

**School of Computer Applications**

**Scheme & Syllabus**

**of**

**Bachelor of Computer Applications (BCA)**

**3 Years Full time program**

**Academic Program**

**July 2023-24**

JECRC University, Jaipur

Plot No. IS-2036 to IS-2039 Ramchandrapura Industrial Area Jaipur, Sitapura, Vidhani, Rajasthan 303905

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**About the School and Department:**

School of computer application was established at the JECRC University, in the year 2013, with the objective of imparting quality education in the field of Computer Application. With rapidly evolving technology and continuous need for innovation, the school has been producing quality professionals, who are currently holding important positions in Information Technology industry both in India and abroad. The BCA Program focuses on providing a sound theoretical background as well as good practical exposure to students in the relevant areas. It is intended to provide a modern, industry-oriented education in applied computer application. It aims at producing trained professionals who can successfully meet the demands of the IT industry. They obtain skills and experience in up-to-date approaches to analysis, design, implementation, validation, and documentation of computer software and hardware. The aim to develop core competence and to prepare the students to take up challenges of research and development. The students develop the ability to apply a high level of theoretical expertise and innovation to complex problems and application of new technologies. This program designed to teach the mathematical principles of specification, design and efficient implementation of both software and hardware. The school also offers MCA to prepare students for a flourishing corporate IT culture with exposure and Doctor of Philosophy (Ph.D.) Program, aimed at producing quality researchers in several diverse branches of Computer Science.

**Introduction to CBCS (Choice Based Credit System)**

**Choice Based Credit System:**

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill-based courses. The courses will be evaluated following the grading system, which is considered to be better than the conventional marks system. Grading system provides uniformity in the evaluation and computation of the Cumulative Grade Point Average (CGPA) based on student’s performance in examinations which enables the student to move across institutions of higher learning. The uniformity in evaluation system also enables the potential employers in assessing the performance of the candidates.

**Definitions:**

(i) ‘Academic Program’ means an entire course of study comprising its Program structure, course details, evaluation schemes etc. designed to be taught and evaluated in a teaching Department/Centre or jointly under more than one such Department/ Centre.

(ii) ‘Course’ means a segment of a subject that is part of an Academic Program

(iii) ‘Program Structure’ means a list of courses (Core, Elective, Open Elective) that makes up an Academic Program, specifying the syllabus, Credits, hours of teaching, evaluation and examination schemes, minimum number of credits required for successful completion of the Program etc. prepared in conformity to University Rules, eligibility criteria for admission.

(iv) ‘Core Course’ means a course that a student admitted to a particular Program must successfully complete to receive the degree and which cannot be substituted by any other course

(v) ‘Elective Course’ means an optional course to be selected by a student out of such courses offered in the same Department.

(vi) ‘Open Elective’ means an elective course which is available for students of all Programs, including students of same department. Students of other Department will opt these courses subject to fulfilling of eligibility of criteria as laid down by the Department offering the course.

(vii) ‘Credit’ means the value assigned to a course which indicates the level of instruction; One -hour lecture per week equals 1 Credit, 2 hours practical class per week equals 1 credit. Credit for a practical could be proposed as part of a course or as a separate practical course

(viii) ‘SGPA’ means Semester Grade Point Average calculated for individual semester.

(ix) ‘CGPA’ is Cumulative Grade Points Average calculated for all courses completed by the students at any point of time. CGPA is calculated each year for both the semesters clubbed together.

(x) MOOCS courses to be offered with forthcoming semesters in which students are requested to enroll courses from only SWAYAM Portal in each semester related to the BCA and MCA Program with the permission of HOD. After Completion of MOOC course student will earn credits for respective subjects.

**BCA Program Details:**

Bachelors of Computer Applications (BCA) is a full-time six semester (3 Years) Program, which includes one semester of project work in the sixth semester. The objective of BCA Program is to impart quality education in Computer Science and its applications, so that students are well prepared to face the challenges of the highly competitive IT industry. The course structure ensures overall development of the student, while concentrating on imparting technical skills required for an IT profession. No wonder, today after 10 years of its existence, its alumni are holding important positions in the IT industry and academics in India and abroad.

**Program Educational Objectives (PEOs):**

|  |  |
| --- | --- |
| **PEO** | **Objectives** |
| **PEO I** | To excel in problem solving and programming skills in the various computing fields |
| **PEO II** | To develop the ability to plan, analyze, design, code, test, implement & maintain a software product for real time problems |
| **PEO III** | To experience the students in finding solutions and developing system based applications for real time problems in various domains involving technical, managerial, economical & social constraints |
| **PEO IV** | To promote students capability to set up their own enterprise in various sectors of Computer applications and to prepare students for higher studies and research. |
| **PEO V** | Toprovide students an educational foundation that prepares them for excellence, leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career |

**Program Outcomes (POs):**

|  |  |
| --- | --- |
| **PO** | **Outcomes** |
| **PO 1** | Apply the knowledge of computer-based techniques to achieve feasible solution to the problems of computer applications domain |
| **PO 2** | Identify & formulate complex computer-based problems meeting valid conclusions using computer science domains |
| **PO 3** | Design and obtain solutions for real world problems and evaluate systems, components, and processes that meet requirements with due consideration to society and environment |
| **PO 4** | Problem Analysis and solutions: Using research-based computing knowledge and methodology including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions |
| **PO 5** | To learn modern latest techniques, tools and practices with their limitations for the process of software development |
| **PO 6** | To make students understand and commit to the norms of professional computing practices, professionals’ ethics and cyber regulations |
| **PO 7** | To develop the habit of self -learning for continued career development to grow as IT professional |
| **PO 8** | To make students understand and apply computing principles as a team member or a leader to manage software projects |
| **PO 9** | To develop communication & Professional Skills/Professional Skills Lab to effectively conceive, design and develop software applications and associated practices |
| **PO 10** | To understand and analyze the responsibilities regarding society and environment in local and global contexts relevant to professional computing practices |
| **PO 11** | To infuse the ability to function effectively as a team member or a leader in multi-disciplinary environments |
| **PO 12** | To help students to identify opportunities to be a successful entrepreneur by adopting innovation skills |

**Program Specific Outcomes for BCA Specialization:**

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| --- | --- |
| **PSO1** | Design, implement, and manage scalable and secure based solutions using leading platforms and services. |
| **PSO2** | Apply principles, techniques, and methodologies to optimize resource utilization, enhance scalability, and ensure reliability. |
| **PSO3** | Develop and deploy models and algorithms to solve real-world problems in various domains |

**Specialization in Cyber Security**

|  |  |
| --- | --- |
| **PSO1** | Identify, assess, and mitigate cyber threats and vulnerabilities by applying effective security practices, tools, and techniques across network, systems, web applications, and cloud environments |
| **PSO2** | Employ ethical hacking and digital investigation techniques to detect and respond to cyber incidents and build secure systems to ensure integrity of digital systems and data |

**Program Structure:**

The BCA. Program is a three- year program divided into six semesters. A student is required to complete 132 credits for the completion of course and the award of degree.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Core (Credits)** | **Elective (Credits)** | **Foundations (Credits)** | **Open (Credits)** | **ID (Credits)** | **Total Credits** |
| I | 15 | 0 | 0 | 0 | 9 | 24 |
| II | 18 | 0 | 0 | 0 | 6 | 24 |
| III | 13 | 0 | 8 | 0 | 3 | 24 |
| IV | 14 | 3 | 3 | 3 | 0 | 23 |
| V | 11 | 7 | 0 | 3 | 0 | 21 |
| VI | 16 | 0 | 0 | 0 | 0 | 16 |
| **Total Credits** | | | | | | **132** |

C- Core, ID- Interdisciplinary, S- Specialization (Skill Enhance Courses), L- Lecture, T- Tutorial,

P- Practical

* Open Electives to the maximum total of 8 credits.
* Duration of examination for each course shall be 3 hours.
* The End Semester exam for all theory courses will be of 100 marks and 50 marks are allotted for Internal Continuous assessment (30 marks for sessional and 20 marks for home assignments)
* The End Semester exam for all theory courses will be of 100 marks and 50 marks are allotted for Internal Continuous assessment (30 marks for sessional and 20 marks for home assignments)
* Each student shall carry out a major project in the fifth semester. The project will be carried out under the supervision of a teacher of the department. When the project is carried out in an external organization (academic institution/ industry), a supervisor will also be appointed from the external organization. The project work will be evaluated jointly by the internal supervisor and an examiner to be appointed by the department in consultation with the internal supervisor. The major project shall carry 100 marks distributed as follows:

1) Dissertation: 50% weightage 2) Viva-voce: 50% weightage

* Each student shall carry out an Internship in the sixth semester. The students shall take internships from external organization. An internal supervisor will also be appointed from the university. The Internship work will be evaluated jointly by the internal supervisor and an examiner to be appointed by the department in consultation with the internal supervisor. The Internship shall carry 600 marks (300-Internal, 300- External)
* The students may select the elective courses out of the list of courses which are offered in a semester.
* There shall be 90 instructional days excluding examination in a semester.
* To be eligible to pass a course and earn credits for it, a student must satisfy the criteria laid down by the University.
* Examination for courses specified in the odd (even) semesters shall be conducted only in the respective odd (even) semesters.
* Promotion Criteria: As laid down by the University.
* Award of degree: In order to be eligible for the award of the degree of Bachelor of Computer Applications (BCA) degree, a student must earn all the credits (132) as per the structure of the course, specified in the above table.
* Attendance is mandatory – Criteria-75% in each course.



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**Total Credits for the Batch 2023-26 = 132 Credits**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester wise credit** | | | | | | **Credits** |
| **I** | **II** | **III** | **IV** | **V** | **VI** | **Total** |
| **24** | **24** | **24** | **23** | **21** | **16** | **132** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester – I** | | | | | | | | |
| **S. No.** | **Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P**  **(Hr.)** | **Credits** | **Contact Hours** | **Type** |
| 1 | BCA115C | Computer Organization and Architecture | 4 | 0 | 0 | 4 | 4 | CORE |
| 2 | BCA302A | Fundamental of Computers & Programming in C | 4 | 0 | 0 | 4 | 4 | CORE |
| 3 | BCA114B | Database Management Systems | 3 | 1 | 0 | 4 | 4 | CORE |
| 4 | BCA303A | Fundamental of Computers & Programming in C Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 5 | BCA118B | Database Management Systems Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 6 | BCA106A | Office Automation Tools Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 7 | DCH001A/BCA113B | Environmental Studies/ Operating System | 4 | 0 | 0 | 4 | 4 | ID |
| 8 | DEN001A/ DEN001B | Communication Skills/ Communication Skills Lab | 2 | 0 | 2 | 3 | 3 | ID |
| 9 | DIN001A | Culture Education-I | 2 | 0 | 0 | 2 | 2 | ID |
| **Total** | | | **19** | **1** | **8** | **24** | **27** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester – II** | | | | | | | | |
| **S. No.** | **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P (Hr.)** | **Credits** | **Contact Hours** | **Type** |
| 1 | BCA152B | Web Technologies | 3 | 0 | 0 | 3 | 3 | CORE |
| 2 | BCA126B | Object Oriented Programming Using C++ | 4 | 0 | 0 | 4 | 4 | CORE |
| 3 | BCA113B/DCH001A | Operating System/Environmental Studies | 3 | 0 | 2 | 4 | 4 | CORE |
| 4 | BCA300A | Python Programming | 4 | 0 | 0 | 4 | 4 | CORE |
| 5 | BCA130B | Project Lab Using C++ | 0 | 0 | 2 | 1 | 2 | CORE |
| 6 | BCA301A | Python Programming Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 7 | BCA255A | Project Lab Using Web Technologies | 0 | 0 | 2 | 1 | 2 | CORE |
| 8 | BCA121B | Software Testing Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 9 | DIN002A | Culture Education-II | 2 | 0 | 0 | 2 | 2 | ID |
| 10 | DEN002A/DEN002B | Professional Skills/Professional Skills Lab | 2 | 0 | 2 | 3 | 5 | ID |
| **Total** | | | **18** | **0** | **12** | **24** | **30** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester – III** | | | | | | | | |
| **S.No.** | **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P**  **(Hr.)** | **Credits** | **Course Hours** | **Type** |
| 1 | BCA305A | Data Structures and Algorithms -I | 3 | 0 | 0 | 3 | 3 | CORE |
| 2 | BCA307A | Web Technology – II | 3 | 0 | 0 | 3 | 3 | CORE |
| 3 | BCA133B | Programming in JAVA | 4 | 0 | 0 | 4 | 4 | CORE |
| 4 | BCA308A | Web Technology - II Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 5 | BCA306A | Data Structures and Algorithms -I Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 6 | BCA136B | Project Lab using JAVA | 0 | 0 | 2 | 1 | 2 | CORE |
| 7 | DMA051B/BCA127A | Mathematical Foundation/Software Engineering | 3 | 1 | 0 | 4 | 4 | F |
| 8 | DEN003A | Life Skills - 1 (Personality Development) | 1 | 0 | 2 | 2 | 4 | F |
| 9 | DIN003A | Value Education and Ethics -1 | 1 | 0 | 2 | 2 | 2 | F |
| **10** | Open Elective | | 3 | 0 | 0 | 3 | 3 | GE |
|  |  | **Total** | **18** | **1** | **10** | **24** | **29** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester – IV** | | | | | | | | |
| **S. No.** | **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P (Hr.)** | **Credits** | **Contact Hours** | **Type** |
| 1 | BCA135A | Computer Network | 4 | 0 | 0 | 4 | 4 | CORE |
| 2 | BCA127A/DMA051B | Software Engineering/ Mathematical Foundation | 4 | 0 | 0 | 4 | 4 | CORE |
| 3 | BCA307A | Data Structures and Algorithms – II | 4 | 0 | 0 | 4 | 4 | CORE |
| 4 | BCA177A | Project Management Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 5 | BCA308A | Data Structures and Algorithms - II Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 6 | DMA003A | Life Skills - 2 (Aptitude) | 1 | 0 | 2 | 2 | 4 | F |
| 7 | DIN004A | Value Education and Ethics -2 | 1 | 0 | 0 | 1 | 2 | F |
| 8 | Departmental Elective – I | | 3 | 0 | 0 | 3 | 3 | E |
| 9 | Open Elective | | 3 | 0 | 0 | 3 | 3 | GE |
|  |  | **Total** | **20** | **0** | **6** | **23** | **28** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester – V** | | | | | | | | |
| **S. No.** | **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P**  **(Hr.)** | **Credits** | **Contact Hours** | **Type** |
| 1 | BCA163A | Introduction to Cloud Computing | 4 | 0 | 0 | 4 | 4 | CORE |
| 2 | BCA317A | Information Security Essentials | 4 | 0 | 0 | 4 | 4 | CORE |
| 3 | BCA318A | Information Security Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 4 | BCA180A | Cloud Computing Lab | 0 | 0 | 2 | 1 | 2 | CORE |
| 5 | BCA147B | Major Project | 0 | 0 | 2 | 1 | 2 | CORE |
| 6 | Departmental Elective –II | | 3 | 0 | 0 | 3 | 3 | E |
| **7** | Departmental Elective –III | | 3 | 0 | 1 | 4 | 4 | E |
| **8** | Open Elective | | 3 | 0 | 0 | 3 | 3 | GE |
|  |  | **Total** | **17** | **0** | **7** | **21** | **24** |  |

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| **Semester – VI** | | | | | |
| **Course Code** | **Course Name** | **L**  **(Hr.)** | **P**  **(Hr.)** | **Credits** | **Type** |
| **BCA165A** | **Industrial Training/Internship** | **0** | **0** | **16** | **CORE** |

**List of courses for Electives**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credit** | **Course Code** | **Course Name** | **Credit** |
| **Track I (Software Development)** | | | **Track 3 (Data Science and Analytics)** | | | |
| BCA309A | Programming in ASP.Net | 3 | BCA193A | Programming in R | 3 |
| BCA181A | Professional Java | 3 | BCA194A | Data Science and Analytics | 3 |
| BCA141A | Android Application Development | 3 | BCA161A | Big Data Analytics | 3 |
| BCA183A | Programming in ASP.Net Lab | 1 | BCA195A | Data warehousing and Data Mining | 3 |
| BCA145A | Android Application Development Lab | 1 | BCA196A | Programming in R Lab | 1 |
| BCA184A | Professional Java Lab | 1 | BCA197A | Data warehousing and Data Mining lab | 1 |
| BCA176A | Software Testing | 3 | BCA121B | Software Testing Lab | 1 |
| **Track 2 (System & Network Administration)** | | | **Track 4 (Emerging Technologies)** | | | |
| BCA185A | Introduction to Linux System Administration | 3 | BCA164A | Introduction to Salesforce | 3 |
| BCA186A | Linux Server Administration and Automation | 3 | BCA172A | Robotics Process Automation | 3 |
| BCA187A | Software Development Using OpenShift Architecture | 3 | BCA198A | Artificial Intelligence and Machine Learning | 3 |
| BCA188A | Network Virtualization Using OpenStack | 3 | BCA199A | Introduction to Salesforce lab | 1 |
|  |  |  | BCA200A | Artificial Intelligence and Machine Learning Lab | 1 |
|  |  |  | BCA201A | Robotics Process Automation Lab | 1 |
|  |  |  | BCA251A | Google Cloud Readiness | 3 |