability Assessment -II** |
| | • Introduction of Unit<br>• Exploitation of vulnerabilities: Students will learn to identify weak and outdated software, and target attacks specifically to that software to gain a foothold within a network Metasploit and other open source tools will be used to further the attack process.<br>• Privilege escalation: Students will learn how to escalate privileges on systems with Metasploit and also will learn about other techniques to gain higher level accounts on systems.<br>• Vulnerability analysis with Metasploit framework<br>• Conclusion of Unit |
| **5.** | **Penetration Testing** |
| | • Introduction of Unit<br>• Penetration testing concepts<br>• Types of penetration testing<br>• Tools and techniques used in penetration testing<br>• Nmap and live scanning on ports and networks<br>• Web application assessment with nikto& burp suite<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy | Patrick Engebretson | First Edition | 2011 |
| 2. | Microsoft Log Parser Toolkit: A complete toolkit for Microsoft's undocumented log analysis tool | Gabriele Giuseppini | 2nd Edition | 2005 |
| **Reference Book** | | | | |
| 1. | Cryptography and Information Security, V. K. Pachghare, Prentice Hall India, 2nd rev ed; 2015 | | | |
| 2. | Cryptography and Network Security, AtulKahate, McGraw Hill India, 3rd ed; July 2017 | | | |
| **Online Resources** | | | | |
| 1. | https://www.edx.org/learn/cryptography | | | |
| 2. | https://sopa.tulane.edu/blog/how-to-learn-cryptography | | | |
| 3. | https://www.youtube.com/watch?v=dz7Ntp7KQGA | | | |

| Code:BCYCCA5104 | Cryptography and Network Security | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Recognize the fundamental concepts involved in cryptography and how they help in achieving the goals of information security
- Remember various algorithms and processes used in cryptography for authenticating users, securing information and communication
- Evaluate the previous algorithms and redesign it in order to maintain the security of the digital data
- Create the modern techniques and algorithms to provide the better security of computer networks
- Apply the knowledge to provide in detail concepts ad tools to enhance the security of in use algorithms

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Cryptography** | 07 |
| 2. | **Cryptographic algorithms** | 08 |
| 3. | **Key Exchange and Management** | 08 |
| 4. | **Application of Cryptography** | 07 |
| 5. | **Network Security** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Cryptography** |
| | • Introduction to Unit<br>• The goals of Security- Confidentiality, Integrity & Availability (CIA) Triad<br>• Cryptographic concepts, methodologies & practices<br>• Symmetric & Asymmetric cryptography, public & private keys<br>• Cryptographic algorithms and uses<br>• Construction& use of Digital signatures<br>• Conclusion of the Unit |
| 2. | **Cryptographic algorithms** |
| | • Introduction to Unit<br>• Chinese Remainder Theorem<br>• Arithmetic modulo primes and finite cyclic groups<br>• DES, RSA, SHA<br>• MD5, HMAC, DSA<br>• Conclusion of the Unit |
| 3. | **Key Exchange and Management** |
| | • Introduction of Unit<br>• Key Exchange mechanisms and its security- Diffie-Hellman<br>• MITM<br>• Public Key Infrastructure<br>• The basic functions involved in key management including creation, distribution, verification, revocation and destruction, storage, recovery. |

| | |
|---|---|
| | • Conclusion of Unit |
| **4.** | **Application of Cryptography** |
| | • Introduction of Unit<br>• Major key distribution methods and algorithms including Kerberos, ISAKMP etc., Vulnerabilities to cryptographic functions.<br>• Use and functions of Certifying Authorities (CAs), Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions.<br>• Web Services security, Cloud Security, VPNs<br>• Conclusion of Unit |
| **5.** | **Network Security** |
| | • Introduction of Unit<br>• Email Security, PGP, POP- versions<br>• Firewall and its types<br>• Modern firewalls<br>• Signature vs. Anomaly based firewalls<br>• Statefull vs. Stateless Firewall<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Cryptography and Network Security | William Stallings | First Edition | 2010 |
| 2. | Everyday Cryptography: Fundamental Principles and Applications | Keith Martin | 2nd Edition | 2017 |
| **Reference Book** | | | | |
| 1. | Cryptography and Information Security, V. K. Pachghare, Prentice Hall India, 2nd rev ed; 2015 | | | |
| 2. | Cryptography and Network Security, Atul Kahate, McGraw Hill India, 3rd ed; July 2017 | | | |
| **Online Resources** | | | | |
| 1. | https://www.edx.org/learn/cryptography | | | |
| 2. | https://sopa.tulane.edu/blog/how-to-learn-cryptography | | | |
| 3. | https://www.youtube.com/watch?v=dz7Ntp7KQGA | | | |

# PRACTICAL

| Code: BCYCCA5201 | Security OperationsLab | 1Credit | [LTP: 0-0-2] |
|---|---|---|---|

**Course Outcome:-**
Students will be able to-

- Know security Encryption and Decryption
- Describe how security is integrated in Software Application.
- Recognize penetration test using standard hacking tools in an ethical manner
- Realize Scripting Attack
- Comprehend Current trends of Ethical Hacking and Attack

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Install virtual machines to create a safe environment for implementing and analyzing cybersecurity threat events. |
| **2** | Install firewall in providing network security and to set Firewall Security in windows |
| **3** | Using TraceRoute, ping, ifconfig, netstat Command |
| **4** | Perform ARP Poisoning in Windows |
| **5** | Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome) |
| **6** | Study of different types of vulnerabilities for hacking a websites / Web Applications. |
| **7** | Analysis the Security Vulnerabilities of E-commerce services. |
| **8** | Analysis the security vulnerabilities of E-Mail Application. |
| **9** | Install IDS (e.g. SNORT) and study the logs. |
| **10** | Perform SQL injection attack. |
| **11** | Detect ARP spoofing using open source tool ARPWATCH. |

**B. RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Security Operations Centre: Building, Operating, and Maintaining your SOC | Joseph Muniz | First Edition | 2015 |
| 2. | The Modern Security Operations Center | Joseph Muniz | First Edition | 2017 |
| **Reference Book** | | | | |
| 1. | Cryptography and Information Security, V. K. Pachghare, Prentice Hall India, 2nd rev ed; 2015 | | | |
| 2. | Gray Hat Hacking: The Ethical Hacker's Handbook, Fifth Edition (NETWORKING & COMM - OMG) | | | |
| **Online Resources** | | | | |
| 1. | https://www.profajaypashankar.com/ethical-hacking-sample-practical-manual/ | | | |
| 2. | http://osou.ac.in/eresources/DCS-05-Block-04-LabManual.pdf | | | |

| Code: BCYCCA5202 | Computer Hacking Forensic Investigation Lab | 1Credit | [LTP: 0-0-2] |
|---|---|---|---|

**Course Outcome:-**
Students will be able:

- Identify the essential and up-to-date concepts, algorithms, protocols, tools,and methodology of Computer Forensics.
- Describe how to conduct an investigation using methods of memory, operating system, network and email forensics
- Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics.
- Differentiate among different types of security attacks
- Appreciate acquisition procedures for cell phones and mobile devices along with forensic equipments

**A. LIST OF EXPERIMENTS:**

| | |
|---|---|
| **1** | Study of Computer Forensics and different tools used for forensic investigation |
| **2** | How to Recover Deleted Files using Forensics Tools |
| **3** | Study the steps for hiding and extract any text file behind an image file/ Audio file using Command Prompt |
| **4** | How to Extract Exchangeable image file format (EXIF) Data from Image Files using Exifreader Software |
| **5** | How to make the forensic image of the hard drive using EnCaseForensics |
| **6** | How to Restoring the Evidence Image using EnCase Forensics |
| **7** | How to Collect Email Evidence in Victim PC |
| **8** | How to Extracting Browser Artifacts |
| **9** | How to View Last Activity of Your PC |
| **10** | Find Last Connected USB on your system (USB Forensics) |
| **11** | Comparison of two Files for forensics investigation by Compare ITsoftware |

**B. RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Digital Forensics with Open Source Tools | C. Altheide& H. Carvey | 2011 | Syngress |
| 2. | Digital forensics: Digital evidence in criminal investigation | Angus M.Marshall | 2008 | John – Wiley and Sons |
| **Reference Book** | | | | |
| 1. | The C programming Language Richie and Kenninghan PBP Publication,2004 | | | |
| 2. | Bill Nelson,AmeliaPhillips,ChristopherSteuart,"Guide to Computer Forensics and Investigations", Fourth Edition,Course Technology. | | | |
| **Online Resources** | | | | |

| | |
|---|---|
| 1. | https://www.tutorialspoint.com/python_digital_forensics/python_digital_forensics_investigation_using_emails.htm |
| 2. | https://www.utc.edu/sites/default/files/2021-04/4680-ch10.pdf |

| Code:BCYCCA5203 | Vulnerability Analysis and Penetration Testing Lab | 1 Credits[LTP: 0-0-2] |
|---|---|---|

**Course Outcome: -**

Students will be able to:

- Comprehend security ,Encryption and Decryption
- Describe how security is integrated in Software Application.
- Articulate the importance of security principles in protecting web applications from vulnerabilities, exploits and attacks.
- Recognize Scripting Attack
- Apprehend Current trends of Ethical Hacking and Attack

### A. LIST OF EXPERIMENTS:

| | |
|---|---|
| **1.** | Use CryptTool to encrypt and decrypt passwords using RC4 algorithm. |
| **2.** | Execute a service based vulnerability scan utilizes specific protocols to communicate with open ports on a remote host, to determine more about the service that is running on that port. |
| **3.** | Use Cain and Abel for cracking Windows account password using Dictionary attack and to decode wireless network passwords |
| **4.** | Using TraceRoute, ping, ifconfig, netstat Command |
| **5.** | Perform ARP Poisoning in Windows |
| **6.** | Using Nmap scanner to perform port scanning of various forms – ACK, SYN. |
| **7.** | Using Nmap scanner to perform port scanning of various forms FIN, NULL, XMAS. |
| **8.** | Use WireShark sniffer to capture network traffic and analyze. |
| **9.** | Simulate persistant Cross Site Scripting attack. |
| **10.** | Session impersonation using Firefox and Tamper Data add-on |
| **11.** | Perform SQL injection attack. |
| **12.** | Create a simple keylogger using python |

### B. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy | Patrick Engebretson | First Edition | 2011 |
| 2. | Microsoft Log Parser Toolkit: A complete toolkit for Microsoft's undocumented log analysis tool | Gabriele Giuseppini | 2nd Edition | 2005 |
| **Reference Book** | | | | |
| 1. | Cryptography and Information Security, V. K. Pachghare, Prentice Hall India, 2nd rev ed; 2015 | | | |

| Online Resources | |
|---|---|
| 1. | https://www.profajaypashankar.com/ethical-hacking-sample-practical-manual/ |

# DEPARTMENT ELECTIVE

**Code: BCAECA5111 Advanced Cloud Technology 3Credits [LTP: 3-0-0]**

**COURSE OUTCOME**

Students will be able to:

- Describe the types of medical robots and the concepts of navigation and motion replication.
- Discuss about the sensors used for localization and tracking
- Summarize the applications of surgical robotics
- Outline the concepts in Rehabilitation of limbs and brain machine interface
- Classify the types of assistive robots. Analyze the design characteristics, methodology and technological choices for medical robots

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| **1.** | Introduction | **07** |
| **2.** | Communications and Networking in the Cloud Computing &Protocols | **08** |
| **3.** | Fundamentals Of Online Robots &IOT Architecture | **08** |
| **4.** | Mobile Robots and Cloud Computing with Web of Things | **07** |
| **5.** | Remote Mobility in the Cloud Computing &IOT Applications | **07** |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| | **Introduction** |
| **1.** | • Introduction of Unit<br>• Overview and background, Brief history of cloud computing and robotics.<br>• Network Robotics, ROS, MatLab<br>• Data Center and remote-device communication , Wireless network and Robot<br>• Different Types of Antennas &Characteristics of Antenna<br>• Privacy and Security Issues in the cloud network.<br>• Conclusion of Unit |
| **2.** | **Communications and Networking in the Cloud Computing &Protocols** |
| | • Introduction of Unit<br>• The Internet ,Wired Communication Links<br>• Wireless Links – Properties of Networked Telerobotics<br>• Building a Networked Telerobotic system<br>• State command Presentation ,Command Execution/ State Generation , Collaborative Control<br>• Protocol Standardization for IoT , Efforts – M2M and WSN Protocols<br>• SCADA and RFID Protocols ,Issues with IoT Standardization ,<br>• Unified Data Standards – Protocols – IEEE802.15.4<br>• BACNet Protocol– Modbus – KNX – Zigbee<br>• Network layer ,APS layer , Security<br>• Conclusion of Unit |
| **3.** | **Fundamentals Of Online Robots & IOT Architecture** |
| | • Introduction of Unit<br>• Introduction – Robot Manipulators , Teleoperation – Teleoperation on a local network<br>• Teleoperation via a constrained link.<br>• IoT Open source architecture (OIC), OIC Architecture &Design principles |

| | |
|---|---|
| | • IoT Devices and deployment models- IoTivity : An Open source IoT stack<br>• Overview-IoTivity stack architecture,Resource model and Abstraction.<br>• Conclusion of Unit |
| **4.** | **Mobile Robots and Cloud Computing with Web of Things** |
| | • Introduction of Unit<br>• Introduction to networked robot system on the Web, Software Architecture and design – Interface design.<br>• Web of Things versus Internet of Things ,Two Pillars of the Web<br>• Architecture Standardization for WoT, Platform Middleware for WoT<br>• Unified Multitier WoT Architecture<br>• WoT Portals and Business Intelligence.<br>• Conclusion of Unit |
| **5.** | **Remote Mobility in the Cloud Computing & IOT Applications** |
| | • Introduction of Unit<br>• Autonomous Mobile Robot on the Web ,<br>• Mobile Mini Robots ,Performance of Mobile Robots controlled through WEB<br>• Handling Latency in Internet based Tele operation<br>• Case Study Computer Networked Robotics<br>• Online Robots and the Robot Museum.<br>• IoT applications for industry: Future Factory Concepts, Brownfield IoT<br>• Smart Objects, Smart Applications. Study of existing IoT platforms /middleware<br>• IoT- A, Hydra etc.<br>• Conclusion of Unit |

**B. RECOMMENDED STUDY MATERIAL**

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Handbook of Cloud Computing | BorkoFurht, Armando Escalante | 2010 | Springer Science &Business, |
| 2. | Cloud Robotics – Distributed Robotics using Cloud Computing | Joao Pedro, Carvalho Rosa, | 2016 | Coimbra |
| **Reference Book** | | | | |
| 1. | Robots and Sensor Clouds | | | |
| 2. | Networking Humans, Robots and Environments | | | |
| 3. | Emergent Trends in Robotics and Intelligent Systems | | | |
| **Online Resources** | | | | |
| 1. | https://www.simplilearn.com/cloud-solutions-architect-masters-program-training?utm_source=google&utm_medium=cpc&utm_term=cloud%20course&utm_content=17438038281-138244819140-602766657095&utm_device=c&utm_campaign=Search-TechCluster-Cloud-AbsoluteBroadKeywords-IN-Main-AllDevice-adgroup-Cloud-Course-Broad&gclid=EAIaIQobChMIra3uw7Gs-AIVEBsrCh0BAgqsEAAYASAAEgLJlvD_BwE | | | |
| 2. | https://www.ibm.com/in-en/cloud/internet-of-things?utm_content=SRCWW&p1=Search&p4=43700052658173554&p5=e&gclid=EAIaIQobChMInZHDz7Gs-AIVvp1LBR0V-gHmEAAYASAAEgLJpfD_BwE&gclsrc=aw.ds | | | |

| Code:BCAECA5112 | Advanced Data Structures | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Explain the basic principles and operations of data structures.
- Analyze algorithms and to determine algorithm correctness and time efficiency class.
- Apply Hashing, Disjoint sets and String Matching techniques for solving problems effectively.
- Apply the concepts of advanced Trees and Graphs for solving problems effectively.
- Analyze the given scenario and choose appropriate Data Structure for solving problems.

## A. OUTLINE OF THE COURSE

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Hashing** | 07 |
| 2. | **Priority Queues (Heaps)** | 08 |
| 3. | **Trees** | 07 |
| 4. | **Graphs Algorithms** | 07 |
| 5. | **Disjoint Sets and String Matching** | 07 |

## B. DETAILED SYLLABUS

| Unit | Unit Details |
|---|---|
| 1. | **Hashing** |
| | • Introduction to Hashing<br>• Hash Function<br>• Separate Chaining<br>• Hash Tables without linked lists: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Hash Tables in the Standard Library<br>• Universal Hashing<br>• Extendible Hashing.<br>• Conclusion of Unit |
| 2. | **Priority Queues (Heaps)** |
| | • Introduction to Priority Queues (Heaps)<br>• Model<br>• Simple implementations<br>• Binary Heap: Structure Property, Heap Order Property,<br>• Basic Heap Operations: insert, delete, Percolate down<br>• Other Heap Operations<br>• Introduction toBinomial Queues<br>• Binomial Queue Structure<br>• Binomial Queue Operations<br>• Implementation of Binomial Queue<br>• Priority Queues in the Standard Library.<br>• Conclusion of Unit |
| 3. | **Trees** |
| | • Introduction to Trees<br>• AVL: Single Rotation, Double Rotation<br>• B-Trees<br>• Multi-way Search Trees – 2-3 Trees |

| | |
|---|---|
| | • Searching for an Element in a 2-3 Tree<br>• Inserting a New Element in a 2-3 Tree<br>• Deleting an Element from a 2-3 Tree<br>• Red-Black Trees<br>• Properties of red-black trees: Rotations, Insertion, Deletion.<br>• Conclusion of Unit |
| **4.** | **Graphs Algorithms** |
| | • Introduction to Graphs Algorithms<br>• Elementary Graph Algorithms: Topological sort<br>• Single Source Shortest Path Algorithms: Dijkstra's, Bellman-Ford, All-Pairs Shortest Paths: Floyd-Warshall's Algorithm<br>• Conclusion of Unit |
| **5.** | **Disjoint Sets and String Matching** |
| | • Introduction to Disjoint Sets<br>• Equivalence relation<br>• Basic Data Structure<br>• Simple Union and Find algorithms<br>• Smart Union and Path compression algorithm.<br>• Introduction to String Matching<br>• The naive string-matching algorithm<br>• The Rabin-Karp algorithm<br>• The Knuth-Morris-Pratt algorithm.<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Data Structures and Algorithm Analysis in C++ | Mark Allen Weiss | 4 th Edition | Pearson |
| 2. | Introduction to Algorithms | Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein | 3 rd Edition | The MIT Press. |
| **Reference Book** | | | | |
| 1. | Fundamentals of Computer Algorithms, 2nd Edition, 2009, University Press Pvt. Ltd, Ellis Horowitz, Satraj Sahani and Raja sekharam. | | | |
| 2. | Advanced Data Structures, Oxford University Press, 2018, ReemaThareja, S. Rama Sree. | | | |
| **Online Resources** | | | | |
| 1. | https://www.coursera.org/learn/advanced-data-structures | | | |
| 2. | https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/ | | | |
| 3. | https://nptel.ac.in/courses/106106133 | | | |
| 4. | https://www.mooc-list.com/search/node?keys=Advanced+Data+Structures | | | |
| 5. | https://freevideolectures.com/course/2279/data-structures-and-algorithms | | | |

| Code:BCAECA5113 | Data Mining and Warehousing | 3 Credits [LTP: 3-0-0] |
|---|---|---|

**COURSE OUTCOME**

Students will be able to:

- Explain the types of the data to be mined and present a general classification of tasks.
- Apply preprocessing methods for any given raw data.
- Extract interesting patterns from large amounts of data.
- Choose and employ suitable data mining algorithms to build analytical applications
- Explain the organization of data in the form of data warehouse

**A. OUTLINE OF THE COURSE**

| Unit No. | Title of The Unit | Time required for the Unit (Hours) |
|---|---|---|
| 1. | **Introduction to Data Mining** | 07 |
| 2. | **Association Rule Mining** | 07 |
| 3. | **Classification** | 08 |
| 4. | **Cluster Analysis** | 07 |
| 5. | **Data warehousing** | 07 |

**B. DETAILED SYLLABUS**

| Unit | Unit Details |
|---|---|
| 1. | **Introduction to Data Mining** |
| | • Introduction to Data Mining<br>• Data Mining Tasks<br>• Components of Data Mining Algorithms<br>• Data Mining supporting Techniques<br>• Major Issues in Data Mining<br>• Measurement and Data<br>• Data Preprocessing<br>• Data sets<br>• Conclusion of Unit |
| 2. | **Classification** |
| | • Introduction to Classification<br>• Basic Concepts<br>• Decision Tree induction<br>• Bayes Classification Methods<br>• Rule Based Classification<br>• Model Evaluation and Selection<br>• Techniques to Improve Classification Accuracy<br>• Classification: Advanced concepts<br>• Bayesian Belief Networks<br>• Classification by Back Propagation<br>• Support Vector Machine<br>• Classification using frequent patterns.<br>• Conclusion of Unit |
| 3. | **Cluster Analysis** |
| | • Introduction to Cluster Analysis |

| | |
|---|---|
| | • Basic concepts and Methods<br>• Partitioning methods<br>• Hierarchical methods<br>• Density Based Methods<br>• Grid Based Methods<br>• Evaluation of Clustering<br>• Advanced Cluster Analysis: Probabilistic model based clustering, Clustering High Dimensional Data, Clustering Graph and Network Data, Clustering with Constraints.<br>• Conclusion of Unit |
| **4.** | **Association Rule Mining and Visualization** |
| | • Introduction to Association Rule Mining<br>• Large Item sets<br>• Basic Algorithms<br>• Parallel and Distributed Algorithms<br>• Comparing Approaches<br>• Incremental Rules<br>• Advanced Association Rule Techniques<br>• Measuring the Quality of Rules<br>• Introduction to Visualization<br>• Visualization of Multidimensional Data<br>• Diagrams for Multidimensional visualization<br>• Visual Data Mining<br>• Data Mining Applications<br>• Case Study: WEKA.<br>• Conclusion of Unit |
| **5.** | **Data warehousing** |
| | • Introduction to Data warehousing<br>• Data warehousing components<br>• Multi dimensional data model<br>• Data warehouse architecture<br>• Data warehouse implementation<br>• Mapping the data warehouse to multiprocessor architecture<br>• OLAP<br>• Need<br>• Categorization of OLAP Tools<br>• Introduction to Data Cube<br>• Data Cube Technology: Efficient Methods for Data Cube Computation<br>• Exploration and Discovery in Multidimensional Databases<br>• Conclusion of Unit |

## C. RECOMMENDED STUDY MATERIAL

| S. No | Text Books: | Author | Edition | Publication |
|---|---|---|---|---|
| 1. | Data Mining Concepts and Techniques | Jiawei Han and Micheline Kamber | Third Edition | Elsevier |
| 2. | Principles of Data Mining (Adaptive Computation and Machine Learning) | David J. Hand, Heikki Mannila and Padhraic Smyth | Latest | |
| 3. | Data Mining: Introductory and Advanced Topics | Margaret H Dunham | Latest | |
| **Reference Book** | | | | |
| 1. | Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006, K.P. Soman, Shyam Diwakar and V. Ajay | | | |
| 2. | Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition, Ian H.Witten and Eibe Frank. | | | |
| 3. | Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, 35th Reprint 2016, Alex Berson and Stephen J.Smith. | | | |
| **Online Resources** | | | | |
| 1. | https://www.javatpoint.com/data-mining | | | |
| 2. | https://nptel.ac.in/courses/106105174 | | | |
| 3. | https://onlinecourses.swayam2.ac.in/cec20_cs12/preview | | | |

**Code:BULCHU5201 HUMAN VALUES & PROFESSIONAL ETHICS 1 Credit [LTP: 0-0-2]**

**Course Outcomes:**

On successful completion of the course the learners will be able to:

- Explain the importance of human values and learn from others' experiences to become the conscious practitioners of the same.
- Enhance their self-esteem, confidence and assertive behaviour to handle difficult situations with grace, style, and professionalism
- Distinguish among various levels of professional ethics while developing an apprehension of them as a process in an organization
- Implement emotional intelligence to achieve set targets and excel in interpersonal as well as intrapersonal
- Demonstrate knowledge of personal beliefs and values and a commitment to continuing personal reflection and reassessment

| UNIT NO. | UNIT NAME | Hours |
|---|---|---|
| **1** | Introduction to Human Values | 6 |
| **2** | Study of Self | 4 |
| **3** | Introduction to Professional Ethics | 4 |
| **4** | Emotional Intelligence | 6 |
| **5** | Life Skills & Value Education | 5 |

| LIST OF LABS | |
|---|---|
| 1. | Human Values: Love & Compassion |
| 2. | Truth, Non-Violence, Righteousness |
| 3. | Peace, Service, Renunciation (Sacrifice) |
| 4. | Self-Esteem: Do's and Don'ts to develop positive self-esteem |
| 5. | Self-Assertiveness: Development of Assertive Personality |
| 6. | Ambition & Desire: Self & Body (concepts & differences ) |
| 7. | Professional Ethics: Personal & Professional Ethics |
| 8. | Emotional Intelligence: Skill Building for Strengthening the Elements of Self-awareness, Self-regulation, Internal motivation, Empathy, Social skills |
| 9. | Governing Ethics & Ethics Dilemma |
| 10. | Profession, Professionalism & Professional Risks |
| 11. | Professional Accountabilities & Professional Success |
| 12. | Life Skills & Value Education |

| Code: BULCHU5202 | LEADERSHIP & MANAGEMENT SKILLS | 1 Credit [LTP: 0-0-2] |
|---|---|---|

**Course Outcomes:**

On successful completion of the course the learners will be able to

- Integrate their apprehensions into their leadership skills development process
- Demonstrate knowledge of the working environment impacting business organizations and exhibit an apprehensions of ethical implications of decisions
- Assess leadership styles and sharpen the managerial skills to communicate effectively and facilitate decision making in relation with self-management, stress management and conflict management
- Generate a creative thinking, something beyond the obvious answers and solution to a specific problem.
- Explain the significance of trust and team skills, creating new innovative ideas with the help of brainstorming and learn work etiquettes.

| UNIT NO. | UNIT NAME | Hours |
|---|---|---|
| **1** | Leadership Skills | 4 |
| **2** | Entrepreneurial Skills | 4 |
| **3** | Managerial Skills: Self –Management, Stress Management & Conflict Management | 6 |
| **4** | Creative Thinking & Design Thinking | 6 |
| **5** | Team Building & Confidence Building | 5 |

| LIST OF LABS | |
|---|---|
| 1. | Leadership Skills: Stages of development |
| 2. | Leadership Skills I: Attributes of great leaders, decision making, activities to enhance such qualities |
| 3. | Leadership Through Biographies |
| 4. | Entrepreneurial Skills: Traits & Competencies of an Entrepreneur |
| 5. | Managerial Skills: Conflict Management |
| 6. | Self-Management: Challenges & Solutions |
| 7. | Stress Management : Causes of stress and regulation |
| 8. | Creating Business Plans: Problem Identification and Idea Generation |
| 9. | Design Thinking: Transforming Challenges into Opportunities |
| 10. | Creative Thinking & Analytical Thinking: Presentation |
| 11. | Team building: Developing teams and team work |
| 12. | Confidence Building : Improving engagement, communicating effectively & activities to facilitate decision making |

| Code: BCACCA5601 | Discipline, VAC, Social Outreach | 1 Credit [LTP: 0-0-4] |
|---|---|---|

**COURSE OUTCOME**:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

Social outreach, Discipline, TEP -V, VAC & Extra Curricular activities shall be evaluated on the basis of its sub constituent programmes, as a complete one credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

Activities included in this category in the Fourth Semester are as follows:

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| Code | Activity | Hours | Credits |
|---|---|---|---|
| BCACCA3601 | Talent Enrichment Programme(TEP)-V | 4 | 1 |
| | Library / MOOC / Online Certificate Courses | | |
| | Non Syllabus Project (NSP) / Industry Visit / CRT | | |

# SEMESTER VI

| Code:BCACCA6501 | Project/Internship | 11 Credit [LTP: 0-0-22] |
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| Part A | |
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| | The students will undertake a project as part of their final semester of **BCA**. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.<br>If the student chooses to undertake an industry project, then the topic should be informed to the mentor, and the student should appear for intermediate valuations. Prior to undertaking this project the students undergo a bridge course.<br><br>**Bridge Course:**<br>The bridge course ensures that all the students have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through two week mandatory classroom participation where faculty and other experts will give adequate inputs in application based subjects, IT and soft skills.<br><br>**The Project:**<br>Each student will be allotted a Faculty Guide and an Industry Guide during the internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project. |
| | Each student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.<br><br>**Project Evaluation Guidelines:**<br>The Project evaluator(s) verify and validate the information presented in the project report. The break-up of marks would be as follows:<br>1. Internal Evaluation<br>2. External Assessment<br>3. Viva Voce<br><br>**Internal Evaluation:**<br>Internal Evaluation of project need to evaluate Internal Project work based on the following criteria:<br>• Project Scope, Objectives and Deliverables<br>• Research Work, Understanding of concepts<br>• Output of Results and Proper Documentation<br>• Interim Reports and Presentations– Twice during the course of the project<br><br>The Components of the Interim Reports are given below:<br><br>**First Interim Report:**<br>• A study on the existing software/app/product in the market<br>• The proposed software/app/product with the additional features<br>• The technical requirements<br>• The proposed work flow scheme - including the work allocation for each of the team members<br>• A Presentation |

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| | **Second Interim Report:**<br>• The refined design and scheme/data-flow<br>• The Course Progress – The percentage completion<br>• Plan for the project completion<br>• A Presentation<br><br>**External Evaluation:**<br>• The Project evaluator(s) perform the External Assessment based on the following criteria.<br>• Understanding of the Project Concept<br>• Delivery Skill<br>• The Final Project Report<br>• Originality and Novelty |
| **Part B** | **The Final Project Report Details:** |
| | The report should have a excel sheet that documents the work of every project member<br>• The project report should be documented in the following format:<br>1. Acknowledgements<br>2. Project Synopsis<br>3. Introduction<br>4. Existing system and proposed system<br>5. Project Background<br>a. Overview<br>b. Objectives<br>c. Development Requirements<br>d. Other Resources<br>e. Issues that needed to be considered<br>f . Preparation done<br>6. Requirements Analysis<br>7. Design Architecture (Based on your respective Specialization)<br>8. (Project Oriented Topics)<br>9. (Project Oriented Topics)<br>10. Future enhancement<br>11. Screen shots<br>12. Summary<br>13. Appendices<br>14. References |
| **Part C** | **Viva Voce** |
| | Handling questions<br>• Clarity and Communication Skill<br><br>**Marking Scheme:**<br>1. **Internal Evaluation:** 35% of Total Marks<br>2. **External Evaluation:** 50% of Total Marks<br>3. **Viva Voce:** 15 % of Total Marks<br><br>**For e.g.,** If the total mark for the project is 100, then<br><br>• Internal Evaluation = 35 marks<br><br>The break-up of marks is shown below:-<br>• Interim Evaluation 1: 10 marks<br>• Interim Evaluation 2: 10 marks<br>• Understanding of concepts: 5 marks<br>• Programming technique: 5 marks<br>• Execution of code : 5 marks |

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| | • External Evaluation = 50 marks<br><br>The break-up of marks is shown below:-<br><br>• Project Report: 15 marks<br>• Explanation of project working: 10 marks<br>• Execution of code: 10 marks – (if done in industry, a standalone<br>• module can be reprogrammed and submitted. Error<br>• rectification etc can be included by the evaluator)<br>• Participation in coding: 15 marks<br>• Viva Voce = 15 marks<br><br>The break-up of marks is shown below: -<br><br>• Questions related to project: 10 marks<br>• Questions related to technology: 5 marks<br>• The Project evaluator(s) verifies and validates the information presented in the project report. |

| Code:BCACCA6601 | Discipline, VAC & Social Outreach | 1 Credit [LTP: 0-0-11] |
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**OVERVIEW AND OBJECTIVES**:

- The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non-technical categories.

- Discipline and Talent Enrichment Programme (TEP)-VI shall be evaluated on the basis of its sub constituent programmes, as a complete Two credit course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance

**********HAPPY LEARNING**********