Pimpri Chinchwad Education Trust's

Pimpri Chinchwad College of Engineering and Research

Plot B, Survey No. 110 (P), Laxminagar, Ravet, Pune – 412101

(An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune)

Academic and Examination Rules and Regulations, Curriculum Structure, and Syllabus

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For

Second Year - Bachelor of Computer Application (BCA)

With effect from (AY 2026-27)

National Education Policy (NEP) 2020 Compliant Approved by the Board of Studies (BoS-Science and Technology) and Academic Council

(Applicable to Regulations 2023, 2021 and 2020)

(www.pccoer.com)

PCET's Pimpri Chinchwad College of Engineering and Research, Pune - 412 101 An Autonomous Institute

Chairman, Academic Council
PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412 101

PREFACE

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research (PCCOE&R) is one of the promising institutes in Quality & Professional Education. Since 2014, PCCOE&R has been imparting value-added quality education to satisfy the needs and expectations of the stakeholders like Students, Parents, Industry etc. Focused efforts are made to achieve this, by providing state-of-the-art Engineering and Management education to Students. PCCOE&R has a student centric academic system to ensure holistic development. Every possible opportunity is provided to the student to progress academically and excel.

PCCOE&R indigenously adheres the philosophy of National Education Policy (NEP)-2020, in curriculum design, as to create an academic system that is flexible, inclusive, and focused on the holistic development of students. NEP-2020 fosters a mindset of continuous growth and lifelong learning. The continuous assessment, which involves regular evaluations throughout the academic year is promoted. This method provides ongoing feedback to students, allowing them to understand their progress and improve over time.

The weightage of stringent Academic Monitoring and Control has led towards Qualitative Results and Placements, thereby becoming the most opted Institute for admissions by engineering aspirants in and around Pune and all over the state of Maharashtra.

This booklet gives comprehensive information on the existing Rules and Regulations for Bachelor of Computer Application (BCA). Programmes of all branches. All Undergraduate Programmes will be governed by these Rules and Regulations. The various departments are given a direction to excel in academics through these Rules and Regulations approved by the Academic Council from time to time, keeping in view the ever-growing challenges and new developments. The stakeholders particularly the students, and parents/guardians, are advised to be fully familiar with the Academic System of the Institute. Students should be aware of the Rules and Regulations governing Academic requirements, Evaluation and Assessment policy, and Grading System. These rules may be revised to ensure the optimized learning experience of students to meet the global needs of the industry. These revisions are recommended as per the directives of UGC, AICTE, DTE and BoS. The Academic Council is the final authority to approve the Rules and Regulations, and these are binding on all the interested parties.

It is expected that this booklet would bring transparency in the functioning of the Institute related to Academics, Examinations and Evaluation amongst Students, Faculty members, Administrators, Parents and other Stakeholders.

Vision:

To be a globally recognized Institute of technological education and research for the holistic development of aspirants, through excellence in education, innovation and collaborations to fulfil the expectations of all stakeholders.

Mission:

1. To design and deliver state-of-art knowhow through experiential learning based on changing needs of industry and society worldwide, to ensure the employability and employment of each aspirant.

2. To enhance the collaborative partnership between Industry and Institute at national and international levels for commercializing and transferring the latest technological know-how towards societal, ethical and economic development.

3. To achieve and sustain institute position as one of the topmost recognized and ranked institutes in technical and technological education.

EOMS Policy:

We, at PCCOE&R, are committed to:

- Develop as a premier institute of technical education & research as per the needs and expectations of all stake holders.
- Comply with all applicable requirements.
- Continual improvement in educational, technical and scientific development, infrastructure and management system.
- Social responsibility
- Managing intellectual property
- We shall strive to maintain an environment conducive to learning and student's overall development with high moral and ethical values.

Annexure I

1. Eligibility Criteria for Admission in Bachelor of Computer Application (BCA)

1.1 **Entrance Requirement**

The candidate must qualify the **Computer-Based Test (CBT)** conducted under the **Common Entrance Test (CET)** for admission to the Bachelor of Computer Applications (BCA) program.

1.2 **Eligibility for Appearing in MAH B.BCA/BBA/BMS/BBM-CET 2025**

The candidate must fulfill the following conditions:

a. The candidate should be a **citizen of India**.
b. The candidate should have **passed the 10+2 (Higher Secondary) examination** or its equivalent, in accordance with the **admission policy of the affiliating university**.
c. Candidates who are **appearing for the 10+2 examination or its equivalent** are also eligible to appear for the CET.

2. EXAMINATION AND EVALUATION

There shall be continuous evaluation of students. This system will have following objectives:

i. To get insights regarding student performance/abilities which helps to identify learning needs and take necessary actions for possible improvement.
ii. To give feedback to the student about his level of understanding and abilities as per required Graduate Attributes (GAs).
iii. To allow students to demonstrate their competence which they will practice in their professional career.
iv. To award students grades based on their performance and abilities.
    a. Evaluation processes shall ensure outcome-based education adopted by the institute. All assessment methods will ensure constructive alignment of curriculum with intended outcomes.
    b. There shall be internal and external evaluation of students as a part of evaluation to award grades. All assessment of Theory, Practical, Project, Seminar and internship shall be conducted to evaluate GAs essential to meet the needs of engineering graduates at national as well as international level. Appropriate weightages given to these evaluation methods will ensure quality of assessment and evaluation.
    c. Evaluation scheme based on type of course with weightage is mentioned in table1.

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1. DEFINITIONS

1. “Institute” means Pimpri Chinchwad College of Engineering and Research (PCCOE&R)
2. “University” means Savitribai Phule Pune University (SPPU), Pune
3. “Bachelor of Computer Application” BCA means, Undergraduate Degree awarded by SPPU
4. “Semester" means the period in which Academic activities are carried out.
5. “Course" means theory/laboratory/seminar/project/mini project/ tutorial etc.
6. “Course Credit" means weightage assigned to a Course.
7. “Course Teacher" means Faculty member assigned to teach a Course.
8. “Grade" means ***Single*** Letter assigned to indicate the Performance of Student in a Course.
9. “GB” means Governing Body.
10. “Academic Council” means apex Academic Body governing the academic programmes & policies in PCCOE&R.
11. “Board of Studies” (BOS) means departmental Academic Body common for UG and PG Programmes.
12. “Board of Examinations” (BOE) means apex Examination Body responsible for Examination conduction, framing and implementing Rules and Regulations approved by Academic Council.
13. “Grievance Redressal and Discipline Committee” (GRDC) means committee appointed by the Director to deal with cases of Grievances and Indiscipline.
14. “Complaint Redressal Committee” (CRC) means Committee appointed by the Director to deal with cases of Unfair means/Malpractice/s in Examination.
15. “Department Advisory Board” (DAB) means Departmental Advisory Body common for UG.
16. “Programme Assessment Committee” (PAC) means departmental committee for Assessment of Program.
17. “Academic Standing Committee (ASC)” means apex body next to Academic Council to take decisions under emergent situations subjected to ratification by Academic Council.

18. “Semester Grade Performance Average (SGPA)" means the weighted average of Grade Point of a Student in a Semester.
19. “Cumulative Grade Performance Average (CGPA)" means the weighted average of Grade Points for all the Semesters completed by a student.
20. “Allowed to Keep Term (ATKT)" means allowed for admission to higher class after satisfying minimum credits criterion.
21. “Academic Examination and Assessment R&R” means Academics, Examination & Evaluation Rules and Regulations governing system of the Institute.
22. “COE” means Controller of Examinations.
23. “FA” means Formative Assessment
24. “SA” means Summative Assessment
25. “DTE” means Directorate of Technical Education, Mumbai
26. “AICTE” means All India Council for Technical Education, New Delhi
27. “UGC” means University Grant Commission
28. “NEP” means National Education Policy
29. “NBA” means National Board of Accreditation
30. “NAAC” means National Assessment and Accreditation Council, Bangalore

2. INTRODUCTION

The provisions made in this document shall govern the Academic Policies and Procedures, Curriculum, Course Delivery, Evaluation System, Continuous Assessment, conduct of the Examinations and declaration of Results.

i. The medium of instruction throughout the programme shall be English except where it is explicitly mentioned as Regional.

ii. Semester system shall be adopted for Academic activities in the Institute. Normally, all Odd Semesters shall commence from the first week of July and Even Semesters shall commence from the first week of January.

iii. The commencement of first semester for B. Tech shall be governed by the admission schedule declared by DTE, Government of Maharashtra.

iv. There are eight semesters having total **126 Credits** for every Undergraduate Programme. Around 02 credits out of 126 credits would be for Multi-Disciplinary Elective course (MDC).

v. Academic Calendar shall be prepared and published before the commencement of every Academic year.

vi. Evaluation norms shall be strictly followed to maintain quality of engineering education. Examination system shall be transparent and governed by Rules and Regulations.

vii. Rules and Regulations hereafter shall be subjected to amendments made by the Academic Council from time to time, based on recommendations of the BOS and BOE. All such amendments shall be applicable from the date of amendment.

viii. The Rules and Regulations formulated in this document shall be subjected to revisions/refinement/updates/modifications through the approval by the Academic Council from time to time, and shall be binding on all concerned Stakeholders, including the Students, Faculty, Staff, Departments, and Administrators.

3. ORGANIZATION STRUCTURE & ACADEMIC DEPARTMENTS

The organization structure and academic departments are well-established to ensure the proper execution of B. Tech Engineering, BBA & BCA programmes in a qualitative way. Following are details about the various committees and undergraduate programmes:

i. The academic administration of the Institute consists of committees and functionaries as below:
   - The Academic Council (AC) is a statutory and supreme body that governs all academic matters of the Institute. The AC is chaired by the AC Chairman (Director of the Institute) and the decisions made by the Chairman of AC in regard to all academic issues shall be final and binding to all the stakeholders. The AC may also form various sub- committees from time to time for specific purposes.
   - The Academic Standing Committee (ASC) shall continuously assess the academic activities and make appropriate revisions / modifications / improvements as and when required. All academic activities shall be scheduled through an approved 'Academic Calendar' notified in the beginning of each Academic Year.
   - Board of Examination (BOE) is constituted as per statutes of Savitribai Phule Pune University to ensure proper organization and conduction of examinations and related processes including moderation, tabulation and declaration of the results.
   - At the department level, the Board of Studies (BOS) is responsible for framing the syllabi for various courses, reviewing and updating syllabi from time to time, introducing new courses of study, determining details of continuous assessment, recommending panels of examiners etc.
   - The Department Advisory Board (DAB) and Programme Assessment Committee (PAC) are responsible to evaluate, assess and monitor the academic practices of the Department.

ii. The functionaries of the Institutes related to Academics and Examination shall be Director, Deputy Director, Dean Academics, Controller of Examinations and Heads of the Departments.

iii. Academic Departments and Programmes offered:

The Institute offers undergraduate programmes in Engineering, management and computer applications as mentioned in Table 3.1.

Table 3.1: Academic Departments and Programmes Offered

Sr. No	Academic Department	Programme Offered	Sanctioned Intake
1	Civil Engineering	Bachelor of Technology in Civil Engineering	60
2	Computer Engineering	Bachelor of Technology in Computer Engineering	360
3	Electronics & Telecommunication Engineering	Bachelor of Technology in Electronics & Telecommunication Engineering	60
4	Information Technology	Bachelor of Technology in Information Technology	60
5	Mechanical Engineering	Bachelor of Technology in Mechanical Engineering	60
6	BBA	Bachelor of Business Administration	120
7	BCA	Bachelor of Computer Applications	120

4. ACADEMIC CALENDAR

The academic activities of the Institute are regulated by Academic Calendar approved by the AC / ASC, and are released at the beginning of each Academic Year. It is mandatory for Students and Faculty to strictly adhere to the academic calendar for completion of academic and related activities.

i. The Academic Calendar shall be prepared by Dean Academics and approved by the AC / ASC.

ii. The AC sets a definite time schedule for various academic activities, through an Academic Calendar issued and notified to all stakeholders at the beginning of each Academic Year.

iii. The Academic Calendar shall be disseminated on the notice boards and website of the Institute.

iv. The academic activities of the institute shall be monitored as per the Academic Calendar

v. Academic Calendar shall incorporate schedule of admissions, course registration, course delivery, examination/evaluation, course feedback, course/graduate exit survey, meeting schedules, student internship, summer examinations.

vi. The curriculum shall be typically delivered in two semesters in an Academic Year.

Each semester shall be of 20 weeks duration, including evaluation, grade moderation and result declaration. The Academic semester shall provide at least 90 instructional days.

vii. All co-curricular and extra-curricular activities shall be scheduled so as not to interfere with the academic activities as stipulated in the academic calendar.

viii. The non-conduct of academics on any particular teaching day for whatever reason shall be made up on a suitable day.

5. SEMESTER REGISTRATION, ATTENDANCE, TEMPORARY BREAK, DETENTION AND TERMINATION

5.1 Semester Registration:

i. Students have to register for courses at the beginning of every semester as per the notification issued by the institute and prescribed dates in the Academic Calendar. The Institute shall notify the process of registration well in advance to the stakeholders.

ii. The students admitted through regular entry shall be automatically registered for the Core Courses of the First Semester. Such students have to register separately for Elective/Choice based Courses only.

iii. On joining the Institute, each student is assigned to a Proctor. Students are advised to discuss with the proctor about the nature of courses for which he / she can register during the semester, as given in the curriculum, within the framework of guidelines approved by the AC.

iv. In case of any delay in registration of courses, due to unforeseen reasons, the student and parent shall take prior approval from the Director well in advance indicating the reason for delay in registration. However, for such students the attendance shall be calculated from the date of commencement of the semester and not from the date of joining.

v. Only those students shall be permitted to register for a course who have:

a. Cleared all dues of the Institute, Hostel and Library including fine if any of the previous semester.

b. Earned all the credits prior to previous academic year and minimum 60% credits during the previous Academic Year.

c. Not been debarred from registration of courses on any other specific ground.

vi. If a student does not register in a prescribed schedule, notified by the Institute, his / her admission shall stand canceled in the respective semester. Parents are advised to take a note.

vii. Students need to re-register for courses in which they failed in earlier year/s by paying applicable fees, if they wish to go for betterment of Formative Assessment. Students are not permitted to re-register for course/(s), which they have already passed.

5.2 ATTENDANCE REQUIREMENT:

The Institute expects all B. Tech. students to attend 100% lectures. However, a shortfall of not more than 25% lectures may be condoned if the shortfall is caused by valid reasons and supported by appropriate evidence, such as personal illness or death in the family. Students shall note that academics should not be missed without valid reasons, and the number of sessions missed due to valid reasons cannot exceed 25%.

i. Each semester is considered as a unit and the candidate has to put in a minimum attendance of 75% in each course with a provision for consideration of 15% of the attendance by the Director, for reasons such as serious medical condition or representing the Institute /University / State / Nation in sports, cultural, technical or academic activity with the permission of the Institute authorities.

ii. For the students representing the institution at University, National and International level, the attendance can be considered as 'Present' for such cases at the end of semester. However, prior permission must be obtained from the HOD and relevant documents must be submitted upon completion of the activity.

iii. The student who has not attended minimum 75% of all conducted classes like Lectures, Tutorials, Laboratories, Workshops etc. shall be declared as Detained and shall not be permitted to attend the SA.

iv. The basis for the calculation of the attendance shall be the period prescribed by the Institution through its Academic Calendar. For late admission / transfer of students from other institutes /universities, the date of admission would be considered for the calculation of attendance (this rule does not apply to higher semesters).

v. The students will be informed about the attendance status periodically by the Institute notifying the percentage attendance on the notice board.

5.3 TEMPORARY SEMESTER BREAK OF STUDY FROM THE PROGRAMME:

A candidate is normally not permitted to break the study. However, if a candidate intends to temporarily discontinue the program in the middle for valid reasons such as entrepreneurship, incubation, start-ups, internships leading to placement, foreign university opportunities, research opportunities etc. and wants to rejoin the programme later in respective semester, he / she shall apply to the Director, well in advance.

i. Such application shall be submitted within at least 6 weeks of the commencement of the semester or from the date he/she has attended the classes, whichever is later, stating fully the reason for such a withdrawal, together with supporting documents and endorsement of his/her parents/guardians through the Head of the Department.

ii. The institute shall examine such an application and if it finds the case to be genuine, it may permit the student to temporarily withdraw from the program. Such permission is accorded only to those

a) who have the possibility to complete the prescribed program requirements within the time limits specified by the programme.

b) who do not have any outstanding dues /demand at the Institute / University level including tuition fees, any other fees library materials etc.

c) Such students are expected to pay 100% fees of the year in which they are taking semester break. The candidate has to rejoin the semester after the break from the commencement of the respective semester as and when it is offered.

iii. The total period for completion of the programme is considered from the commencement of the semester to which the candidate was first admitted and shall not exceed the maximum period prescribed for the respective programme. The maximum period includes the break period.

a. If any candidate is detained for any reason, the period of detention shall not be considered as a "break of study".

b. It may be noted that the fees/charges once paid shall not be refunded.

c. Normally, a student will be entitled to avail of the temporary break facility only once for maximum period of two years during his/her studentship of the programme. Hence, the student shall take the advice of the Director to use the above provision only in exceptional cases.

5.4 DETENTION:

i. A student shall be declared as Detained and shall not be permitted to attend the SA and Practical/Oral Exams if;
    a. The student who has not attended minimum 75% of all conducted classes like Lectures, Tutorials, Laboratories, Workshops etc.
    b. Incomplete term work and non-submission of laboratory journal.

ii. Such students are expected to pay 100% fees of the year in which they are detained.

iii. Such students are expected to take admission in the next Academic Year by paying applicable fees as below: 100% fees if detained in odd semester and 50% fees if detained in even semester.

5.5 TERMINATION FROM THE PROGRAMME:

A student shall be terminated from the programme in the following cases:

i. Involved in ragging and in any illegal activity as per law defined by the governing authorities.

ii. Successive failures in first Year: On failure to get admitted in third semester after three successive academic years from the date of admission, he / she shall be declared as Not Fit for Technical Education (NFTE). Such students shall be permitted for only one year to continue the education in the institute provided the permission is accorded by AC. Director shall be authorized to terminate the student from the program.

iii. Not completing programme in prescribed period: Students will have to complete B. Tech. programme in maximum period of 6 years (12 semesters) for regular entry and 5 years (10 semesters) for lateral entry from the date of first admission. Genuine cases with valid justification may be referred to the Director. On behalf of the Academic Council, the Director is authorized to make decisions regarding such applications for extending the programme completion period for degree award, in accordance with the prevailing rules and guidelines set by professional statutory bodies. Students who are not able to complete the programme in the stipulated period will be declared as Not Fit for Technical Education (NFTE).

iv. Under following circumstances student admission may be terminated from the programme if;

a. Students misbehave with faculty or staff.

b. Remain absent without any information for a period of one year.

c. In case of termination, the student has to pay all applicable dues.

6. CURRICULUM

There shall be a prescribed course structure for each of the academic programmes and in general terms it shall be known as the Curriculum. The Curriculum prescribes all the Courses of study semester-wise with credits assigned, teaching/contact hours, evaluation scheme and minimum requirements for the award of degree. The curriculum revisions/reforms/revamping shall be a continuous process governed by outcome-based education, choice-based credit system and AICTE model curriculum.

6.1 Credit System:

i. The primary purpose of the credit system is continuous evaluation of a student's performance which is measured by the number of credits the student has earned. Typically, credit measures the quantum of work involved in a course.

ii. Credit structures for various courses with various combinations of theory/tutorial and Laboratory/Project/Seminar/Mini Project hours are given in Table 7.1.

iii. A student can earn credits for a particular course by fulfilling the minimum academic requirements of attendance, assessment and evaluation. No credits shall be awarded if a student satisfies the minimum attendance requirements but fails to meet minimum assessment & evaluation requirements.

Table 7.1: Assigned credits for various types of courses

Hours per week per student for engagement for			Credits Assigned
Theory	**Tutorial/Seminar**	**Laboratory/Project**	
1	0	0	1
0	1	0	1
0	0	2	1
0	0	4	2
1	1	0	2
1	0	2	2
3	0	0	3
2	0	2	3
2	1	0	3
3	1	0	4
3	0	2	4
4	0	0	4
2	0	4	4
Credit = Theory hours + Tutorial hours + 0.5 (Laboratory hours)			

iv. The CGPA & SGPA is calculated based on the course credits and grades obtained by students. A minimum number of earned credits and minimum CGPA should be acquired in order to qualify for the degree.

6.2 Components of Curriculum:

i. The structure of curriculum for a programme and course syllabi shall be approved by AC on recommendation of respective BOS.

ii. The entire curriculum is spanned over eight semesters and has thoughtfully designed contents and evaluation methods. Total credits are 168. The exact number of credits required is mentioned in the curriculum structure for the respective programme.

iii. Curriculum shall have credit and audit (Non-Credit) courses.

iv. Curriculum will have balanced offerings of various courses such as Basic Science, Engineering Science, Professional Core, Professional Electives, Multidisciplinary courses, Skill courses, Humanities Social Science and Management courses, Experiential courses, and Liberal Learning courses. The curriculum offerings include various course types as mentioned in Table 7.2.

Table 7.2: Curriculum Components.

Sr. No	Course Code	*Component of Curriculum
1	AEC	Ability Enhancement Course
2	CC	Core Courses
3	DSE	Discipline Specific Elective
4	MDE	Multi-Disciplinary Elective course
5	OE	Open Elective
6	SEC	Skill Enhancement Courses
7	VAC	Value added Courses
8	CO-C	Co-Curricular Courses

v. Normally the number of courses in a semester shall not be more than six for theory and four for laboratory courses.

vi. Audit courses in the curriculum shall offer students to understand the way their expertise/ domain knowledge can be utilized for developing core engineering knowledge.

vii. A typical description of the programme curriculum shall consist of course title, course code, teaching hours per week for lecture/ tutorial/practical's, credit allotment, pre-requisites, text books, reference books, Course Objectives and Course Outcomes (COs) with relevant Bloom's taxonomy levels, Programme Outcomes (POs), Programme Specific Outcomes (PSOs), mapping of the COs with POs and PSOs and assessment scheme etc.

viii. The details of the programme structure and course details shall be published on

institute website https://www.pccoer.com

7. EXAMINATION AND EVALUATION

There shall be continuous evaluation of students. This system will have following objectives:

i. To get insights regarding student performance/abilities which helps to identify learning needs and take necessary actions for possible improvement.
ii. To give feedback to the student about his level of understanding and abilities as per required Graduate Attributes (GAs).
iii. To allow students to demonstrate their competence which they will practice in their professional career.
iv. To award students grades based on their performance and abilities.
    a. Evaluation processes shall ensure outcome-based education adopted by the institute. All assessment methods will ensure constructive alignment of curriculum with intended outcomes.
    b. There shall be internal and external evaluation of students as a part of evaluation to award grades. All assessment of Theory, Practical, Project, Seminar and internship shall be conducted to evaluate GAs essential to meet the needs of engineering graduates at national as well as international level. Appropriate weightages given to these evaluation methods will ensure quality of assessment and evaluation.
    c. Evaluation scheme based on type of course with weightage is mentioned in table 8.1.

Table 8.1: Scheme of evaluation for courses prescribed in curriculum with weightages

Sr. No.	Type of course	Method of Formative/ Internal Assessment	Formative / Internal Assessment Weightage (%)	Method of Summative / External Assessment	Summative / External Assessment Weightage (%)	Total
1	AEC/CC/ VAC/OEC /DEC/MD E/SEC (Theory)	Assignment/ case study/ Quiz/Poster presentation/ Seminar presentation/ Open book test etc.	50 (20 + 20 + 10)	SA of 50 Marks based on 100% syllabus shall be conducted.	50	100
2	Term work	Experiment/Assignment/ case study report for each Experiment/Assignment	25 or 50	NA		25 or 50
3	Laboratory	Oral/practical examination	NA	Oral/practical examination	25 or 50	25 or 50

Sr. No.	Type of course	Method of Formative/ Internal Assessment	Formative / Internal Assessment Weightage (%)	Method of Summative / External Assessment	Summative / External Assessment Weightage (%)	Total
4	Major Project *TW	Project Reviews (Minimum 2) Rubric based Evaluation	-	Oral and Term Work	50+100	150
	OR	-	-	Viva voce	50+100	
5	Internship*	Rubrics based evaluations along with report.	-	-	50	50
6	Skill courses	Hands on/Practical test, Live projects, Assignment/case study/Quiz/Poster presentation/Seminar presentation/Open book test/ Class test etc.	50/100	If needed as per the demand of course	-	50/100
7	*Experiential Learning/ Liberal Learning courses	Rubric based Evaluations/ Live task / assignment / Practice/ case study / Quiz / Poster presentation for PP or NP grade	50/100	-	-	50/100

* As specified in the programme curriculum.

7.1 Internal Evaluation:

Internal Evaluation shall be done continuously by faculty over a span of semester. Structured Evaluation will be done for all programmes with appropriate schedule in Academic Calendar as follows:

7.1.1 Formative Assessment (FA) Theory Courses:

i. The FA for Professional Core, Professional Elective, Open Elective, Basic Science Course, Engineering Science Course, HSMC courses and MDM courses, Experiential Learning Courses etc. shall be conducted at department level. FA shall consist of three evaluation instances as follows:
   a. Formative Assessment 1 (FA 1) [Unit test]
   b. Formative Assessment 2 (FA2) [Assignment/ case study/ Quiz/Poster/ Presentation / Seminar presentation/ Open book test etc.] The FA for other type of courses shall be based on feasibility & need of Evaluation.
   c. Formative Assessment 1 (FA3) [Quiz]

ii. Sum of the scores obtained in FA1, FA2 and FA3 shall be considered for computing the final FA of a student in each course.

7.1.2 Internal Evaluation of Practical Term work

i. Continuous evaluation of each experiment/assignment shall be done throughout the semester, collating as Term work at the end of each semester. The Evaluation in a laboratory course will be based on the following criteria
   - Attendance and participation in laboratory work.
   - Performance in Evaluation of understanding through viva voce, group discussions, quizzes, etc.
   - The quality of work as prescribed by the course instructor.
   - Timely Submission
   - Report through laboratory journals

ii. It is mandatory for the student to complete all the experiments/assignments as specified in course curriculum for the grant of Term work. It is obligatory to maintain and submit laboratory journals as prescribed by the course instructor before the Term End.

iii. Students shall be detained for incomplete Term work and non-submission of laboratory journals and will require registering the course again.

iv. Term work marks assigned for special courses such as Mini Project etc. shall be evaluated based on parameters proposed by respective Department and duly approved by Dean Academics.

7.1.3 Internal Evaluation of Project/Seminar/Internship:

i. Project/Seminar Term work will be evaluated based on Reviews scheduled in the semester/s as mentioned in the Guidelines.

ii. For Internship rubrics-based evaluations along with a report shall be conducted. The marks of this evaluation will be collated as term work with 100% weightage in total Evaluation.

7.2 External Evaluation:

7.2.1 Theory Evaluation:

Summative Assessment (SA): Summative assessment at the end of semester shall be conducted for external evaluation. This SA of 50 Marks and it will be conducted at Institute level.

Re-examination: Re-examination shall be conducted after declaration of result of main SA examination for students with failed/acquired transitional grade as per rules and regulations. Students need to pay additional examination fees for such Re-SA examinations.

Re-SA examination shall be provided for those students who are having satisfactory attendance (Minimum 75%), course-wise, but remained absent for the regular SA due to a valid/unavoidable circumstance, like:

a. Students, who have sought due prior permission from concerned HOD and Director through proper channel, and there after permitted by the institute for taking part in important curricular/ co-curricular/ extra-curricular activities like Technical events/NSS/Sports/Cultural/Project Competitions/Paper presentation etc. at University/ State/ National/ International levels (the students/ authorities should exercise enough care that a student shall not remain absent for the makeup examination) After such an event, at the time of reporting to the Institute, the student must submit the proof of participation/ certificate from the competent authority for approval of the prior leave request. The prior leave request shall be converted to official leave and an endorsement will be issued by the Institute, based on which the student shall be eligible for the makeup examination.

b. Students seeking prior leave on account of
    1. Accident or severe illness leading to hospitalization, which disables the student from writing the examination.
    2. A calamity in the family (first relation Only-Parents, Grandparents and Siblings) barring the student from writing the examination.

c. Students seeking prior leave for attending any competitive examinations (NDA/SSB/UPSC/MPSC etc.) /Placement drives.

In the event of b and c, it is mandatory on the part of the student/parent to inform the respective departmental authorities (Class Teacher/HOD) immediately through email or mobile message and submit a prior leave request. If the information reaches the Class Teacher first, it is the responsibility of the Class Teacher to immediately intimate the HOD and record the same in the examination report without fail. After such an event at the time of reporting to the Institute, the student must submit all the relevant reports/certificates from the competent authority for approval of the prior leave request. The prior leave request will then be converted to official leave and an endorsement will be issued by the Institute, based on which the student becomes eligible for the Re-SA examination. Any intimation after the completion of regular examination and/or non-submission of report/certificate will be construed as absent for the examination and the student will be awarded ZERO marks in the respective examination. No further request will be entertained in this regard.

The Re-SA examination shall not to be treated as an improvement examination.

Summer Examination: The Summer examination shall be conducted at the end of even semester. The summer exam includes courses offered in both the semesters. Only Summative examination will be conducted. Students need to register for such examinations by paying specified fees.

If a student fails in the Summer Examination, then he/she may Reregister with FA again or he/she may Reappear with his/her existing FA performance (Latest FA will be considered).

7.2.2 Practical Evaluation

Practical/Oral examinations by the internal and external examiners will be conducted for Practical's at the end of each semester as per the schedule in Academic Calendar.

i. Final examination for laboratory courses will normally be held in the last week of conclusion of teaching as per Academic Calendar.
ii. These oral/practical examinations will be conducted in the presence of an External Examiner appointed by competent authority.
iii. Weightage of 50% each for evaluation by internal and external examiner shall be considered. In case of absence from oral/practical examination, the same rules as those for theory courses are applicable.
iv. Re-examination for practical/oral examinations shall be conducted before re-examination of theory courses.

7.2.3 Major Project/Seminar Evaluation

The Project is a group activity. Minimum two Internal Reviews per semester shall be conducted. Students shall be evaluated as per the rubric designed by the relevant Programmes. A Viva voce will be conducted at the end of the semester in the presence of an External Examiner. The student team has to submit a hard bound copy of the report summarizing the Problem, Relevant Literature, Design, Analysis, Experimentation, Results, Outcomes and Conclusions as per the guidelines provided by the relevant Programmes.

8. EXAMINATION RULES AND REGULATION

8.1 Credit Courses:

Based on the Evaluation student will be awarded letter grades after combining performance of all (FA+SA) evaluations for the respective course. These letter grades will be derived from quantitative and qualitative evaluation converted into a 10-point scale called as grade point for credit courses.

8.2 Noncredit Courses:

Apart from credit courses, Noncredit courses will be awarded letter grades as PP (Pass) and NP (Not Pass) based on quantitative and qualitative Evaluation. In addition to above letter grades students will be awarded dual letter grades in specific circumstances mentioned in rules and regulations for passing, A.T.K.T, award of class.

8.3 Passing, A.T.K.T. and award of class

8.3.1 Rules of Passing

i. Term work/Practical/Oral

To pass the Termwork/Practical/Oral the student has to earn a minimum of 40% marks in each head.

ii. Theory Course head

a. To pass the Theory Subject head the student must earn a minimum of 40 percent marks in SA and 40 percent average marks (FA+ SA).

b. The failing student can repeat the SA to pass the head in the same semester and the FA marks will be retained as it is. However, grades earned in re- examination (Re-SA) shall be marked with *(asterisk) for more than 2 attempts except for transitional grades II and XX.

Students failed in re-examination (Re-SA) can:

i) continue their FA just by appearing for SA (Reappear)

ii) apply for FA betterment (Re-Registration).

This is irrevocable once opted.

If students have applied for FA betterment (Re-Registration), they need to attend classes and perform their FA and appear for the SA.

c. To earn credits of a course (Theory/term work/practical/oral/presentation) students must pass the course with minimum passing marks/grade.

Summary:

Students must earn a minimum of 40 percent marks in SA and 40 percent average marks (FA + SA) for passing.

Students failed in Re-examination need to reappear for the course/s by paying applicable fees in the Summer Examination, if offered by the Department or reappear/re-register by paying applicable fees in respective semester (Odd and Even) of next academic year.

iii. A student shall be awarded the bachelor's degree if he/she earns 168 credits as per the structure defined by the programme and clears all the audit and noncredit courses specified in the curriculum. In case of lateral entry, students shall be awarded the bachelor's degree if he/she earns 124 credits as per the structure defined by the programme.

8.3.2 Rules of A.T.K.T.:

i. A student can register for the third semester if he/she earns minimum 60% credits of the total of first and second semesters.

ii. A student can register for the fifth semester if he/she earns a minimum 60% credits of the total of third and fourth semesters and all the credits of first and second semester.

iii. A student can register for the seventh semester if he/she earns a minimum 60% credits of the total of fifth and sixth semesters and all the credits of third and fourth semester.

9. PERFORMANCE INDICES SGPA & CGPA

9.1 Grading and Evaluation:

Grade points and equivalent letter grades for absolute grading will be as mentioned in Table 10.1.

Table 10.1. Performance with grade points and equivalent letter grades

Grade Point	Letter Grade
10	O (Outstanding)
9	A+ (Excellent)
8	A (Very Good)
7	B+ (Good)
6	B (Above Average)
5	C (Average)
4	P (Pass)
0	F (Fail)
0	Ab (Absent)

i. Apart from credit courses, Noncredit courses will be awarded with letter grades based on quantitative and qualitative evaluations as PP (Pass) and NP (Not Passed).

ii. Grades in special circumstances: In addition to above letter grades students will be awarded dual letter grades in specific circumstances as mentioned in table 10.2.

Table 10.2 Grades in special circumstances

Reason	Letter Grade
Detained due to insufficient attendance or incomplete Term work (Detained and Repeat)	DR
Withdrawal of course with satisfactory attendance (Willful Withdrawal)	WW
Satisfactory performance in FA but absent in SA due to valid reason (Incomplete due to Illness)	II
Very good performance in FA (more than or equal to 80%) but poor performance in SA leading to fail (F) overall grade	XX
Credit Transfer grades, if student is completing grades for any courses at other Institute/ University etc.	CT
Special Grades to be given to students appearing for special examination, who could not attend earlier examination due to Co-curricular activities/ NSS/ NCC/ Competitions.	SG
Result Reserved due to backlog	RRB

iii. Note: 'II' and 'XX' are transitional grades awarded which will be converted to actual grades earned in re-examination else will automatically get converted into 'F' grade. Candidates can avail facility of XX grade only once over the span of program for theory courses.

9.2 Calculation of SGPA and CGPA:

Based on the grade points earned by the students, performance of student in each semester will be calculated as semester grade point average (SGPA) as follows

$$GA = \frac{\sum_{=1} rd\ os\ rd\ \ rds\ of\ h\ ors}{o\ rds\ \ ssr}$$

For Example: suppose in a given semester a student has registered for five courses having credits C1, C2, C3, C4, C5 and his / her grade points in those courses are G1, G2, G3, G4, G5 respectively. Then student's SGPA will be

$$GA = \frac{\sum_{=1} 11 + CC + CC + CC +}{1 + C + C + C +}$$

At the end of each academic year cumulative grade point average will be calculated based on the grade points obtained in all the courses (Theory/term work/practical/oral) of first semester to eighth semester for the students admitted in the First year and third to eighth semesters for the students directly admitted in Second year. It is calculated in the same manner as the SGPA. The class shall be awarded to a student on the CGPA calculated as mentioned in Table 10.3:

Table 10.3 Class of Degree

Sr. No.	CGPA	Class of the degree awarded
1	7.75 or More than 7.75	First class with distinction
2	6.75 or more but less than 7.75	First class
3	6.25 or more but less than 6.75	Higher second class
4	5.50 or more but less than 6.25	Second class
5	4.00 or more but less than 5.50	Pass Class

9.3 Percentage of Marks: Based on the CGPA earned by the students, percentage of marks of student will be calculated as follows:

Percentage of Marks = CGPA X 9.5

10. SEMESTER GRADE REPORT

i. A Grade Report in the form of a Grade Card shall be issued to students at the end of each Semester.

ii. The Grade Card shall include the following;
   a. The list of courses registered for an academic year along with credits.
   b. The letter grade obtained in each course.
   c. The total number of credits earned by a student.
   d. SGPA, CGPA Details.
   e. Examination details.
   f. Grading System, calculation of performance indices and conversion of CGPA to equivalent percentage shall be provided on the back page of the grade card.

iii. Grade Cards shall be used to prepare Transcripts of the student.

11. AWARD OF THE DEGREE

A student shall be eligible for the award of Bachelor of Computer Application (BCA). Degree from the institute and Savitribai Phule Pune University if the student has:

i. Obtained eligibility certificate from the University.
ii. Registered & passed all the prescribed courses & earned minimum credit requirement for the said degree.
iii. Obtained CGPA ≥ 4.00
iv. Paid all the Institute dues and satisfied all the requirements prescribed.
v. No case of indiscipline pending against him/her.

The Academic Council (AC) shall recommend the list of all eligible students to SPPU for award of Bachelor of Computer Application (BCA). Degree with additional Honors/Minor certification wherever applicable.

12. DISCIPLINE & CONDUCT

i. Every admitted student shall be issued a photo identification (ID) card which must be retained by the student while he/she is registered at PCCOE&R. The student must have a valid ID card with him/her while in the Institute.

ii. Discipline & Conduct: Any act of misconduct committed by a student inside or outside the campus shall be an act of violation of discipline of the institute. Violations of the discipline shall include:
   a. Disruption of teaching, examination, administrative work, curricular or extracurricular activity, and any act likely to cause such disruption.
   b. Refusing to provide an identity card when demanded by any institute authority.
   c. Damaging or defacing the property inside or outside the institute campus.
   d. Engaging in any attempt at wrongful confinement of teachers, offices, employees and students of the institute.
   e. Use of abusive and derogatory slogans or intimidatory language or incitement of hatred and violence.
   f. Ragging in any form (“Ragging” means causing, inducing, compelling or

forcing a student, whether by way of a practical joke or otherwise, to do any act which detracts from human dignity or violates his person or exposes him to ridicule or to forbear from doing any lawful act, by intimidating, wrongfully re-straining, wrongfully confining or injuring him or by using criminal force to him or by holding out to him any threat of such intimidation, wrongful restraint, wrongful confinement, injury or the use of criminal offense. Supreme Court of India has defined ragging as a criminal offense.)

g. Eve teasing or disrespectful behavior to women or girl's students.
h. An assault upon, or intimidation of, or insulting behavior towards a teacher, officer, employee or student or any other person.
i. Getting enrolled in more than one programme course of study simultaneously.
j. Committing forgery, tampering with documents or records, identity cards, furnishing false certificate or false information.
k. Organizing instant agitation/meetings without prior permission in the campus.
l. Viewing/downloading obscene information/data, images and executable files, sending obscene mails/ messages via facebook / twitter/other social sites using institute servers.
m. Sharing the login and passwords & other details of IT facilities provided to other students/outsiders.
n. Consuming or possessing alcoholic drinks, dangerous drugs or other intoxicants in the institute campus.
o. Possessing or using any weapons and firearms in the institute campus.
p. Unauthorized occupation of a hostel, Accommodating guests or other persons in hostels without permission.
q. Malpractice in examination.
r. Indulging in anti-national activities contrary to the provisions of acts and laws enforced by the Government.
s. Any other act which may be considered by the Director or the Discipline Committee to be an act of violation of discipline.

iii. Any act of indiscipline of a student reported to Director/concerned authority shall be referred to Grievance Redressal and Disciplinary Committee (GRDC) of the institute. The Committee shall enquire into the charges and recommend suitable punishment if the charges are substantiated. The penalties/punishment/actions may include:

a. Written warning and information to the parents/guardian.
b. Imposition of fine ranging from Rs.500/- up to Rs.5000/-
c. Suspension from the Institute/Hostel/Mess/Library/ or availing of any other facility.
d. Suspension or cancellation of scholarships /fellowship or any financial assistance from any source.
e. Recover of loss caused to Institute property.
f. Debarring from participation in sports/NSS/student club.
g. Disqualifying from holding any representative position in the Class/institute

/ Hostel / Mess/Sports/ Clubs and in similar other bodies.

h. Disqualifying from appearing in placement and receiving any awards.
i. Expulsion from the Hostel/Mess/Library/Club/institute for a specified period by forfeiting fees.
j. Debarring from an examination.
k. Action as per Maharashtra anti-ragging act1999.

iv. If a student is found guilty of malpractice in examinations, then he/she shall be punished as per the recommendations of the Complaint Redressal Committee (CRC) constituted by BOE. The CRC committee shall inquire and decide the punishment by following the guidelines for imposing punishment on examinee/s/others involved in unfair means. However, depending on the situation, committee may quantify the severity of the punishment which may include:

a) Cancellation of the performance of the student in the course/s in which he/she was involved in malpractice.
b) Cancellation of the performance in that examination for all the courses.
c) Expulsion/termination from the institute if repeatedly involved.
d) Stoppage of scholarships/stipend.
e) Issuing warning.
f) Debarring from the examinations for a specified period.

Student/s involved in acts of indiscipline/malpractice in examination shall be issued notice asking him/her to be present before the respective committee (CRC) on the day at specified time and venue with his/her parents/guardian. He/she shall give written reply/oral explanation to the charges leveled against him/her for consideration. If the implicated students fail to appear before the committee, then a decision shall be taken in absentia, based on available evidence/documents, which shall be binding on the concerned student.

12.1 Conduct during Examination:

i. Timing:

a. The students are required to be present outside the examination hall exactly 20 minutes before the start of the examination.
b. Students will only be allowed to enter the examination hall 15 minutes prior to commencing the examination.
c. The students will not be allowed to appear in the examination if they reach the examination center 30 minutes after commencement of examination.
d. No student can leave for 30 minutes after the commencement of the examination.
e. Students are not permitted to leave the examination hall during the last 10 minutes.
f. Students are responsible for keeping themselves informed about exam dates, as well as the time and place of the examination.
g. Differently abled students will be given additional time of 20 minutes/ hour of

examination.

ii. Identity check-up:

a. Students will not be allowed into the examination hall without presenting an appropriate photo identity card, Hall ticket issued by the Institute.
b. Invigilators are responsible to ensure full compliance with such requirements.
c. If a student forgets his/her Institute Identity Card, the driving license/ other photo identity card will be accepted in place subject to verification by the concerned teacher/ examination coordinator/ Head of the Department concerned.

iii. Breaks:

a. Breaks for visits to the bathroom may be taken only after permission from the invigilator and under the condition that the invigilator's instructions given on the occasion are followed.
b. If a student falls ill during the examination and is unable to complete the examination, the concerned student should alert the invigilator and senior supervisor in consultation with the concerned Head of the Department may make suitable arrangements for proper medical attention.
c. No student shall re-enter the examination hall after leaving it unless he/she was under approved supervision during the full period of absence.

iv. Question papers and answer sheets:

a. During an ongoing examination students are not allowed to take the examination question paper outside the examination hall. After the examination, the student should personally submit his/her examination answer sheet to the invigilator.
b. Even a blank answer sheet shall be handed over to the invigilator.
c. Each answer sheet should contain details as mentioned on the front page.
d. If there are any queries regarding the exam questions the students must ask the invigilators who will contact the course teacher through the proper channel.

v. Other materials:

a. Students should bring their own pencils, pens, erasers, rulers, non-programmable calculators, and any other tools required for the examination.
b. Students are advised not to bring valuables for examination. Students shall keep their handbags, cases, outdoor clothes, etc. at identified locations for the same. Students are responsible for the safekeeping of all personal belongings they bring to the examination hall. The Institute takes no responsibility for the loss or damage of such belongings.
c. Pencil cases, mobile phones, smart watches, earbuds/neck bands/headphones, dictionaries, electronic dictionaries, written or electronic media, digital media, or any other materials are not permitted/ allowed into the examination hall, with the exception of devices used for assisting students with hearing visual or other physical difficulties.
d. Exchange of pens, pencils, calculators, study material, etc. is not permitted.

e. Calculators with more than one-line display or with alphanumeric display (programmable calculators) are not permitted into the examination hall unless specified in advance by the examiner. If the invigilator reasonably believes that a student is using a calculator that does not conform to the rules, he/she has the discretion to replace the calculator and a report on the matter will be made on the invigilator's declaration form.

vi. Disturbance:

a. During the examination period, there must be no communications among students or between a student and an outsider by any means, such as phones. This rule applies to students in the examination hall and those on supervised breaks for visits to bathroom/s.
b. No student shall leave his/her assigned seat without the permission of the invigilator. It is the invigilator's discretion to decide whether there is enough reason to remove a student from the examination hall owing to disorderly conduct.

vii. Miscellaneous:

a. The students must ensure before they leave the examination hall that they have signed the attendance sheet.
b. The students with medical problems will be provided Writer in the Examinations only subject to prior permission from the Dean Academics.
c. The documentary proof along with recommendations of concerned HOD will be required. All such cases will be dealt with as per academic rules.
d. If you suffer from language difficulties or any disabilities you can apply for an extension of the test time.
e. Students are not allowed to wear a smart watch during the examination.
f. Cheating, and attempts at cheating, will immediately be reported to the Examination Office. Consequences of proven cheating or attempts at cheating will be dealt with separately by the malpractice and grievance handling committee.

13. CONCLUSIONS

i. The Academic, Examination and Evaluation Policies/Rules and Regulations regarding conduct of undergraduate programmes at PCCOE&R are published in this document. The Academic Council reserves the right to modify these policies/ regulations as and when required from the point of achieving academic excellence.

ii. The rules for grace marks, consideration of extracurricular activities, condonation, amendment of results, unfair means resorted to by the students and punishments, physically challenged students will be governed by the ordinance approved in Academic Council. These policies will be in concurrent with the rules and guidelines of professional statutory bodies such as AICTE, UGC and affiliating university SPPU etc.

iii. Interpretation: Any question as to the interpretation of these guidelines shall be decided by the institute head, whose decision shall be final and binding in the matter. The institute head shall also have the power to issue clarifications to remove any doubt, difficulty or anomaly, which may arise regarding the implementation of these Guidelines.

iv. The decision of the Director (Chairman, Academic council) shall be final and binding on all concerned i) for the cases not covered through this document; ii) in case of dispute, difference of opinion in interpretation of this regulation; and
iii) emergent cases.

1) Formative Assessment Paper Format

	**Pimpri Chinchwad Education Trust's** **Pimpri Chinchwad College of Engineering & Research Ravet, Pune** An Autonomous Institute | NBA Accredited (4 UG Programs) | NAAC A++ Accredited | ISO 21001:2018 Certified **IQAC PCCOER**	
Academic Year:2025-26 **Term**–I	**Formative Assessment**	**ACAD/R/11-FA**

Department: **Class:** **Div:**
Subject: **Maximum Marks: 30** **Duration:** 1 hr
Subject Code: **Date:**

Note: *1. Attempt all Questions*
2. Give explanation or justification wherever required.
3. Neat diagrams must be drawn wherever necessary.

Course Outcomes:

CO No.	Course Outcomes	BT Level

Question No.		Question	CO / BTL /PI	Marks
Q1		**Attempt any Three (Unit 1)**		**15 Marks**
	a			
	b			
	c			
	d			
	e			
Q2		**Attempt any Three (Unit 2)**		**15 Marks**
	a			
	b			
	c			
	d			
	e			

**********END**********

Department Seal

2) Summative Assessment Paper Format

	Pimpri Chinchwad Education Trust's **Pimpri Chinchwad College of Engineering & Research Ravet, Pune** An Autonomous Institute | NBA Accredited (4 UG Programs) | NAAC A++ Accredited | ISO 21001:2018 Certified **IQAC PCCOER**	
Academic Year:2025-26 **Term**–I	**Summative Assessment**	**ACAD/R/11-SA**

Department: **Class:** **Div:**
Subject: **Maximum Marks: 50** **Duration:** 2 Hrs
Subject Code: **Date:**

Note: *1. Attempt all Questions*
2. Give explanation or justification wherever required.
3. Neat diagrams must be drawn wherever necessary
4. Figures to the right indicate full marks

Course Outcomes:

CO No.	Course Outcomes	BT Level

Question No.		Question	CO & BT	Marks
Q1		**Attempt any Two (Unit 1)**		**10 Marks**
	a			
	b			
	c			
Q2		**Attempt any Two (Unit 2)**		**10 Marks**
	a			
	b			
	c			
Q3		**Attempt any Two (Unit 3)**		**10 Marks**
	a			
	b			
	c			
Q4		**Attempt any Two (Unit 4)**		**10 Marks**
	a			

b
c

Q5 **Attempt any Two (Unit 5)** **10 Marks**

a
b
c

****

These Academics, Examinations and Evaluation Guidelines are applicable for all years and all batches under autonomy, as per NEP 2020 guidelines commencing from the Academic Year 2025-26.

For any difficulty in understanding rules and regulations, please write to:

- deanacademics@pccoer.in
- examcell@pccoer.in
- registrar@pccoer.in
- principal@pccoer.in

Note:

The above rules and regulations are also applicable to BBA and BCA courses with obvious changes wherever required/applicable.

Dr. Harish Tiwari

Director
PCET's Pimpri Chinchwad College of Engineering and Research, Ravet,
Pune - 412 101

Pimpri Chinchwad Education Trust's

Pimpri Chinchwad College of Engineering and Research, Ravet Pune

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Curriculum Structure and Syllabus of

Second Year B.C.A.

With Effective from Academic Year 2026-27

National Education Policy (NEP) 2020 Compliant. Approved by the Board of Studies (BoS – Science and Technologies) and the Academic Council.

Dr. Smriti Pathak

Chairman - Board of Studies (Bachelor of Computer Application) Pimpri Chinchwad College of Engineering and Research, Ravet Pune

An Autonomous Institute

Chairman, Academic Council
PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412 101

1. Nomenclature

Abbr.	Full Form
AEC	Ability Enhancement Course
AICTE	All India Council for Technical Education
CC	Core Courses
DSE	Discipline Specific Elective
MDE	Multi-Disciplinary Elective course
NEP	National Education Policy
NPTEL	National Programme on Technology Enhanced Learning
OE	Open Elective
PEO	Programme Educational Objectives
PSO	Program Specific Outcomes
SEC	Skill Enhancement Courses
SWAYAM	Study Webs of Active-learning for Young Aspiring Minds
UGC	University Grants Commission
VAC	Value added Courses
CC	CO- Curriculum

2. Preface by Board of Studies

We, the members of the Board of Studies of Bachelor of Computer Application, are very happy to present the First Year of Bachelor of Computer Application syllabus effective from the AY Year 2025-26. Subsequently this will be carried forward for SY and TY in the AY 2026-27, 2027-28, respectively.

Bachelor of Computer Application is a dynamic discipline that provides the foundation for the design, development, and application of computer systems and other computing devices. This curriculum is designed to provide students with the comprehensive understanding of the fundamental principles, theories, and practices of computer application, while also preparing them for the ever-evolving technological landscape.

The revised syllabus falls in line with the objectives of NEP - 2020, Savitribai Phule Pune University, AICTE New Delhi, UGC, and various accreditation agencies by keeping an eye on the technological developments, innovations, and industry requirements. Wherever possible additional resource links of platforms such as NPTEL, Swayam are appropriately provided at the end of each course. Learners are now getting sufficient time for self-learning either through online courses or additional projects for enhancing their knowledge and skill sets. This will definitely help learners to facilitate their enhanced learning based on their interest.

This curriculum is the result of extensive consultation with academic experts, industry professionals, and alumni to ensure relevance and excellence. It is designed not only to meet the current industry standards but also to prepare students for higher studies and research in the field of computer Application.

We hope that this curriculum will inspire students to become competent professionals, responsible citizens, and contributors to the technological advancement of society. We would like to place on record our gratefulness to the faculty, students, industry experts and stakeholders for having helped us in the formulation of this syllabus.

Dr. Smriti Pathak

Chairman - Board of Studies (Bachelor of Computer Application) Pimpri Chinchwad College of Engineering and Research, Ravet Pune

Members of Board of Studies - Bachelor in Computer Application	
Dr. Janardan Pawar	Dr. Chaitali Gadekar
Dr. Rahul Kulkarni	Dr. Dipak Gore
Mr. Advait Lele	Mr. Yogesh Shinde
Mrs. Indrayani Deshpande	Mrs. Harshada Deshpande
Mrs. Kamini Fulpagar	Mr. Vishal Shishupal
Ms. Bharati V. Patange	Ms. Sneha Mane
Ms. Sheetal More	

3. Vision Mission of the Institute and Department

VISION

To be a globally recognized Institute of technological education and research for the holistic development of aspirants, through excellence in education, innovation and collaborations to fulfill the expectations of all stakeholders.

MISSION

1. To design and deliver state-of-art knowhow through experiential learning based on changing needs of industry and society worldwide, to ensure the employability and employment of each aspirant.

2. To enhance the collaborative partnership between Industry and Institute at national and international levels for commercializing and transferring the latest technological know-how towards societal, ethical and economic development

3. To achieve and sustain institute position as one of the topmost recognized and ranked institutes in technical and technological education

Department: Bachelor of Computer Applications

Vision:

The Department of BBA and BCA aim to become a premier center for business, technology, and research education by preparing confident, creative, and socially responsible, who are ready to serve the needs of society and associated stakeholders.

Mission:

- To provide quality education that builds strong knowledge, critical thinking, and problem-solving skills in business and technology.
- To inspire students to explore new ideas and use the latest technologies to develop innovative solutions in management and computer applications.
- To develop practical, entrepreneurial, and technical skills that prepare students for successful and meaningful careers worldwide.
- To nurture ethical values and a sense of social responsibility, encouraging students to become responsible professionals who contribute positively to their communities.

4. Program Specific Outcomes

- **PSO1 (Design and Development in Software):** -The ability to apply software development life cycle principles to design and develop application software that meets the automation needs of society and industry, along with the ability to understand, analyze, and develop computer programs in areas such as algorithms, system software, multimedia, web design, big data analytics, and networking for the efficient design of computer-based systems of varying complexities.
- **PSO2 (Computing and Research ability):-** The ability to employ modern computer languages, environments, and platforms to create innovative career paths in SMAC (Social, Mobile, Analytics, and Cloud) technologies."
- **PSO3 (Successful Career and Entrepreneurship):-** the ability to employ modern computer languages, environments, and platforms to create innovative career paths, whether as entrepreneurs or through higher studies also demonstrate professionalism and ethical values, serve as efficient team leaders, communicate effectively, and work competently in multidisciplinary environments.

5. Program Educational Objectives

- **PEO1:** Possess a strong foundation in core computing and programming skills, enabling them to design, develop, and implement software solutions using appropriate technologies and methodologies.
- **PEO2:** They will apply computational principles, critical thinking, and problem-solving techniques to develop innovative solutions for real-life challenges, preparing them for industry-ready professional skills.
- **PEO3:** They will be equipped to adapt to technological advancements, address global challenges, and contribute to society, industry, and the environment by embracing professionalism, communication, teamwork, lifelong learning, and ethics.

6. Program Outcomes (POs)

PO1: Apply knowledge of ICT in solving business problems.

PO2: Learn various programming languages and custom software.

PO3: Design component, or processes to meet the needs within realistic constraints.

PO4: Identify, formulate, and solve problems using computational temperaments.

PO5: Comprehend professional and ethical responsibility in the computing profession.

PO6: Express effective communication skills.

PO7: Recognize the need for interdisciplinary, and an ability to engage in life- long learning.

PO8: Knowledge of contemporary issues and emerging developments in the computing profession.

PO9: Utilize the techniques, skills and modern tools, for actual development Process.

General Rules and Guidelines

- **Course Outcomes (CO):** Course Outcomes are narrower statements that describe what students are expected to know, and are able to do at the end of each course. These relate to the skills, knowledge and behavior that students acquire in their progress through the course.
- **Assessment:** Assessment is one or more processes, carried out by the institution, that identify, collect, and prepare data to evaluate the achievement of Program Educational Objectives and Program Outcomes.
- **Evaluation:** Evaluation is one or more processes, done by the Evaluation Team, for interpreting the data and evidence accumulated through assessment practices. Evaluation determines the extent to which Program Educational Objectives or Program Outcomes are being achieved, and results in decisions and actions to improve the program.

Guidelines for Examination Scheme

Theory Examination: The theory examination shall be conducted in two different parts Formative Assessment (FA) and End-Semester Examination (ESE).

Theory				**Practical**				**Term Work**	
100 Marks		**50 Marks**		**50 Marks**		**25 Marks**		**25 Marks**	
FA	ESE	FA	ESE	Practical	OR	Practical	OR	Attendance	Lab Assessment
50	50	25	25	35	15	25	-	4	21

SEMESTER WISE CREDIT DISTRIBUTION

SEMESTER WISE CREDIT DISTRIBUTION OF PROPOSED

BCA *[BCA (HONOURS) AND BCA (HONOURS WITH RESEARCH)*] PROGRAM

Description	BCA							BCA (Honours)			BCA (Honours with Research)		
	I	II	III	IV	V	VI	Total Credit	VII	VIII	Total Credit	VII	VIII	Total Credit
Core Courses (CC)	8	12	11	15	0	4	50	5	0	55	11	21	82
Ability Enhancement Courses(AEC)	2	0	0	0	0	1	3	0	0	2	0	0	2
Multi-Disciplinary Elective course(MDC)	2	0	0	0	0	0	2	3	0	5	0	0	2
Value added Courses(VAC)	2	2	2	0	0	0	6	0	0	6	0	0	6
Skill Enhancement courses(SEC)	5	7	4	2	6	4	28	4	8	40	0	0	28
Discipline Specific Elective(DSE)	0	0	4	4	14	11	33	9	13	56	10	0	44
Open Elective Courses(OEC)	2	1	0	0	0	0	3	0	0	3	0	0	3
Co-Curricular Courses (COC)	1	0	0	0	0	0	1	0	0	1	0	0	1
Total	22	22	21	21	20	20	126	21	21	168	21	21	168

Description	Core Courses (CC)	Ability Enhancement Courses (AEC)	Multi-Disciplinary Elective course (MDC)	Value added Courses (VAC)	Skill Enhancement courses (SEC)	Discipline Specific Elective (DSE)	Open Elective Courses (OE)	Co-Curricular Courses (COC)	Total
BCA	50	3	2	6	28	33	3	1	126
BCA (Honours)	55	2	5	6	40	56	3	1	168
BCA (Honours with Research)	82	2	2	6	28	44	3	1	168

3 Years BCA Program	**Total Credits = 126**
4 Years BCA (Honours)	**Total Credits = 168**
4 Years BCA (Honours with Research)	**Total Credits = 168**

SEMESTER - III

Level 5																	
Course Code	Course	Course Type	Credits	Credit Scheme				Teaching Scheme (Hrs / Week)				Evaluation Scheme					Total Marks
				L	TU	PR	TW	L	TU	PR	TW	FA	SA	PR	OR	TW	
Semester III																	
CC-201-CA	Probability and Statistics	CC	3	3	0	0	0	3	0	0	0	50	50	-	-	-	100
CC-202-CA	Data Structure	CC	5	3	0	2	0	3	0	4	0	50	50	50	-	-	150
CC-203-CA	Software Engineering	CC	3	3	0	0	0	3	0	0	0	50	50	-	-	-	100
SEC-201-CA	Python Programming	SEC	4	2	0	0	2	2	0	0	4	25	25	-	-	50	100
DSE-201-CA	Professional Elective – I	DSE	4	2	0	2	0	2	0	4	0	25	25	50	-	-	100
VAC-201-CA	Value Added Courses	VAC	2	0	0	0	2	0	0	0	4	-	-	-	-	50	50
	Total		21	13	0	4	4	13	0	8	8	200	200	100	-	100	600

Elective Subject of DSE:

Course Code	Course Name	Subject Name
DSE-201(A)-CA	Web Development & Design	Bootstrap
DSE-201(B)-CA	Cyber Security & Cloud Computing	Fundamentals of Cloud Computing
DSE-201(C)-CA	Data Science	Basics of Data Analytics using Spreadsheets
DSE-201(D)-CA	Artificial Intelligence & Machine Learning	Future Engineering

Elective Subject of VAC:		
Sr. No	Course Code	Value Added Courses Elective
1	VAC-201(A)-CA	Yoga
2	VAC-201(B)-CA	Sports
3	VAC-201(C)-CA	NSS

SEMESTER - IV

Level 5																	
Course Code	Course	Course Type	Credits	Credit Scheme				Teaching Scheme (Hrs / Week)				Evaluation Scheme					Total Marks
				L	TU	PR	TW	L	TU	PR	TW	FA	SA	PR	OR	TW	
Semester IV																	
CC-251-CA	Entrepreneurship and Startup Ecosystem	CC	2	2	0	0	0	2	0	0	0	25	25	-	-	-	50
CC-252-CA	Computer Networks	CC	5	3	0	2	0	3	0	4	0	50	50	50	0	-	150
CC-253-CA	Design and Analysis of Algorithm	CC	3	3	0	0	0	3	0	0	0	50	50	-	-	-	100
CC-254-CA	Data Base Management System	CC	5	3	0	0	2	3	0	0	4	50	50	0	0	50	150
DSE-251-CA	Professional Elective – II	DSE	4	2	0	2	0	2	0	4	0	25	25	50	-	-	100
SEC-251-CA	Design Thinking and Innovation	SEC	2	1	0	0	1	1	0	0	2	-	-	-	-	50	50
	Total		21	14	0	4	3	14	0	8	6	200	200	100	0	100	600

Elective Subject of DSE:

Course Code	Course Name	Subject Name
DSE-251(A)-CA	Web Development & Design	Advanced Java Programming
DSE-251(B)-CA	Cyber Security & Cloud Computing	Digital Forensics-I
DSE-251(C)-CA	Data Science	Data Visualization
DSE-251(D)-CA	Artificial Intelligence & Machine Learning	Introduction to Machine Learning

Semester III

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)					**Semester: III**
Course Code: CC-201-CA			**Name of Course: Probability and Statistics**		
Teaching Scheme (Hrs/week):			**Credits: 3**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
3	**-**	**-**	**3**	**-**	**-**
Examination Scheme:					
FA	**SA**	**Total**			
50 Marks	**50 Marks**	**100 Marks**			

Course Objective: The course aims to

1. This course aims to make the students trained to handle randomness scientifically using theory of probability.
2. This course intends to make the students able to represent the statistical data in a systematic way and analyze it to draw meaningful information from them.
3. Through plentiful examples and exercises, this course provides the students scope to apply probabilistic and statistical techniques to deal with real-life problems.

Course Outcome: Upon successful completion of this course, students will be able to

CC-201.1	Remember basic concepts and represent data diagrammatically.
CC-201.2	Understand and compute measures of central tendency and dispersion, and interpret their significance in data analysis.
CC-201.3	Develop and calculate correlation coefficients and regression equations, and analyze relationships between variables.
CC-201.4	Analyze sample data, perform hypothesis testing, and interpret statistical inferences.
CC-201.5	Evaluate statistical data and make data-driven decisions using appropriate statistical tools.

Course Content

Unit I	**Introduction to Statistics**	**(9 Hours)**

Data Types: Basic concepts of Statistics, attribute, variable, discrete and continuous variable qualitative and quantitative data, classification of data, Data presentation: Frequency distribution, Histogram, Ogive, Box-plot, Bar Plots, Pi chart.

Unit II	**Measures of Central Tendency & Dispersion**	**(9 Hours)**

Measures of Central Tendency: Arithmetic mean, median and mode-their properties, Measures of Dispersion: Range, mean deviation, quartile deviation, variance and standard deviation.

Unit III	**Correlation & Regression**	**(9 Hours)**

Correlation: Definition Correlation & its types, Scatter diagram, Measures-Karl Pearson's correlation coefficient and Spearman's rank correlation coefficient, Regression: Concept Linear regression-fitting by least square method and interpretation

Unit IV	Probability Distributions	(9 Hours)
Concepts of probability: Experiment and sample space, Events and operations with events Probability of an event, basic probability rules, Applications of probability rules, Conditional probability. Random Variables: Discrete and continuous random variable, Probability distribution of a random variable, Probability mass function, probability density function, Expectation and variance of a random variable. Standard Probability Distributions: - Binomial probability distribution, Poisson probability, distribution , Normal probability distribution		
Unit V	**Inferential Statistics**	**(9 Hours)**
Sampling Distribution: Concept of Population and Sample, Parameter and statistic, Sampling distribution of sample mean and sample proportion, Statistical Inference: Estimation and Hypothesis Testing (only concept), Hypothesis Testing for Single Population: Concept of a hypothesis testing, tests involving a population mean and population proportion (z test and t test).		

Learning Resources

Text Books:

1. Manish Sharma, Amit Gupta, The Practice of Business Statistics, Khanna Book Publishing Company, 2010 (AICTE Recommended Textbook)
2. Das N. G., Statistical Methods, Combined Edition, Tata McGraw Hill, 2010.
3. Ross Sheldon M., Introduction to Probability and Statistics for Engineers and Scientists, 6th Edition, Elsevier, 2021

Reference Books:

1. Pal Nabendu and Sarkar Sahadeb, Statistics: Concepts and Applications, Second Edition, PHI, 2013
2. Montgomery Douglas and Runger George C., Applied Statistics and Probability for Engineers, Wiley, 2016.
3. Reena Garg, Engineering Mathematics, Khanna Publishing House, 2024

MOOC / NPTEL/YouTube Links: -

1. https://nptel.ac.in/courses/111106112
2. https://nptel.ac.in/courses/111105041

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)					**Semester: III**
Course Code: CC-202T-CA			**Name of Course: Data Structure**		
Teaching Scheme (Hrs/week):			**Credits: 3**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
3	**-**	**-**	**3**	**-**	**-**
Examination Scheme:					
FA	**SA**	**Total**			
50 Marks	**50 Marks**	**100 Marks**			

Course Objective: The course aims to

1. Understand the fundamental concepts of Data Structures and their applications.
2. Develop problem-solving skills using Data Structures.
3. Implement Data Structures using the C programming language.

Course Outcome: Upon successful completion of this course, students will be able to

CC-202.1	Describe the fundamental concepts, operations, and classifications of data structures and explain their role in solving computational problems.
CC-202.2	Apply array-based techniques to store, access, and manipulate data efficiently and illustrate their use in problem-solving scenarios.
CC-202.3	Construct and implement different types of linked lists (singly, doubly, circular) to support dynamic data storage and processing.
CC-202.4	Analyze and utilize stack and queue ADTs to solve real-world problems such as expression evaluation, recursion, and scheduling.
CC-202.5	Evaluate and compare tree and graph traversal/searching techniques to select appropriate structures for various applications.

Course Content

Unit I	**Introduction and Overview of Data Structure**	**(6 Hours)**

Introduction to Data Structure, Basic concepts of Data Structure, Data types and data objects, Abstract Data Types (ADT), Types of Data Structures: Linear and non –linear, Algorithm analysis: Frequency counts, Space and Time complexity, Asymptotic notation: Big O, Omega (Ω) (With examples)

Unit II	**Arrays**	**(10 Hours)**

Definition and Classification of Arrays, Representation of Linear Arrays in Memory, Operations on Linear Arrays: Traversing, Inserting, Deleting, Searching, Sorting and Merging, Searching: Linear Search and Binary Search, Comparison of Methods- Linear Search and Binary Search, Sorting: Bubble Sort, Selection Sort, and Insertion Sort, Two-Dimensional Arrays, Representation of Two-Dimensional Arrays in Memory, Matrices and Sparse Matrices, Multi-Dimensional Arrays.

Unit III	Linked Lists	(10 Hours)
Definition of Linked List, Comparison with Arrays, Representation of Linked List, Types of Linked lists, Traversing, Inserting, Deleting and Searching in Singly Linked List, Traversing, Inserting, Deleting and Searching in Doubly Linked List, Traversing, Inserting, Deleting and Searching Circular Linked List, Applications of Linked Lists: Addition of Polynomials.		
Unit IV	**Stacks and Queue**	**(10 Hours)**
Stacks: Definition, Representation of Stacks using Arrays and Linked List, Operations on Stacks using Arrays and Linked List, Application of Stacks: Arithmetic Expressions, Polish Notation, Conversion of Infix Expression to Postfix Expression, Evaluation of Postfix Expression. Queue Definition, Representation of Queues using Array and Linked List, Types of Queues: Simple Queue, Circular Queue, Double-Ended queue, Priority Queue, Operations on Simple Queues and Circular Queues using Array and Linked List, Applications of Queues.		
Unit V	**Tree and Graphs**	**(9 Hours)**
Trees Definition and its Trees Terminologies, Binary Trees, Traversal of Binary Tree, Binary Search Tree, Inserting, Deleting and Searching in Binary Search Tree, Height Balanced Trees: AVL Trees, Insertion and Deletion in AVL Tree, Graphs Definition, Graphs Terminologies, Graphs Types, Graphs Representation, Graphs Traversal		

Learning Resources

Text Books:

1. R.B. Patel, “Expert Data Structures with C”, Khanna Book Publishing Company, 2023 (AICTE Recommended Textbook)
2. Seymour Lipschutz, “Data Structures with C”, Schaum’s Outlines, Tata McGraw-Hill, 2011.
3. Yash Avant Kanetkar, "Data Structures Through C", 4th Edition, BPB Publications, 2022

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, and Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, Universities Press, 2007.
2. Reema Thareja, “Data Structures Using C", Second Edition, Oxford University Press, 2014.

E-resources:

Web Resources:

1. GeeksforGeeks - Data Structures Tutorial
2. Khan Academy - Algorithms Course

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code: CC-202P-CA			**Name of Course: Data Structure**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Practical	**Lecture**	**TW**	**Practical**	**Lecture**	**TW**
4	**-**	**-**	**2**	**-**	**-**
Examination Scheme:					
Practical	**Total**				
50 Marks	**50 Marks**				

Course Objective: The course aims to

1. Understand the fundamental concepts of Data Structures and their applications.
2. Develop problem-solving skills using Data Structures.
3. Implement Data Structures using the C programming language.

Course Outcome: Upon successful completion of this course, students will be able to

CC-202P.1	Describe the fundamental concepts, operations, and classifications of data structures and explain their role in solving computational problems.
CC-202P.2	Apply array-based techniques to store, access, and manipulate data efficiently and illustrate their use in problem-solving scenarios.
CC-202P.3	Construct and implement different types of linked lists (singly, doubly, circular) to support dynamic data storage and processing.
CC-202P.4	Analyze and utilize stack and queue ADTs to solve real-world problems such as expression evaluation, recursion, and scheduling.
CC-202P.5	Evaluate and compare tree and graph traversal/searching techniques to select appropriate structures for various applications.

List of Laboratory Practical

Practical No.	Content
01	Write a program for insertion and deletion operations in an array.
02	Write a program to search for an element in an array using Linear Search and Binary Search.
03	Write a program to sort an array using Bubble Sort
04	Write a program to sort an array using Selection Sort
05	Write a program to sort an array using Insertion Sort.

06	Write a program to insert an element into a Singly Linked List: (a) At the beginning (b) At the end (c) At a specified position
07	Write a program to delete an element from a Singly Linked List: (a) At the beginning (b) At the end (c) A specified element
08	Write a program to perform the following operations in a Doubly Linked List: (a) Create (b) Search for an element
09	Write a program to perform the following operations in a Circular Linked List: (a) Create (b) Delete an element from the end
10	Write a program to implement stack operations using an array.
11	Write a program to implement stack operations using a linked list.
12	Write a program to add two polynomials using a linked list
13	Write a program to evaluate a postfix expression using a stack.
14	Write a program to implement simple queue operations using an array.
15	Write a program to implement circular queue operations using an array
16	Write a program to implement circular queue operations using a linked list.
17	Write a program to perform the following operations on a binary search tree. (a) Preorder Traversal (b) In order Traversal (c) Post order Traversal
18	Write a program to perform insertion operation in a binary search tree

Practical conduction

Conducting a two-hour practical session allows for more in-depth exploration and interaction. Here are comprehensive guidelines to effectively conduct a two-hour tutorial session

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour duration.

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)					**Semester: III**
Course Code: CC-203T-CA			**Name of Course: Software Engineering**		
Teaching Scheme (Hrs/week):			**Credits: 3**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
3	**-**	**-**	**3**	**-**	**-**
Examination Scheme:					
FA	**SA**	**Total**			
50 Marks	**50 Marks**	**100 Marks**			

Course Objective: The course aims to

1. To Acquire a comprehensive understanding of the software development lifecycle and its application in contemporary software engineering practices.
2. To Develop proficiency in project management methodologies and strategic decision making for successful software project execution.
3. To Master the art of software design, development, and testing to produce robust and efficient software solutions.

Course Outcome: Upon successful completion of this course, students will be able to

CC-203.1	Understand the fundamental concepts, principles, and evolving role of software engineering and explain various software process models and agile methodologies.
CC-203.2	Analyze and document software requirements using appropriate requirements engineering processes, including elicitation, specification, validation, and management.
CC-203.3	Apply software design principles and modeling techniques (such as UML diagrams and architectural design) to develop effective software design solutions.
CC-203.4	Demonstrate the ability to select and implement software testing strategies including black-box, white-box, validation, and system testing, along with debugging techniques.
CC-203.5	Evaluate software quality, metrics, release management practices, and sustenance strategies such as maintenance, updates, end-of-life, and migration planning.

Course Content

Unit I	**Introduction to software engineering**	**(9 Hours)**

The evolving role of software, changing nature of software, layered technology, and a process framework, Process models: The waterfall model, incremental process models, process models, the unified process, Agile software development: Agility Principles, Agile methods, Plan-driven and agile development, Extreme programming, Scrum, A Tool Set for the Agile Process.

Unit II	Software Requirements Engineering	(9 Hours)
Software Requirements Engineering: Functional and non-functional requirements, the software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management. Risk management: Project planning- Software pricing, Plan-driven development, Project scheduling, Agile planning, Estimation techniques.		
Unit III	**Software Design and Testing Strategies**	**(9 Hours)**
Design process and design quality, design concepts, the design model, software architecture, data design, architectural design. Basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams, Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.		
Unit IV	**Software Quality and Release Management**	**(9 Hours)**
Quality concepts, software quality assurance, software reviews, formal 68 Model curriculum for UG Degree in BCA technical reviews, statistical software quality assurance, software reliability, Release Management: Release planning, development and build plans, release strategies, risk management, and post-deployment monitoring, Product sustenance: Maintenance, updates, End of life, migration strategies.		
Unit V	**Software Product Metrics and Sustenance**	**(9 Hours)**
Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance, Product sustenance: Maintenance, updates, End of life, migration strategies**.**		

Learning Resources

Text Books:

1. Software Engineering, N.S. Gill, Khanna Publishing House, 2023 (AICTE Recommended Textbook)
2. Software Engineering, Ian Somerville, 9th edition, Pearson education.
3. Software Engineering a Practitioner's Approach, 8th edition, Roger S Pressman, Bruce R. Maxim. McGraw Hill Education, 2015.

Reference Books:

1. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.
2. Software Engineering: Principles and Practice Hans van Vliet

E-resources:

E-Book: Let Us C by Yashavant Kanetkar – BPB Publications
https://bpbpublications.com/

MOOC/NPTEL/YouTube Links:

Course Title: Software Engineering: Prof. Rushikesh K. Joshi, Prof. Umesh Bellur, Prof. N.L. Sarda
Institute: IIT Bombay CSE IIT Bombay+1 URL: NPTEL Course Page NPTEL
YouTube Link: Lecture 1: Introduction to Software Engineering (IIT Bombay) YouTube

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code:SEC-201T- CA			**Name of Course: Python Programming**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme:					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. The course is designed to provide Basic knowledge of Python.
2. To understand the reading and writing data through file concept.
3. Manipulate and output data using lists, loops, and operators.
4. To introduce various concepts of programming to the students using Python

Course Outcome: Upon successful completion of this course, students will be able to

SEC-201.1	Understand basic Python concepts, components, data types, and I/O operations.
SEC-201.2	Apply Python flow control, conditions, and loops to write basic programs.
SEC-201.3	Use functions, modules, and packages effectively in Python programs.
SEC-201.4	Apply object-oriented programming concepts like classes, objects, and inheritance.
SEC-201.5	Perform file and directory operations using Python.

Course Content

Unit I	**Introduction to Python Programming**	**(6 Hours)**

Introduction & Components of Python, Understanding Python, Role of Python in AI and Data science, Installation and Working with Python, The default graphical development environment for Python - IDLE, Types and Operation, Python identifiers and reserved words Lines and indentation, multi-line statements Comments, Input/output with print and input functions.

Unit II	**Basics of Python**	**(6 Hours)**

Python Data Types- Number, Strings, Lists, Dictionaries, Tuples, Files, User Defined Classes, understanding python blocks, Python Program Flow Control- Conditional blocks using if, else and elseif Simple for loops in python, Python Program Loops- For loop using ranges, string, list and dictionaries Use of while loops in python, Loop manipulation using pass, continue, break and else, Programming using Python conditional and loops block.

Unit III	Python Functions, Modules & Packages	(6 Hours)
Python Functions, Modules &Packages, Function Basics-Scope, nested function, non-local statements Built-in functions, Arguments Passing, Anonymous Function: lambda decorators and Generator, Module basic usage, namespaces, reloading Modules– Math, random, date time etc., Package- import basics-Python namespace packages, User defined modules and packages .		
Unit IV	**Python Object Oriented Programming**	**(6 Hours)**
Python Object Oriented Programming-Concept of class, object and instances, method called Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, superclass- Overloading operators, static and class methods, Adding and retrieving dynamic attributes of classes, Programming using OOPS .		
Unit V	**Files and Directories**	**(6 Hours)**
Files and Directories - Creating files Operations on files (open, close, read, write), File object attributes, file positions, Listing Files in a Directory, Testing File Types, Removing Files and directories, Copying and Renaming Files- Splitting Pathnames-Creating and Moving to Directories, Traversing Directory Trees, Illustrative programs: word count, copy file .		

Learning Resources

Text Books

1. Python Crash Course: A Hands-On, Project-Based Introduction to Programming — 2nd Edition, published May 2019.
2. Think Python: How to Think Like a Computer Scientist — 2nd Edition, published December 2015

Reference Books:

1. Programming Python Mark Lutz O'Reilly
2. Core Python Programming Wesley J. Chun Prentice Hall

E-resources:

1. All Units: HTTPs
2. All Units: HTTPs://www.tutorialspoint.com/python/index.htm

MOOC/NPTEL/YouTube Links:

1. https://onlinecourses.nptel.ac.in/noc22_cs31/preview
2. https://nptel.ac.in/courses/106106212

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code: SEC- 201P- CA			**Name of Course: Python Programming**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**-**	**4**	**-**	**-**	**2**
Examination Scheme:					
TW	**Total**				
50 Marks	**50 Marks**				

Course Objective: The course aims to

1. The course is designed to provide Basic knowledge of Python.
2. To understand the reading and writing data through file concept.
3. Manipulate and output data using lists, loops, and operators.
4. To introduce various concepts of programming to the students using Python

Course Outcome: Upon successful completion of this course, students will be able to

SEC-201P.1	Understand the basics of Python programming, including components, data types, identifiers, input/output, and indentation rules.
SEC-201P.2	Apply Python control structures, loops, and data types to develop small programs and solve computational problems
SEC-201P.3	Develop Python programs using functions, modules, packages, and built-in libraries, demonstrating modular and reusable code.
SEC-201P.4	Implement object-oriented programming concepts in Python, including classes, objects, inheritance, operator overloading, and dynamic attributes.
SEC-201P.5	Perform file and directory operations in Python, including creating, reading, writing, copying, renaming, and analyzing text files.

Python Programming Laboratory

List of Laboratory Practical

Practical No.	Content
01	Print "Hello, Python" and take user input to display a personalized message
02	Demonstrate identifiers, reserved words, comments, and indentation rules in Python.
03	Take input for 3 subjects' marks and calculate total and average.
04	Create and manipulate data types: numbers, strings, lists, tuples, dictionaries.
05	Write a program using if-elif-else to determine student grades.
06	Write a program to print even numbers from 1 to 50 using a for loop.

07	Write a program to compute the sum of the first 50 natural numbers using a while loop.
08	Demonstrate break, continue, and pass statements in loops.
09	Write a Python function to find the factorial of a number (using recursion).
10	Create a Python module calculator.py with functions add(), subtract(), multiply(), divide() and use it in a program.
11	Write a Python program using lambda to compute squares of numbers in a list.
12	Use built-in modules: math (sqrt, power), random (generate random numbers), datetime (current date/time).
13	Create a class Employee with attributes name, id, salary and display object details.
14	Extend Employee class to Manager with department attribute; demonstrate inheritance.
15	Demonstrate operator overloading by comparing two employee objects based on salary.

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs. **Prepare Materials:** Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction.

Assessment and Evaluation:

Formative Assessment: Assess student understanding through informal assessments, discussions, and problem- solving activities.

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour duration.

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code: DSE-201(A)T-CA			**Name of Course: Bootstrap**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. Understand the fundamentals of front-end development and the role of Bootstrap in responsive web design.
2. Set up Bootstrap using CDN and local installation, and utilize the grid system to create responsive layouts.
3. Apply Bootstrap components, utilities, and attributes to enhance web pages efficiently.
4. Design responsive forms, tables, and incorporate icons for professional web interfaces.
5. Build complete, responsive web projects using Bootstrap, demonstrating practical application of learned concepts.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-201.1	Explain the basics of front-end frameworks and the importance of Bootstrap in modern web design.
DSE-201.2	Implement Bootstrap components such as buttons, cards, modals, and dropdowns to create interactive user interfaces.
DSE-201.3	Utilize Bootstrap attributes and utility classes to customize layouts and elements efficiently.
DSE-201.4	Develop responsive forms, tables, and incorporate Bootstrap icons for better UI/UX design.
DSE-201.5	Design and deploy a complete responsive web page or mini project using Bootstrap principles.

Course Content

Unit I	**Introduction to Bootstrap**	**(6 Hours)**

Overview of front-end frameworks**,** What is Bootstrap and why use it, Setting up Bootstrap (CDN and local installation), Understanding the Bootstrap grid system, Containers, rows, and columns, Responsive design basics.

Unit II	**Bootstrap Components**	**(6 Hours)**

Working with typography and text utilities, Buttons, badges, and alerts, Cards and list groups, Pagination and breadcrumbs, Progress bars and spinners, Dropdowns, modals, and collapse.

Unit III	Bootstrap Attributes & Utilities	(6 Hours)
Introduction to Bootstrap attributes and data-attributes, Common attributes like data-toggle, data-target, data-bs-, Attribute-based initialization vs JavaScript initialization, Utility classes for spacing, alignment, borders, shadows, Using flex and grid utilities, Examples using attributes for modals, carousels, and tooltips.		
Unit IV	**Forms, Tables & Icons**	**(6 Hours)**
Creating responsive forms, Form controls, validation, and input groups, Checkboxes, radio buttons, and switches, Tables: styling and responsive tables, Using Bootstrap Icons, Creating simple input forms with validation.		
Unit V	**Advanced Layouts & Project**	**(6 Hours)**
Responsive navbar and footer design, Carousel and media components, Using cards and grids in projects, Building a simple portfolio or company landing page, Testing responsiveness across devices, Mini project presentation and evaluation.		

Learning Resources

Text Books

1. "Learning Bootstrap 5" – Matt Lambert, Packt Publishing
2. "Bootstrap 5 By Example" – Silvio Moreto, Packt Publishing
3. "Bootstrap 5 Quick Start" – Jacob Lett, Leanpub

Reference Books:

1. Bootstrap 5 By Example – Silvio Moreto, Packt Publishing
2. Learning Bootstrap 5 – Matt Lambert, Packt Publishing
3. Bootstrap 5 Quick Start – Jacob Lett, Leanpub

MOOC/NPTEL/YouTube Links

1. Bootstrap Official Documentation
2. W3Schools Bootstrap Tutorial
3. TutorialsPoint Bootstrap Tutorial

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code:SEC- 201(A)P- CA			**Name of Course: Bootstrap**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**4**	**-**	**-**	**2**	**-**
Examination Scheme:					
Practical	**-**	**Total**			
50 Marks	**-**	**50 Marks**			

Course Objective: The course aims to

1. Understand the fundamentals of front-end development and the role of Bootstrap in responsive web design.
2. Set up Bootstrap using CDN and local installation, and utilize the grid system to create responsive layouts.
3. Apply Bootstrap components, utilities, and attributes to enhance web pages efficiently.
4. Design responsive forms, tables, and incorporate icons for professional web interfaces.
5. Build complete, responsive web projects using Bootstrap, demonstrating practical application of learned concepts.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-201P.1	Explain the basics of front-end frameworks and the importance of Bootstrap in modern web design.
DSE-201P.2	Implement Bootstrap components such as buttons, cards, modals, and dropdowns to create interactive user interfaces.
DSE-201P.3	Utilize Bootstrap attributes and utility classes to customize layouts and elements efficiently.
DSE-201P.4	Develop responsive forms, tables, and incorporate Bootstrap icons for better UI/UX design.
DSE-201P.5	Design and deploy a complete responsive web page or mini project using Bootstrap principles.

Bootstrap Laboratory

List of Laboratory Practical

Practical No.	Content
01	Create a basic webpage using Bootstrap containers.
02	Apply Bootstrap typography and text utilities (headings, colors, alignment).
03	Design a navigation bar using Bootstrap's Navbar component. Include a brand logo, navigation links, and a dropdown menu. Make it responsive so it collapses into a toggle button on smaller screens.

04	Create a simple responsive webpage combining text, images, and buttons
05	Create a form using Bootstrap's form components. Include input fields for name, email, and a message, along with a submit button. Apply appropriate Bootstrap classes for styling and responsiveness.
06	Create a 3-column responsive layout using grid classes (col-sm, col-md, col-lg).
07	Design a nested grid layout with proper spacing and padding.
08	Build a portfolio gallery layout using Bootstrap grids.
09	Create a responsive blog page layout with multiple sections.
10	Demonstrate Bootstrap flex utilities for alignment and order control.
11	Design a landing page layout using the grid system with footer and header
12	Create a navigation bar with logo and menu items.
13	Build a dropdown navigation bar with responsive toggle.
14	Design a profile card using the card component with image, text, and button.
15	Create a pricing table layout using cards and grid.

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction.

Assessment and Evaluation:

Formative Assessment: Assess student understanding through informal assessments, discussions, and problem- solving activities.

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour Duration.

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code: DSE-201(B)T-CA			**Name of Course: Fundamentals of Cloud Computing**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. Introduce students to the fundamental concepts of cloud computing, including its architecture, infrastructure and service models.
2. It focuses on virtualization techniques, selection of suitable cloud platforms.
3. Understanding key issues like security, privacy, and interoperability.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-201.1	Understand the evolution, features, advantages, and limitations of cloud computing.
DSE-201.2	Explain cloud deployment, service models, and components; identify major cloud service providers.
DSE-201.3	Describe PaaS architecture, application frameworks, and service provider offerings.
DSE-201.4	Analyze IaaS and cloud-based data services, including advantages, limitations, and providers.
DSE-201.5	Apply virtualization concepts and identify types, components, and benefits in cloud environments.

Course Content

Unit I	**Introduction to Cloud Computing**	**(6 Hours)**

Evolution and History of Cloud Computing, Introduction to Cloud Computing, Why Cloud Computing is Becoming Highly Important, Features of Cloud Computing, Cloud Computing for various users, Advantages of Cloud Computing, Limitations of Cloud Computing ,Evolution and History of Cloud Computing, Introduction to Cloud Computing, Why Cloud Computing is Becoming Highly Important, Features of Cloud Computing, Cloud Computing for various users, Advantages of Cloud Computing, Limitations of Cloud Computing.

Unit II	Cloud Models and Types of SaaS	(6 Hours)
The NIST Model, Cloud Cube Model, Deployment Models, Service Models. Layers and Types of Cloud, Components of Cloud Computing, Cloud Computing Service Providers Software as a Service (SaaS), Software as a Service , Evolution of SaaS, Brief Introductory part of Software as a Service ,SaaS Unification Technologies , SaaS Integration Products and Technologies, SaaS Product Selection Criteria, SaaS Integration Services, Advantages of SaaS.		
Unit III	**Platform as a Service (PaaS)**	**(6 Hours)**
Introduction to PaaS, Evolution of PaaS, PaaS Service Providers- Acquia Cloud, Amazon AWS, Amazon Elastic Beanstalk, Google App Engine, Force.com, PaaS Application framework, PaaS Operator Verbs, PaaS Developer Verbs, Advantages and Challenges of PaaS.		
Unit IV	**Infrastructure as a Service (IaaS) and Cloud Data**	**(6 Hours)**
Infrastructure as a Service (IaaS): Evolution, IaaS Architecture- Advantages and Disadvantages of Infrastructure as a Service, SAN model, IaaS Providers, IaaS Architecture, Advantages and Disadvantages of Infrastructure as a Service Data in Cloud : Evolution of Network Storage in Cloud, Data as a Service, Database as a Service, Cloud Based Data Storage, Advantages and Limitations of Cloud, Based Storage Solution, Cloud Based Data Storage Service Providers.		
Unit V	**Virtualization**	**(6 Hours)**
Introduction to Virtualization and its Technical Evolution, History of Virtualization, Types of Virtual Machines, Advantages of Virtualization, Components of Virtualization, Types of Virtualizations.		

Learning Resources

Text Books

1. Cloud Computing: Nirali Prakashan.

Reference Books:

1. Handbook of Cloud Computing — Dr. Anand Nayyar (Ed.), First Edition 2019, BPB Publication, India
2. Cloud Computing: A Practical Approach — Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Tata McGraw-Hill, New Delhi, 2010
3. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online — Michael Miller, Que, 2008
4. Cloud Computing: Theory and Practice — Dan C. Marinescu, Morgan Kaufmann/Elsevie
5. Cloud Computing: A Hands-On Approach — Arshadeep Bahga, Vijay Madisetti, University Press

MOOC/NPTEL/YouTube Links

https://onlinecourses.nptel.ac.in/noc21_cs14
https://onlinecourses.nptel.ac.in/noc25_cs12

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code:SEC- 201(B)P- CA			**Name of Course: Fundamentals of Cloud Computing**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**4**	**-**	**-**	**2**	**-**
Examination Scheme:					
Practical	**-**	**Total**			
50 Marks	**-**	**50 Marks**			

Course Objective: The course aims to

1. This practical course aims to provide students with hands-on skills in cloud computing, including installing and managing Open Stack identity and administrative features.
2. Implementing security in private clouds, designing cloud services, setting up private cloud infrastructure, and using tools like JOSSO for secure access.

Course Outcome: Upon successful completion of this course, students will be able to

DSE- 201P.1	Install and configure OpenStack identity management features.
DSE- 201P.2	Implement and manage security features in a private cloud.
DSE- 201P.3	Utilize administrative tools to manage cloud resources effectively.
DSE- 201P.4	Design and set up private cloud services and infrastructure.
DSE- 201P.5	Implement single sign-on (SSO) using JOSSO for secure cloud access.

Laboratory

List of Laboratory Practical

Practical No.	Content
01	Create a word document of your class time table and store locally and on cloud with doc and pdf format.
02	Prepare a PowerPoint on the cloud on the topic of your choice.
03	Create your resume in a neat format using Google and Zoho cloud
04	Install OpenStack and use it as Infrastructure as a Service and use technology own Cloud.
05	Installing and using identity management features of Open Stack.
06	Write a program for web feed using PHP, HTML.

07	Installing and using JOSSO.
08	Installing and using security features of our own Cloud.
09	Installing and using Administrative features of own Cloud.
10	Case study on Amazon EC2.
11	Case study on Microsoft Azure.

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session.

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction.

Assessment and Evaluation:

Formative Assessment: Assess student understanding through informal assessments, discussions, and problem- solving activities.

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress.

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating , lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour Duration.

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code: DSE-201(C)T-CA			**Name of Course: Basics of Data Analytics Using Spreadsheets**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. Understand the basics of data analytics and its applications.
2. Develop proficiency in using spreadsheet software for data manipulation and analysis.
3. Build and use spreadsheet models for decision making & Communicate data insights effectively

Course Outcome: Upon successful completion of this course, students will be able to

DSE-201.1	Explain the fundamental concepts, roles, and applications of data analytics and spreadsheets in decision-making.
DSE-201.2	Use spreadsheet tools to organize, clean, validate, and transform raw data into structured formats for analysis.
DSE-201.3	Analyze datasets using logical, statistical, and lookup functions to derive insights and perform data-driven problem solving.
DSE-201.4	Interpret and evaluate analytical outcomes through charts, pivot tables, and dashboards to support business decisions.
DSE-201.5	Design automated spreadsheet solutions, dashboards, and analytical reports using advanced tools, macros, and scenario analysis.

Course Content

Unit I	**Introduction to Data Analytics and Spreadsheets**	**(6 Hours)**

Overview of Data Analytics: Concepts and Applications, Role of Spreadsheets in Data Analytics, , Introduction to Spreadsheet Interfaces (Excel/Google Sheets),Data Types and Formats, Working with Cells, Ranges and Worksheets Data Entry, Editing, Formatting Basics, Using Basic Formulas, Functions (SUM, AVERAGE, MIN, MAX, COUNT).

Unit II	**Data Cleaning and Preparation**	**(6 Hours)**

Understanding Data Quality:Errors,Missing Values,Duplicates,Data Cleaning Techniques: Trimming ,Removing Duplicates, Handling Blanks, Data Validation and Conditional Formatting, Sorting and Filtering Data Text Functions for Cleaning (LEFT, RIGHT, MID, TRIM,CONCATENATE, TEXTJOIN) Working with Dates and Times, Importing and Exporting Data (CSV, XLSX formats).

Unit III	Data Analysis Using Formulas and Functions	(6 Hours)
Logical Functions: IF, AND, OR, NOT, Lookup and Reference Functions: VLOOKUP, HLOOKUP, XLOOKUP, INDEX-MATCH, Statistical Functions: AVERAGEIF, COUNTIF, SUMIF, MEDIAN, MODE, Mathematical and Financial Functions, Data Aggregation and Summarization, Using Named Ranges for Efficient Analysis.		
Unit IV	**Data Visualization and Dashboards**	**(6 Hours)**
Importance of Data Visualization, Creating Basic Charts: Column, Line, Pie, Bar, Area, Advanced Charts**:** Combo, Scatter, Histogram, Sparklines, Customizing Chart Elements (titles, axes, legends, colors),Using Pivot Tables and Pivot Charts, Designing Interactive Dashboards, Best Practices in Data Visualization and Reporting.		
Unit V	**Introduction to Advanced Analytics and Reporting**	**(6 Hours)**
Introduction to Data Analysis Toolpack (Excel), Performing Descriptive Statistics (mean, variance, correlation), Forecasting and Trend Analysis, Scenario and What-If Analysis (Goal Seek, Solver), Automating Tasks Using Macros (Introductory Level), Preparing Analytical Reports and Presentations , Case Studies: Business, Finance, and Marketing Applications.		

Learning Resources

Text Books

1. “Beginner's Guide for Data Analysis using R Programming” by Jeeva Jose, Khanna Publishing House, 2024.
2. “Data Analytics” by V.K. Jain, Khanna Book Publishing Company, 2024.
3. “Excel Data Analysis For Dummies" by Stephen L. Nelson and E. C. Nelson, John Wiley & Sons; 3rd edition, 2016
4. "Data Analysis Using Microsoft Excel" by Michael R. Middleton, Thomson, Brooks/Cole, 3rd edition , 2004

Reference Books:

1. "Excel 2019 Bible" by Michael Alexander, Richard Kusleika, and John Walkenbach, John Wiley & Sons, 25 Sept 2018
2. "Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Business Analytics" by Cliff T Ragsdale, Cengage learning asia pet. 2015
3. “Mastering Excel” by WebTech Solutions, Khanna Publishing House, 2024.

MOOC/NPTEL/YouTube Links

https://www.youtube.com/watch?v=pCJ15nGFgVg&t=12s

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code:DSE- 201(C)P- CA			**Name of Course: Basics of Data Analytics Using Spreadsheets**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**4**	**-**	**-**	**2**	**-**
Examination Scheme:					
Practical	**-**	**Total**			
50 Marks	**-**	**50 Marks**			

Course Objective: The course aims to

1. Students will apply spreadsheet interfaces (Excel/Google Sheets) to perform data entry, formatting, and basic formula operations.
2. Students will analyze and clean datasets by identifying errors, duplicates, missing values, and using appropriate data cleaning techniques.
3. Students will apply logical, lookup, statistical, and mathematical functions and analyze data to derive meaningful patterns and summaries.
4. Students will create visualizations and interactive dashboards using charts, pivot tables, and slicers for effective data presentation.
5. Students will evaluate analytical results and create automated spreadsheet solutions using Data Analysis Toolpak, scenario tools, and basic macros for reporting.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-201P.1	Perform data entry, formatting, and manipulation using spreadsheet interfaces (Excel/Google Sheets).
DSE-201P.2	Clean and prepare datasets using trimming, filtering, validation rules, text functions, and duplicate removal.
DSE-201P.3	Use formulas, logical operations, and lookup functions to examine patterns and summarize datasets.
DSE-201P.4	Develop data visualizations and interactive dashboards using charts, pivot tables, and slicers.
DSE-201P.5	Build basic automated workflows (macros), run scenario analysis, and prepare analytical reports based on real-world case data.

Laboratory

List of Laboratory Practical

Practical No.	Content
01	**Basic Spreadsheet Operations** – Data entry, editing, formatting, cell referencing, working with worksheets.

02	**Using Basic Formulas & Functions** – SUM, AVERAGE, MIN, MAX, COUNT on a sample dataset.
03	**Data Types & Formatting Techniques** – Number formats, text formats, date formats, creating structured tables.
04	**Detecting and Correcting Data Quality Issues** – Missing values, duplicates, inconsistent formats.
05	**Text Cleaning Functions** – LEFT, RIGHT, MID, TRIM, CONCATENATE, TEXTJOIN.
06	**Sorting, Filtering & Conditional Formatting** – Multi-level sorting, advanced filters, highlight errors/duplicates.
07	**Working with Dates & Importing Data** – Importing CSV files, fixing date/time formats, extracting date components.
08	**Logical Functions** – IF, AND, OR, NOT for business rules (grading, eligibility, risk levels).
09	**Lookup Functions** – VLOOKUP, HLOOKUP, XLOOKUP, INDEX-MATCH.
10	**Statistical & Aggregation Functions** – SUMIF, COUNTIF, AVERAGEIF, MEDIAN, MODE for data analysis.
11	**Named Ranges and Formula Efficiency** – Create and use named ranges in calculations.
12	**Creating Basic Charts** – Column, Line, Pie, Bar, Area charts.
13	**Pivot Tables & Pivot Charts** – Summary views, slicers, formatting pivot charts.
14	**Designing an Interactive Dashboard** – Combine charts, KPIs, pivot tables, slicers, and formatting principles.
15	**Data Analysis Toolpak & Scenario Tools** – Descriptive statistics, correlation, forecasting, Goal Seek, Solver, introductory macros.

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session.

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies: **Active Participation:** Encourage all students to actively engage in discussions and activities throughout the session. **Use of Technology:** Utilize multimedia presentations or online tools to enhance learning experiences and engagement. **Group Activities:** Incorporate group discussions or collaborative activities to promote peer learning and interaction.
Assessment and Evaluation: **Formative Assessment:** Assess student understanding through informal assessments, discussions, and problem- solving activities. **Feedback Mechanism:** Provide timely feedback on students' participation and comprehension to support their learning progress.
Logistics and Environment: **Classroom Setup:** Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations. **Time Management:** Manage time effectively to cover all planned activities within the two-hour Duration.

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code: DSE-201(D)T-CA			**Name of Course: Future Engineering**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. To understand the fundamental principles of software testing, including SDLC, STLC, types of testing, testing techniques, and core testing artifacts.
2. To gain foundational knowledge of Artificial Intelligence and Machine Learning, including key concepts, learning types, and commonly used algorithms.
3. To explore how AI and ML techniques are applied in software testing, including intelligent test case generation, defect prediction, NLP-based requirement analysis, and test optimization.
4. To learn modern AI-based testing tools and automation frameworks, including visual testing, Self-healing scripts, and AI-enhanced performance testing.
5. To analyze real-world challenges, limitations, and ethical concerns in the application of AI to software testing.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-201.1	Demonstrate a thorough understanding of software testing fundamentals, including SDLC, STLC, types of testing, manual and automated testing techniques, and test artifacts
DSE-201.2	Explain core concepts of Artificial Intelligence and Machine Learning, including supervised, unsupervised, and reinforcement learning, and identify their applications in software testing.
DSE-201.3	Apply AI and ML techniques to enhance software testing processes, including AI-driven test case generation, defect prediction, NLP-based requirement analysis, and visual testing.
DSE-201.4	Utilize AI-enabled testing tools and frameworks to automate testing, optimize test execution, handle flaky tests, and maintain high-quality software efficiently.
DSE-201.5	Evaluate the limitations, ethical considerations, and future trends of AI in software testing, and propose intelligent testing solutions for real-world software systems.

Course Content		
Unit I	**Fundamentals of Software Testing**	**(6 Hours)**
Introduction to Software Testing: Process of evaluating a software product to identify defects. Ensure quality, reliability, performance, and customer satisfaction. Importance of Testing: Detect defects early, Reduce development cost, Improve customer satisfaction, Ensure software works as expected, SDLC Phases :Requirement Gathering, Design, Development, Testing, Deployment, Maintenances Phases Requirement Analysis, Test Planning, Test Case Development ,Test Environment Setup , Test Execution ,Defect Reporting , Test Closure, Types of Testing Functional, Testing: Unit, Integration, System, UAT, Non-Functional Testing: Performance, Security, Usability, Compatibility, Manual vs Automation Testing: Manual: Human-driven, usability & exploratory testing, Automation: Tool-driven, fast & repeatable (Selenium, Appium, JMeter),Test Artifacts Test Case, Test Scenario, Test Plan, Defect, Defect Life Cycle (New → Assigned → Fixed → Retest → Closed).		
Unit II	**Basics of Artificial Intelligence**	**(6 Hours)**
Introduction to AI Machines performing tasks requiring human intelligence, Examples: speech recognition, recommendation systems, autonomous vehicles, Applications of AI Healthcare (diagnosis),Finance (fraud detection),Retail (product recommendation),Education (personalized learning),IT (automation, testing),Machine Learning Basics ML is a subset of AI that learns from data. Key terms: Dataset, Features, Labels, Training, Testing, Types of Machine Learning Supervised Learning: spam detection, defect prediction Unsupervised Learning: user clustering, log grouping Reinforcement Learning: game AI, autonomous testing. Common ML Algorithms Decision Tree Random Forest, Naive Bayes, SVM, Neural Networks.		
Unit III	**AI Techniques for Software Testing**	**(6 Hours)**
AI in Testing? Handles large test case volume, Adapts to frequent UI changes, Reduces automation maintenance, Reduces flaky scripts, Improves speed, accuracy, and coverage, AI-driven Test Case Generation, AI reads: Requirements, User stories, Past defects, UX flow And produces: Test cases ,Test data ,Edge cases, ML-based Defect Prediction ML analyses: Code complexity, Previous bugs, Module history, Predicts defect-prone areas, AI in Requirement Analysis (NLP)Converts requirement docs → test cases, Identifies missing or ambiguous requirements, Auto-generates test reports.		
Unit IV	**AI-based Automation, Visual & Performance Testing**	**(6 Hours)**
AI in Visual Testing AI detects: Layout issues, Color mismatches, Missing UI elements, Rendering differences, Tools: Applitools, Percy.AI in Test Execution & Maintenance Self-healing test scripts, Auto-fixing locators, Flaky test identification, Optimized test execution Chatbots & AI Assistants for Testing Uses: Test case suggestions Test data generation Script review, Query answering, AI for Performance Testing Predictive load analysis Bottleneck detection, Intelligent resource usage Tools: LoadRunner AI, JMeter ML plugins.		

Unit V	Emerging Trends, Limitations & Future of AI in Testing	(6 Hours)
Limitations of AI in Testing Depends heavily on data quality, Cannot replace human creativity, High computational cost, Misinterpretation of ambiguous requirements, Ethical and Practical Challenges Data privacy concerns, Bias in ML models, Over-reliance on automated decisions, Future of AI in Software Testing Fully autonomous test pipelines, Real-time defect prediction, and Smart requirement → code → test generation, Zero-maintenance automation frameworks. Industry Tools & Trends Testim, Mabl, AI-enabled Selenium tools, Visual AI platforms, GPT-based test assistants.		

Learning Resources

Text Books:

1. AI-Driven Software Testing: Transforming Software Testing with Artificial Intelligence and Machine Learning by Srinivasa Rao Bittla, Apress (Springer), 1st edition, 2025
2. Software Testing with Generative AI by Mark Winteringham, Manning, 1st edition, 2024

Reference Books:

1. The Art of Software Testing by Glenford J. Myers, John Wiley & Sons; 3rd edition, 2011. 'Reilly Media+2BibSonomy+2
2. Effective Methods for Software Testing: Includes Complete Guidelines, Checklists, and Templates by William E. Perry, John Wiley & Sons; 3rd edition, 2006

MOOC/NPTEL/YouTube Links

1. Course name: NOC: Software Testing NPTEL Online Courses+2NPTEL+2
2. Instructor: Prof. Meenakshi D'souza, IIIT Bangalore NPTEL Online Courses
3. Duration: 12 weeks NPTEL Online Courses
4. Topics: Test case design (graphs, logic, syntax), object-oriented testing, web app testing,
5. 5. symbolic testing. NPTEL+2NPTEL Online Courses+2
6. Study Materials (video + slides): Available via NPTEL. NPTEL
7. Practice / Assignments: On NPTELPrep.

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: III**		
Course Code:DSE- 201(D)P- CA			**Name of Course: Future Engineering**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**4**	-	-	**2**	-
Examination Scheme:					
Practical	-	**Total**			
50 Marks	-	**50 Marks**			

Course Objective: The course aims to

1. To understand the fundamental principles of software testing, including SDLC, STLC, types of testing, testing techniques, and core testing artifacts.
2. To gain foundational knowledge of Artificial Intelligence and Machine Learning, including key concepts, learning types, and commonly used algorithms.
3. To explore how AI and ML techniques are applied in software testing, including intelligent test case generation, defect prediction, NLP-based requirement analysis, and test optimization.
4. To learn modern AI-based testing tools and automation frameworks, including visual testing, self-healing scripts, and AI-enhanced performance testing.
5. To analyze real-world challenges, limitations, and ethical concerns in the application of AI to software testing.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-201P.1	Demonstrate a thorough understanding of software testing fundamentals, including SDLC, STLC, types of testing, manual and automated testing techniques, and test artifacts
DSE-201P.2	Explain core concepts of Artificial Intelligence and Machine Learning, including supervised, unsupervised, and reinforcement learning, and identify their applications in software testing.
DSE-201P.3	Apply AI and ML techniques to enhance software testing processes, including AI-driven test case generation, defect prediction, NLP-based requirement analysis, and visual testing.
DSE-201P.4	Utilize AI-enabled testing tools and frameworks to automate testing, optimize test execution, handle flaky tests, and maintain high-quality software efficiently.
DSE-201P.5	Evaluate the limitations, ethical considerations, and future trends of AI in software testing, and propose intelligent testing solutions for real-world software systems.

Laboratory

List of Laboratory Practical

Practical No.	Content
01	**Write Manual Test Cases** Write 10 test cases for any app (login/registration). Output: Test case table (Test steps + Expected result).
02	**Generate Test Cases Using AI** Aim: Use ChatGPT or any AI tool to generate test cases for same feature. Output: AI-generated test cases.
03	**Compare Manual vs AI Test Cases** Aim: Identify differences between manual and AI test cases. Output: Comparison table.
04	**Create Test Scenarios Using AI** Aim: Type a requirement into an AI tool and get test scenarios. Example: "Users should be able to reset password." Output: AI-generated test scenarios.
05	**Generate Test Data Using AI** Aim: Ask AI to create sample data (emails, names, phone numbers). Output: A list of 20 AI-generated test data values.
06	**Identify Defects Using AI** Aim: Upload or paste an error log to AI and ask the cause. Output: AI-described cause + fix suggestion.
07	**Compare Manual vs AI Test Cases** Aim: Identify differences between manual and AI test cases. Output: Comparison table.
08	**Use AI to Summarize a Bug Report** Aim: Give a long bug description to AI and get a short summary. Output: Summarized bug report.
09	**Generate Test Plan with AI** Aim: Ask AI to create a simple test plan for any mobile app. Output: Test plan with scope, features, tools.
10	**Mini-Project – Choose Any One Small Task** Aim: Choose one: AI-generated login test suite AI-based test data file AI-generated UI defect list Output: One small project file (2–3 pages).
11	**Create User Stories Using AI** Aim: Provide a feature description to AI and generate user stories. Example Input: "A user should be able to change profile picture." Output: User stories in *As a user, I want… so that…* format.
12	**AI-Generated Test Summary Report** Aim: Paste sample test execution results and ask AI to create a summary report. Output: Test summary including passed/failed count, blockers, and recommendations.
13	Convert Requirements Into Test Cases Using AI Aim: Provide 3–4 lines of requirement text to AI and ask it to generate test cases. Output: A set of detailed test cases in table format.

14	AI-Based Risk Identification Aim: Give AI a project description and ask it to identify risks. Output: List of 5–10 project or testing risks + mitigation steps
15	Generate Traceability Matrix Using AI Aim: Provide requirements and test cases, and ask AI to create RTM. Output: RTM table mapping Requirement → Test Cases.

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction.

Assessment and Evaluation:

Formative Assessment: Assess student understanding through informal assessments, discussions, and problem- solving activities.

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour Duration.

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)			**Semester: III**		
Course Code:VAC-201(A)-CA			**Name of Course: Value Added Courses -Yoga**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**-**	**4**	**--**	**-**	**2**
Examination Scheme :					
FA	**TW**	**Total**			
-	**50 Marks**	**50 Marks**			

1. Course Objective: The course aims to

1. To develop physical, mental, and emotional well-being through yoga
2. To introduce students to basic yogic practices and principles
3. To improve flexibility, strength, posture, and concentration
4. To promote stress management and relaxation techniques
5. To encourage a healthy lifestyle through regular yoga practice

Course Outcome: Upon successful completion of this course, students will be able to

VAC-201.1	Understand yoga's significance and its practical applications for holistic well-being.
VAC-201.2	Explore the role of yoga in enhancing health through yogic practices.
VAC-201.3	Study the various paths of yoga to foster self-realization and spiritual growth.
VAC-201.4	Yoga is for physical, mental, and spiritual harmony - Identify with self.
VAC-201.5	Apply yogic principles to manage weight and nutrition

Course Content

Sr. No.	Activity
1	**Preparatory Practices** Sukshma Vyayama (Loosening Exercises) Joint Movements (Neck, Shoulder, Hip, Knee rotations) Surya Namaskar (Sun Salutation – Basic Sequence)
2	**Standing Asanas** Tadasana (Palm Tree Pose) Vrikshasana (Tree Pose) Trikonasana (Triangle Pose)
3	**Sitting Asanas** Vajrasana (Thunderbolt Pose) Paschimottanasana (Seated Forward Bend) Ardha Matsyendrasana (Half Spinal Twist)
4	**Prone & Supine Asanas** Bhujangasana (Cobra Pose) Shalabhasana (Locust Pose) Pavanamuktasana (Wind-Relieving Pose)

5	**Pranayama & Relaxation** Anulom Vilom (Alternate Nostril Breathing) Bhramari Pranayama (Bee Breathing) Shavasana (Relaxation / Meditation Practice)

Preparation:
Review Content: Ensure a thorough understanding of the activity
Set Objectives: Define clear activity objectives that align with the learning and engagement
Prepare Materials: Gather necessary materials.

Engagement Strategies:
Active Participation: Encourage all students to actively engage in activities.
Group Activities: Incorporate group activities or collaborative activities to promote interaction.

Assessment and Evaluation:
Assessment: Assess student understanding activities and report submitted.
Feedback Mechanism: Provide timely feedback on students' participation and comprehension.

Logistics and Environment:
Activity Setup: Ensure a comfortable and conducive environment with adequate seating
Time Management: Manage time effectively to cover all planned activities

Note: All the theoretical contents shall be delivered through the practical workshop mode only. No class room teaching is encouraged in this course.

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)			**Semester: III**		
Course Code:VAC-201(B)-CA			**Name of Course: Value Added Courses -Sports**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**-**	**4**	**-**	**-**	**2**
Examination Scheme :					
FA	**TW**	**Total**			
-	**50 Marks**	**50 Marks**			

Course Objective: The course aims to

1. To develop physical fitness and motor skills
2. To encourage participation in sports and games
3. To promote discipline, teamwork, and sportsmanship
4. To develop a habit of regular physical activity

Course Outcome: Upon successful completion of this course, students will be able to

VAC-201.1	Demonstrate improved physical fitness (strength, endurance, flexibility, speed).
VAC-201.2	Perform basic skills in athletics and Apply rules and techniques of selected sports during practice and matches
VAC-201.3	Practice yoga and relaxation techniques for physical and mental well-being.
VAC-201.4	Exhibit teamwork, leadership, discipline, and sportsmanship.
VAC-201.5	Adopt a healthy and active lifestyle through regular participation in physical activities.

Laboratory

List of Laboratory Practical

Sr. No.	Activity
1	**Physical Fitness Exercises** Warm-up and stretching exercises 50-meter run (speed test) Increase distance up to 100/200-meter run (endurance test) Sit-ups / Curl-ups (core strength) Push-ups (upper body strength)
2	**Athletics and Nutrition Advise** Standing broad jump (explosive strength) Shot put (basic technique) Relay race (team coordination)
3	**Team Games** Basic skill practice (passing, catching, dribbling, etc.) Game situation drills Mini match / practice match

4	**Indoor Games (Activities 12–13)** Basic skill execution and rules Practice game / match play
5	**Yoga & Wellness** Practice of Yoga Asanas (Tadasana, Bhujangasana, Vajrasana, etc.) Pranayama & Meditation (breathing techniques, relaxation) Importance of Diet and Nutrition

Preparation:

Review Content: Ensure a thorough understanding of the activity.

Set Objectives: Define clear activity objectives that align with the learning and engagement.

Prepare Materials: Gather necessary materials.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in activities.

Group Activities: Incorporate group activities or collaborative activities to promote interaction.

Assessment and Evaluation:

Assessment: Assess student understanding through Performance in activities, Participation, attendance & discipline and Report Submission / Practical demonstration –

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress

Logistics and Environment:

Sports Facilities: Ensure a comfortable and conducive environment for sports with adequate playing options for outdoor and indoor games.

Time Management: Manage time effectively to cover all planned activities

Note: All the theoretical contents shall be delivered through the practical workshop mode only.
No class room teaching is encouraged in this course.

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)			**Semester: III**		
Course Code:VAC-201(C)-CA			**Name of Course: Value Added Courses-NSS**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**-**	**2**	**-**	**-**	**2**
Examination Scheme :					
FA	**TW**	**Total**			
-	**50 Marks**	**50 Marks**			

Course Objective: The course aims to

1. To provide students with an understanding of the history, philosophy, and basic concepts of the National Service Scheme (NSS).
2. To familiarize students with the aims, objectives, and organizational structure of NSS.
3. To equip students with knowledge about NSS Programmes, activities, and their relevance.
4. To develop an understanding of community mobilization techniques and their importance in NSS activities.
5. To cultivate an appreciation for volunteerism, shramdan (voluntary labor), and their role in community development initiatives.

Course Outcome: Upon successful completion of this course, students will be able to

VAC-201.1	Mastery of Discipline and Leadership through Drill Learners would demonstrate the ability to effectively command a group, foster discipline, and work collaboratively towards achieving shared objectives.
VAC-201.2	Mastery of Grace and Dignity in Foot Drill Performance Learners would demonstrate an understanding of how these qualities enhance performance and foster teamwork within a group setting.
VAC-201.3	Proficient Weapon Handling and Safety Adherence Learners would showcase a thorough understanding of the criticality of safety measures, emphasizing accident prevention through strict adherence to safety protocols.
VAC-201.4	Enhanced Tactical Awareness and Strategic Decision-Making Learners would gain the ability to make informed decisions and effectively utilize terrain features to gain tactical advantage during operations.
VAC-201.5	Demonstrate social responsibility and leadership skills by actively participating in NSS activities and community development initiatives while promoting volunteerism and national values.

Course Content:		
Unit 1	**Introduction and Basic Concepts of NSS**	**(12 Hrs)**
National Service Scheme (NSS) - history, philosophy, and fundamental concepts, aims and objectives, providing clarity on the organization's overarching goals. Symbols of NSS - Emblem, flag, motto, song, and badge; Organizational structure of NSS		
Unit 2	**NSS Programmes and Activities**	**(12 Hrs)**
Diverse Programmes and activities conducted under the aegis of the National Service Scheme (NSS); Significance of commemorating important days recognized by the United Nations, Centre, State Government, and University; Examination of the methodology for adopting villages/slums and conducting surveys; Financial patterns of the NSS scheme		
Unit 3	**Community Mobilization**	**(12 Hrs)**
Dynamics of community mobilization within the framework of the National Service Scheme (NSS); Functioning of community stakeholders; The conceptual lens of community development.		
Unit 4	**Volunteerism and Shramdan in the Indian Context**	**(12 Hrs)**
Ethos of volunteerism and shramdan (voluntary labor) within the cultural context of India and the framework of the National Service Scheme (NSS); Motivations and constraints shaping volunteer engagement; Role of NSS volunteers in the Swatch Bharat Abhiyan and Digital India.		
Unit 5	**Social Responsibility and Leadership Development through NSS**	**(12 Hrs)**
Concept of social responsibility and its relevance in community service; Role of NSS in promoting leadership qualities, teamwork, and civic responsibility among students; Participation in community development activities such as health awareness campaigns, environmental protection initiatives, literacy drives, disaster management support, and rural development programmes; Importance of ethical values, national integration, and personality development through NSS activities.		
Preparation: **Review Content:** Ensure a thorough understanding of the activity **Set Objectives:** Define clear activity objectives that align with the learning and engagement **Prepare Materials:** Gather necessary materials such as lecture notes, handouts, and any other material.		
Engagement Strategies: **Active Participation:** Encourage all students to actively engage in discussions and activities. **Group Activities:** Incorporate group activities or collaborative activities to promote learning and interaction.		
Assessment and Evaluation: **Assessment:** Assess student understanding through informal assessments, and other activities. **Feedback Mechanism**: Provide timely feedback on students' participation and comprehension to support their learning progress		
Logistics and Environment: **Classroom Setup:** Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations. **Time Management:** Manage time effectively to cover all planned activities		

Note: All the theoretical contents shall be delivered through the practical workshop mode only.
No class room teaching is encouraged in this course.

Semester IV

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)			**Semester: IV**		
Course Code:CC-251-CA			**Name of Course: Entrepreneurship and Startup Ecosystem**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. To understand Entrepreneurship and its types.
2. To understand that not all ideas can be turned into viable business models and guestimate business potential of an idea.
3. To understand different type of finances available and financing methods.
4. To be able to draft business plans on an identified idea.
5. To understand the nuances of operating a startup – low budget marketing, stabilizing operations, build a team from scratch and scaling the business.
6. To know what is a Family Business and how is it different from Entrepreneurship.

Course Outcome: Upon successful completion of this course, students will be able to

CC-251.1	Understand basic building blocks of creating a venture
CC-251.2	Be able to identify a business opportunity and translate it into a viable business model
CC-251.3	Identify the elements of the Indian entrepreneurship ecosystem and take relevant Benefits from the constituents
CC-251.4	Know the legacy of family businesses and key differentiations from entrepreneurship
CC-251.5	To Develop the ability to apply linear programming and transportation models for effective decision-making and optimization in computing scenarios.

Course Content

Unit I	**Introduction to Entrepreneurship & Family Business**	**(6 Hours)**

Definition and Concept of entrepreneurship, Entrepreneur Characteristics, Classification of Entrepreneurs , Role of Entrepreneurship in Economic Development –Start-ups,Knowing the characteristics of Family business with discussion on few Indian cases of, Family Business like Murugappa, Dabur, Wadia, Godrej, Kirloskar etc..

Unit II	**Evaluating Business opportunity**	**(6 Hours)**

Sources of business ideas and opportunity recognition, Guesstimating the market potential of a business idea ,Feasibility analysis of the idea ,Industry, competition and environment analysis

Unit III	Building Blocks of Starting Ventures	(6 Hours)
Low-cost Marketing using digital technologies ,Team building from scratch ,Venture Funding , Establishing the value-chain and managing operations ,Legal aspects like IPR and compliances.		
Unit IV	**Start-up Ecosystem**	**(6 Hours)**
Know the components of the start-up ecosystem including Incubators, Accelerators, Venture Capital Funds, Angel Investors etc.		
Unit V	**Entrepreneurial support system in India**	**(6 Hours)**
Know various govt. schemes like Start-up India, Digital India, MSME etc., Sources of Venture Funding available in India ,Source of Technology, Intellectual Property management.		

Learning Resources

Text Books:

1. *Startup India Learning Program* by Start Up India available at www.startupindia.gov.in
2. Entrepreneurship, Rajeev Roy, Oxford University Press
3. Entrepreneurship: Successfully Launching New Ventures by R. Duane Ireland Bruce R. Barringer, Pearson Publishing
4. Family Business Management by Rajiv Agarwal, Sage Publishing
5. Anish Tiwari (2003), "Mapping the Startup Ecosystem in India", Economic & Political Weekly
6. Ramachandran, K, Indian Family Businesses: Their survival beyond three generations, ISB Working Paper Series

Reference Books:

1. Startup Ecosystem in India Text & Cases Paperback – 1 January 2021 by Dr. Ramesh Sardar (Author), Dr. Ganesh Waghmare (Author)
2. Entrepreneurial Ecosystems for Tech Start-ups in India: Evolution, Structure and Role: 1 (De Gruyter Studies in Knowledge Management and Entrepreneurial Ecosystems) by M H Bala Subrahmanya (Author)

E-resources:

1. https://www.entrepreneur.com/
2. https://www.startupgrind.com/
3. https://stvp.stanford.edu/series/etl/
4. https://techcrunch.com/
5. https://hbr.org/

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)			**Semester:IV**		
Course Code:CC-252T-CA			**Name of Course: Computer Networks**		
Teaching Scheme (Hrs/week):			**Credits:3**		
Lecture	**Practical**	**Tutorial**	**Lecture**	**Practical**	**Tutorial**
3	-	-	3	-	-
Examination Scheme :					
FA	**SA**	**Total**			
50 Marks	**50 Marks**	**100 Marks**			

Course Objective

1. To understand the basic concepts and components of data communication and computer networks.
2. To study different transmission media and their characteristics.
3. To explain network models, addressing techniques, and physical layer functions.
4. To understand IP addressing, routing concepts, and network layer protocols.
5. To identify and describe the functions of various network devices and modern networking technologies.

Course Outcome: Upon successful completion of this course, students will be able to

CC-252.1	Explain the fundamentals of data communication, network types, and topologies.
CC-252.2	Describe different guided and unguided transmission media.
CC-252.3	Demonstrate understanding of OSI and TCP/IP models and physical layer concepts.
CC-252.4	Analyze network layer addressing, routing, and data delivery mechanisms.
CC-252.5	Identify and describe various networking devices, their roles, and modern trends in networking.

Course Content

Unit I	**Introduction to Data Communications in Computer Networks**	**(9 Hours)**

Data communications, Characteristics of Data Communication , Data Representation – Text, Numbers, Images, Audio, Video , Modes of Communication – Simplex, Half Duplex, Full Duplex , Network Topologies –Bus, Star, Ring, Mesh, Hybrid , Types of Networks - LAN, MAN, WAN, PAN, Wireless, Home networks , Computer Networks applications –Business Application, Home Application, Mobile User Broadcast and point-to-point networks.

Unit II	**Transmission Media**	**(9 Hours)**

Introduction, Types of Transmission Media , Guided Media: Twisted Pair Cable- Physical Structure, Categories, Connectors &Applications , Coaxial Cable – Physical Structure, Standards, Connectors & Applications, Fiber Optic Cable- Physical Structure, Propagation Modes, Connectors & Applications, Unguided Media: , Wireless Transmission: Radio Waves, Microwaves, Infrared .

Unit III	Network Models and Layer	(9 Hours)
Computer Network Model: OSI – layers, protocols, encapsulation , Computer Network Model: TCP/IP layer and protocol., Addressing – physical, logical, port, specific addresses , IPv4 addressing – classful, classless, subnetting, super netting, NAT , IPv4 datagram format – fragmentation, checksum, options , IPv6 addressing – structure and address space , IPv6 packet format and extension headers , Routing concepts and algorithms (overview).		
Unit IV	**Short Range Wireless Technologies**	**(9 Hours)**
Introduction of Short-Range Technologies ,Infrared(IR): Frequency Band range and Application, Bluetooth: Bluetooth architecture, Frame Format and Application ,Zigbee: Characteristics, Structure and Application ,RFID : Working Frequency range types and Applications.		
Unit V	**Long Range Wireless Technologies**	**(9 Hours)**
Introduction of Long Range Technologies, GPS : Component of GPS system , Component and , Applications , Wireless Sensor Network : WSN architecture, Topologies, Types of Nodes (Coordinator, Router End , Devices) and Applications , Satellite Communication: Basic Concept, Segment, Orbit, Application.		
Learning Resources		
Reference Books: 1. Data Communications and Networking by Behrouz Forouzan, Fifth Edition, ISBN 978-0-07-337622-6 McGraw Hill. 2. Computer Networks, ANDREW S. Tanenbaum, Fifth Edition, ISBN-13: 978-0-13- 212695-3, Pearson		
E-resources: 1. https://www.youtube.com/watch?v=LkIdrXw_TvQ 2. https://www.youtube.com/watch?v=OA5GmbX39m8 3. https://www.geeksforgeeks.org/physics/difference-between-radio-wave-microwave-and-infrared-waves		

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: IV**		
Course Code: CC-252P-CA			**Name of Course: Computer Networks**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Practical	**Lecture**	**Tutorial**	**Practical**	**Lecture**	**TW**
4	-	**-**	**2**	-	**-**
Examination Scheme :					
Practical	**Total**				
50 Marks	**50 Marks**				

Course Objective: The course aims to

1. To gain hands-on experience in designing and configuring computer networks using simulation tools like Cisco Packet Tracer and Circuit Mod.
2. To understand the practical aspects of network topologies, transmission media, and communication modes.
3. To configure IP addressing, subnetting, and routing in a simulated network environment.
4. To study and configure various network devices, including switches, routers, access points, and firewalls.
5. To analyze network performance, security measures, and modern networking technologies like IoT and cloud networking.

Course Outcome: Upon successful completion of this course, students will be able to

CC-252P.1	Simulate and analyze different network topologies and communication modes.
CC-252P.2	Compare and demonstrate guided and unguided transmission media using simulation tools.
CC-252P.3	Configure IP addressing, subnetting, and verify connectivity between devices in a network.
CC-252P.4	Set up, configure, and troubleshoot network devices including switches, routers, access points, and firewalls.
CC-252P.5	Simulate modern networking scenarios, including wireless networks, IoT connections, and cloud-based network setups.

List of Laboratory Practical

Practical No.	Content
01	Study of different network topologies (Bus, Star, Ring, Mesh, Hybrid) using **Circuit Mod**
02	Simulation of Simplex, Half Duplex, and Full Duplex communication modes using **Circuit Mod**

03	Study of guided media – Twisted pair, Coaxial, and Fiber optic cables (simulation/demonstration).
04	Simulation of data transfer using unguided media (Radio, Microwave, Infrared).
05	Create a small LAN network using **Cisco Packet Tracer**
06	To Study IP and MAC Address.
07	Convert given IP Address from dotted Decimal to Binary.
08	Convert given IP Address from Binary to dotted Decimal.
09	To Find The class of Given IP address.
10	To Study The Arduino LED Pattern Generation
11	To Study Bluetooth.
12	To Study RFID.
13	Point to Point Communication using Zigbee
14	Wireless Sensor Node used for Street Light Control.
Case Study 1:	Designing a Small Office Network
Case Study 2:	Study The Smart Home/ Farm.

Practical conduction:

Conducting a two-hour practical session allows for more in-depth exploration and interaction. Here are comprehensive guidelines to effectively conduct a two-hour tutorial session.

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction.

Assessment and Evaluation:

Formative Assessment: Assess student understanding through informal assessments, discussions, and problem-solving activities.

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress.

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour Duration.

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)					**Semester: IV**
Course Code:CC-253-CA			**Name of Course: Design Analysis of Algorithm**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**Tutorial**	**Lecture**	**Practical**	**Tutorial**
3	**-**	**-**	**3**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
50 Marks	**50 Marks**	**100 Marks**			

Course Objectives:

1. This course envisions to impart to students the understanding of basic algorithm designing paradigms.
2. This course introduces the basic knowledge on how to analyse an algorithm.
3. This course expects to enable a student to synthesize efficient algorithms in common design situations and real-life problems.

Course Outcome: Upon successful completion of this course, students will be able to

CC-253.1	Define algorithm design and analysis principles, and explain the significance of algorithm efficiency in solving computational problems.
CC-253.2	Apply the Divide and Conquer strategy to solve problems, such as sorting and searching, and analyze the time complexity of the algorithms using recurrence relations.
CC-253.3	Illustrate the Greedy approach by solving optimization problems and evaluate the correctness and efficiency of greedy algorithms.
CC-253.4	Construct dynamic programming algorithms to solve problems with overlapping subproblems and optimal substructure, and analyze their time and space complexity.
CC-253.5	Compare various graph algorithms (e.g., BFS, DFS, shortest path, minimum spanning tree) and critique the limitations of algorithmic power in terms of computational complexity (e.g., NP-completeness).

Course Content

Unit I	**Introduction to Analysis and Design of Algorithms**	**(9 Hours)**

What is an algorithm, Design and performance analysis of algorithms, time complexity, space complexity, Asymptotic notations (O, Ω, Θ) to measure growth of a function and application to measure, complexity of algorithms, Analysis of sequential search, bubble sort, selection sort, insertion sort, matrix multiplication, Recursion: Basic concept. Analysis of recursive algorithms, Master's theorem.

Unit II	**The Divide & Conquer Design Technique**	**(9 Hours)**

The general concepts of Divide & Conquer Design Technique, Binary search, finding the maximum and minimum, merge sort, quick sort, Best- and worst-case analysis for the mentioned algorithms, Strassen's matrix multiplication, Lower bound for comparison-based sorting.

Unit III	The Greedy Design Technique	(9 Hours)
The general concepts of the Greedy Design Technique, Applications to general Knapsack problem, finding minimum weight spanning trees: Prim's and Kruskal's algorithms, Dijkstra's algorithm for finding single source shortest paths problem.		
Unit IV	**The Dynamic Programming Design Technique**	**(9 Hours)**
The general concepts of Dynamic Programming Design Technique, Computation of Fibonacci series and Binomial coefficients, All pair shortest paths problem (Floyd-Warshall's algorithm), 0/1 Knapsack problem.		
Unit V	**Algorithms on Graphs And Limitations of Algorithmic Power**	**(9 Hours)**
Breadth First Search, Depth First Search, Finding connected components, Depth first search of a directed Graph, Topological sorting, Backtracking Method: n-Queen problem; sum of subsets problem/ Hamiltonian circuit problem/vertex cover problem, Computational Intractability: Overview of non-deterministic algorithms, P, NP,NP-Complete and NP-hard problems.		

Learning Resources

Text Books:

1. Gajendra Sharma, Design and Analysis of Algorithms, Khanna Publishing House (AICTE Recommended Textbook)
2. Cormen Thomas H., Leiserson Charles E., Rivest Ronald L. and Stein Clifford, Introduction to Algorithms, PHI publication, 3rd Edition, 2009.
3. Horowitz Ellis, Sahni Sartaj and Rajasekaran Sanguthevar, Fundamentals of Computer Algorithms, University Press (I) Pvt. Ltd., 2012.
4. Levitin Anany, Introduction to Design and Analysis of Algorithms, 3rd Edition, Pearson, 2012

Reference Books:

1. Aho Alfred V., Hopcroft John E. & Ullman Jeffrey D., The Design & Analysis of Computer Algorithms, Addison Wesley Publications, Boston, 1983.
2. Kleinberg Jon & Tardos Eva, Algorithm Design, Pearson Education, 2006.

MOOC/NPTEL/YouTube Links: Web Resources

1. https://nptel.ac.in/courses/106101060

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: IV**		
Course Code: CC-254T-CA			**Name of Course: Data Base Management System**		
Teaching Scheme (Hrs/week):			**Credits:3**		
Lecture	**Practical**	**Tutorial**	**Lecture**	**Practical**	**Tutorial**
3	-	-	**3**	-	-
Examination Scheme :					
TW	**SA**	**Total**			
50 Marks	**50 Marks**	**100 Marks**			

Course Objective: The course aims to

1. To understand the fundamental concepts of database management systems
2. To study and understand systematic approaches for design of database systems
3. To learn SQL - the database Query language

Course Outcome: Upon successful completion of this course, students will be able to

CC-254.1	Explain basic file operation, DBMS architecture, applications of DBMS
CC-254.2	Understanding Core Concepts of DBMS
CC-254.3	Design and create relational database systems.
CC-254.4	Construct E-R Model for given requirements and convert it into database tables.
CC-254.5	Use SQL DDL and DML commands

Course Content

Unit I	**File Structure and Organization**	**(9 Hours)**

Introduction , Logical and Physical Files, Basic File Operations - Opening Files, Closing Files, Reading and Writing, Seeking, File Organization -Field and Record structure in file , Record Types ,Types of file organization - Sequential , Indexed , Hashed.

Unit II	**Introduction to Database Management System**	**(9 Hours)**

Introduction, Basic Concept and Definitions -Data and Information, Data Vs Information ,Data Dictionary , Data Item or Field , Record ,Definition of DBMS , Applications of DBMS, File processing system Vs DBMS ,Advantages and Disadvantages of DBMS ,Users of DBMS -Database Designers, Application programmer, Sophisticated Users, End Users ,Data Models: Introduction to Data Models, Types of Data Models (Hierarchical, Network, Relational, Object-oriented), Importance of Data Models in DBMS, Entity Relationship Diagram(ERD) Extended, features of ERD.

Unit III	Relational Model	(9 Hours)
Introduction , Terms -Relation ,Tuple, Attribute, Cardinality, Degree of relationship set, Domain ,Keys - Super Key , Candidate Key ,Primary Key , Foreign Key , Relational Algebra Operations -Select , Project, Union, Difference , Intersection, Cartesian Product , Natural Join.		
Unit IV	**SQL (Structured Query Language)**	**(9 Hours)**
History Of SQL, Basic Structure , DDL Commands ,DML Commands , Simple Queries , Nested Queries , Aggregate Functions.		
Unit V	**Relational Database Design**	**(9 Hours)**
Introduction , Anomalies of un normalized database , Normalization , Normal Form -First Normal Form , Second Normal Form ,Third Normal Form , BCNF.		

Learning Resources

Text Books:

1. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", third edition, McGraw – Hill, 2018
2. Benjamin Rosenzweig, Elena Rakhimov, "Oracle PL/SQL by Example", fifth edition, Prentice Hall, 2015
3. Brad Dayley, "NoSQL with MongoDB in 24 Hours", 1st edition, Sams Publishing, 2024

Reference Books:

1. Silberschatz, Korth, and Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill, 2011
2. Kahate, "Introduction to Database Management Systems", 1st Edition, Pearson Education, 2004
3. R.P. Mahapatra, Govind Verma, "Database Management Systems", Khanna Publishing House, 2025.

E-resources:

Web Resources

1. https://oracle-base.com/articles
2. https://forums.oracle.com/ords/apexds/domain/devcommunity/category/sql_and_pl_sql
3. https://asktom.oracle.com/ords/f?p=100:1:0

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: IV**		
Course Code: CC-254P-CA			**Name of Course: Data Base Management System**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Practical	**Lecture**	**TW**	**Practical**	**Lecture**	**TW**
-	-	**4**	-	-	2
Examination Scheme :					
TW	**Total**				
50 Marks	**50 Marks**				

Course Objective: The Course aims to

1. To study DDL and DML Queries
2. To understand SQL and PL/SQL

Course Outcome: Upon successful completion of this course, students will be able to

CC-254P.1	Design E-R Model for given requirements and convert the same into database tables
CC-254P.2	Design and create relational database systems.
CC-254P.3	Use SQL DDL and DML commands
CC-254P.4	Apply constructs in PL/SQL.
CC-254P.5	Design Normalize database.

List of Laboratory Practical

Practical No.	Content
01	Create simple tables including all data types. • Primary key constraint (as a table level constraint and as a column level constraint) • Check constraint (All types) • Unique constraint, Null/Not null constraint. Consider the following Schema Supplier(SID, Sname, branch, city, phone) Part(PID, Pname, color, price) Supplies (SID, PID, qty, date supplied).
02	Create more than one table and access them using referential integrity constraints.
03	Drop a table, Alter schema of a table. • Insert / Update / Delete records using tables created in previous Assignments using DDL Commands.
04	Write queries on the tables using SQL select query ➢ Select from table [where order by], Select from table [where group by <> having <> order by <>] • To create views and retrieve data using the views.
05	Write queries using set operations (minus operation, union, union all, intersect, intersect all).

06	Write nested queries using Except, Except all, Exists, Not exists etc.
07	Computation on table using, aggregate functions, string functions, special clauses (order by, group by, Having).
08	To query table, using set operations (union, intersect) set membership operator (in ,not in)

Practical conduction

Conducting a two-hour practical session allows for more in-depth exploration and interaction. Here are comprehensive guidelines to effectively conduct a two-hour tutorial session

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction.

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour duration.

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)			**Semester: IV**		
Course Code: DSE-251(A)T-CA			**Name of Course: Advanced Java Programming**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**Tutorial**	**Lecture**	**Practical**	**Tutorial**
2	**-**		**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. To know the concept of Java Programming.
2. To understand how to use programming in day to day applications.
3. To develop programming logic.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-251.1	Identify and explain the concepts of Applet and JDBC Programming.
DSE-251.2	Describe and illustrate the concepts of Multithreading and Socket Programming.
DSE-251.3	Understand and analyze the concepts of Spring and Hibernate frameworks.
DSE-251.4	Design and develop a project using JSP and JDBC.
DSE-251.5	Create and implement applications using Spring and Hibernate frameworks.

Course Contents

Unit I	**JDBC**	**(6 Hours)**
Introduction to Applet and JDBC , JDBC Architecture ,JDBC Process ,Working with Result Set Interface.		
Unit II	**Multithreading**	**(6 Hours)**
Introduction to Multithreading ,Thread creation: Thread Class, Runnable Interface, Life cycle of Thread, Thread Priority ,Execution of Thread Application, Synchronization and Interthread communication.		
Unit III	**Servlet**	**(6 Hours)**
Introduction to Servlet , Types of Servlets: Generic Servlet and Http Servlet Life cycle of servlet , Session Tracking ,Servlet with database .		
Unit IV	**JSP**	**(6 Hours)**
Introduction to JSP ,JSP Life Cycle ,Components of JSP ,JSP with Database		

Unit V	Spring and Hibernate	(6 Hours)
Spring: Introduction, Applications and Benefits of spring ,Architecture and Environment Setup ,Hello World Example ,Core Spring- IoC Containers, Spring Bean Definition, Scope, Lifecycle **Hibernate:** Architecture and Environment, Configuration, Sessions, Persistent Class ,Mapping Files, Mapping Types ,Examples		
Learning Resources		
Text Book: 1.Advanced Java Programming -Nirali Prakashan		
Reference Books 1. The Complete Reference – JAVA Herbert Schildt 2. Professional Hibernate, by Eric Pugh, Joseph D. Gradecki by Wiley Publishing, Inc., ISBN: 0-7645-7677-1 3. Spring In Action, Craig Walls, Ryan Breidenbach, Manning Publishing Co., ISBN: 1- 932394- 35-4 4. Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam -2nd edition-Bryan Basham, Kath.		
E-Resources and MOOC/NPTEL/YouTube Links: 1. https://www.javatpoint.com/ 2. https://www.w3schools.com/java/		

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)			**Semester : IV**		
Course Code:DSE-251(A)P-CA			**Name of Course: Advanced Java Programming**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**Tutorial**	**Lecture**	**Practical**	**Tutorial**
-	**4**	**-**	**-**	**2**	**-**
Examination Scheme :					
Practical	**Total**				
50 Marks	**50 Marks**				

Course Objective: The course aims to

1. To know the concept of Java Programming.
2. To understand how to use programming in day to day applications
3. To develop programming logic.

Course Outcome: After successful completion of this course, learner will be able to

DSE-251P.1	Implement Applet Programming concepts.
DSE-251P.2	Implement JDBC Programming concepts.
DSE-251P.3	Apply the concepts of Multithreading and Socket Programming in real-time programs.
DSE-251P.4	Implement and test applications using Spring and Hibernate frameworks.
DSE-251P.5	Design**,** build, and evaluate applications using Spring and Hibernate.

List of Laboratory Assignments

Practical No.	Content
01	Write a program to display a simple Applet showing "Welcome to Java Applet".
02	Develop an Applet that interacts with user input using text fields and buttons.
03	Write a JDBC program to connect to a database and retrieve records from a student table.
04	1. Write a JDBC program to insert, update, and delete records in an employee database. 2. Write a Java Program to create a Emp (Eno, EName, Sal) table and insert record into it. (Use PreparedStatement Interface).
05	1. Write a Multithreading program to print numbers from 1 to 10 using two threads. 2. Write a Multithreading program to display even and odd numbers using two different threads.

06	1. Write a Socket program for file transfer between client and server. 2. Write a Socket programming example for a simple Client-Server text messaging system.
07	1. Create a JSP page that inserts and retrieves data from a student database using JDBC 2. Create a JSP page to accept user details and display them on the next page.
08	Write a JSP Program to display addition of 1 to 10 numbers
09	Write a Servlet and JSP combination program for a feedback form storing data in MySQL
10	Write a SERVLET program to display the details of Product (ProdCode, PName, Price) on the browser in tabular format. (Use database)
11	Write a JSP program to calculate sum of first and last digit of a given number. Display sum in Red Color with font size 18.
12	Write a Hibernate program to display all Employee details in tabular format.
13	Write a Hibernate program to insert Employee details (EmpID, EmpName, Salary) into database.
14	Write a Spring Core program using Constructor Injection for displaying product information.
15	Write a Spring JDBC program to insert Customer details (CustID, Name, City) into database.

Practical conduction

Conducting a two-hour practical session allows for more in-depth exploration and interaction. Here are comprehensive guidelines to effectively conduct a two-hour tutorial session

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction.

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour duration.

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)					**Semester: IV**
Course Code: DSE-251(B)T-CA			**Name of Course: Digital Forensics-I**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**Tutorial**	**Lecture**	**Practical**	**Tutorial**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. To understand underlying principles and many of the techniques associated with the digital forensic practices and cyber crime
2. To explore practical knowledge about digital forensic methodology.
3. To learn the importance of evidence handling and storage for various devices.
4. To develop an excellent understanding of current cyber security issues and analyze the ways that exploits in securities.
5. To investigate attacks, Intrusion Detection System technical exploits and router attacks and "Trap and Trace" computer networks.
6. To apply digital forensic knowledge to use computer forensic tools and investigation report writing.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-241.1	Describe Forensic science and Digital Forensic concepts
DSE-241.2	Determine various digital forensic Operandi and motive behind cyber attacks
DSE-241.3	Interpret the cyber pieces of evidence. Digital forensic process model and their legal Perspective.
DSE-241.4	Demonstrate various forensic tools to investigate the cybercrime and to identify the digital pieces of evidence
DSE-241.5	Analyze the digital evidence used to commit cyber offences.

Course Contents

Unit I	**Introduction: Digital Forensics**	**(6 Hours)**

What Is Digital Forensics?, Digital Forensics Goals, Cybercrime - Cybercrime Attack Mode How Are Computers Used in Cybercrimes?, Example of Cybercrime, Types of Digital Forensics - Computer Forensics, Mobile Forensics Network Forensics , Database Forensics , Forensics Data Analysis, Digital Forensics Users - Law Enforcement , Civil Ligation , Intelligence and Counter intelligence, Types of Digital Forensics Investigation, Forensics Readiness -The Importance of Forensic Readiness for Organizations.

Unit II	**Essential Technical Concepts**	**(6 Hours)**

Data Representation - Decimal (Base-10) ,Binary , Hexadecimal (Base-16) , Computer Character Encoding Schema, File Structure, Digital File Metadata, Timestamps Decoder (Tool), Hash Analysis, How to Calculate File Hash, Memory Types - Volatile Memory, Nonvolatile Memory, Types of Computer Storage - Primary Storage , Secondary Storage.		
Unit III	**Initial Response and First Responder Tasks**	**(6 Hours)**
Digital Evidence- Digital Evidence Types ,Locations of Electronic Evidence, Challenges of Acquiring Digital Evidence , Who Should Collect Digital Evidence? , Chain of Custody ,Cloning and Live vs Dead System ,Hashing, and Final Report, Digital Forensics Examination Process- Seizure , Acquisition , Analysis, Digital Forensics vs. Other Computing Domain.		
Unit IV	**Network Forensic**	**(6 Hours)**
What is Network Forensics? Computing Environment - Personal Computing Environment , Client Server Computing Environment, Distributed Computing Environment, Introduction to the Incident Response Process, Investigative and Forensics Methodologies, Where Network Forensics Fits In, Capturing Network Traffic- The Importance of DHCP Logs, Using tepdump/WinDump , Using wireshark ,Using SPAN Ports or TAPS , Using Fiddler , Firewalls.		
Unit V	**Digital Forensics Tools**	**(6 Hours)**
Evaluating Digital Forensics Tool Needs -Types of Digital Forensics Tools , Tasks Performed by Digital Forensics Tools , Tool Comparisons ,Other Considerations for Tools, Digital Forensics Software Tools -Command-Line Forensics Tools , Linux Forensics Tools ,Other GUI Forensics Tools, Digital Forensics Hardware Tools- Forensic Workstations ,Using a Write-Blocker , Recommendations for a Forensic Workstation, Validating and Testing Forensics Software- Using National Institute of Standards and Technology Tools , Using Validation Protocols.		
Learning Resources		
Reference Books : 1. John Sammons, "The Basics of Digital Forensics - The Primer for Getting Started in Digital Forensics" Syngress is an imprint of Elsevier 2. Nihad A. Hassan, "Digital Forensics Basics A Practical Guide Using Windows OS" Apress 3. Clint P Garrison "Digital Forensics for Network, Internet, and Cloud Computing A forensic evidence guide for moving targets and data, Syngress Publishing, Inc. 2010		
E-Resources and MOOC/NPTEL/YouTube Links: https://youtube.com/playlist?list=PLa2xctTiNSCiTGuejkc05zsr-G5t9AuH8&si=J2-g_STW67fXldKM		

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: IV**		
Course Code: DSE- 251(B)P- CA			**Name of Course: Digital Forensics-I**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**4**	**-**	**-**	**2**	**-**
Examination Scheme:					
Practical	**Total**				
50 Marks	**50 Marks**				

Course Objective: The course aims to

1. Describe digital forensics and relate it to an investigative process. Practice the basic digital forensic investigations.
2. Understand and use different digital forensic tools.
3. Explain the legal issues of preparing for and performing digital forensic analysis based on the
4. investigator's position and duty.

Course Outcome: Upon successful completion of this course, students will be able to

DSE- 251P.1	To evaluate the integrity and reliability of forensic image creation.
DSE- 251P.2	To assess the accuracy and effectiveness of data acquisition methods.
DSE- 251P.3	To evaluate digital evidence and justify findings in a forensic case.
DSE- 251P.4	To assess recovered data and validate the correctness of the file restoration process.
DSE- 251P.5	To evaluate browser artefacts and determine their forensic value.

Laboratory

List of Laboratory Practical

Practical No.	Content
01	Creating a Forensic Image using FTK Imager/Encase Imager: -Creating Forensic Image - Check Integrity of Data -Analyze Forensic Image
02	Data Acquisition: - Perform data acquisition using: - USB Write Blocker + FTK Imager
03	Forensics Case Study: Solve the Case study (image file) provided in the lab using Encase Investigator. Forensics Case Study: Solve the Case study (image file) provided in the lab using Autopsy.

04	Recovering and Inspecting deleted files: -Check and Recover the Deleted Files - Analyzing and Inspecting the recovered files
05	Web Browser Forensics. -Web Browser working -Forensics activities on browser -Cache/Cookies analysis
06	Analyze the packets provided in the lab and solve the questions using Wireshark: What web server software is used by www.snopes.com? -About what cell phone problem is the client concerned? -According to Zillow, what instrument will Ryan learn to play? -How many web servers are running Apache?
07	Capturing and analyzing network packets using Wireshark (Fundamentals) -Identification the live network -Capture Packets -Analyze the captured packets
08	Using Sysinternals tools for Network Tracking and Process Monitoring: -Check Sysinternals tools -Monitor Live Processes -Capture RAM and TCP/UDP packets -Monitor Hard Disk, Virtual Memory and Cache Memory

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear objectives that align with the course syllabus and learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts etc.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction

Assessment and Evaluation:

Formative Assessment: Assess student understanding through informal assessments, discussions, and problem- solving activities.

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour Duration.

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: IV**		
Course Code: DSE-251(C)T-CA			**Name of Course: Data Visualization**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. Understand the fundamentals of data visualization and its importance.
2. Learn about visual perception and its impact on data interpretation.
3. Explore the ethical considerations and challenges in data visualization.
4. Study different types of visualizations and their appropriate uses.
5. Utilize Power BI to create and customize various types of visualizations.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-251.1	Explain the concepts, principles, and best practices of data visualization and choose appropriate visual representations for different data types.
DSE-251.2	Create static visualizations using Matplotlib, Seaborn, and Pandas, customizing visual elements for clarity and accuracy.
DSE-251.3	Perform data exploration, clean datasets, identify patterns and anomalies, and apply transformations necessary for effective visualization.
DSE-251.4	Produce interactive visualizations and dashboards using Plotly, Dash, and Bokeh, incorporating interactivity such as hover events, filters, and linked charts.
DSE-251.5	Design and evaluate advanced visualizations (maps, network graphs, 3D charts) and develop complete data storytelling projects, combining visuals, narrative flow, and deployment.

Course Content

Unit I	**Introduction to Data Visualization**	**(6 Hours)**

What is Data Visualization?, Importance of visualizing data for communication and decision-making., Visualizing data for exploratory analysis and presentation., The Role of Data in Visualization, Types of data: Quantitative vs. Qualitative, Structured vs. Unstructured., Understanding the data lifecycle and transformation for visualization, Principles of Effective Visualization, Clarity, simplicity, and accuracy, Avoiding misleading visuals (chartjunk).Visual encoding: Color, size, shape, and position, Types of Visualizations - Common chart types: Bar charts, line charts, scatter plots, histograms, pie charts, etc. When to use each type based on data characteristics, Best Practices in Data Visualization - Choosing the right chart based on data and audience, Designing for accessibility and clarity. Case Studies - Review of real-world examples of good and bad visualizations, Analyzing what makes them effective or ineffective.

Unit II	Static Visualization Techniques	(6 Hours)
Introduction to Data Visualization Libraries: Overview of libraries: Matplotlib, Seaborn, Pandas Setting up and installing libraries, Matplotlib Basics: Creating simple line, bar, scatter, and pie charts, Customizing plots: Titles, labels, ticks, legends, and gridlines, Saving and exporting visualizations., Advanced Matplotlib Techniques: Customizing colors, styles, and plot types, Subplots and multi-panel Plots, Adding annotations and markers to highlight insights, Seaborn for Statistical Visualizations: Using Seaborn for advanced plots: Heatmaps, pair plots, violin plots, and box plots, Styling options in Seaborn for better aesthetics, Customizing Seaborn plots with Matplotlib, Best Practices for Static Visualizations: Choosing the right type of plot for statistical data, Ensuring clarity with appropriate scaling and labeling, Avoiding over-complication and "chartjunk.", Case Study and Practice: Hands-on project: Create a set of static visualizations from a real-world dataset.		
Unit III	**Data Exploration and Preprocessing for Visualization**	**(6 Hours)**
Introduction to Data Cleaning and Preprocessing: Why data cleaning is crucial for effective visualizations. ,Common data issues: Missing values, duplicates, and inconsistencies, Data Exploration: Summary statistics and visualizing distributions (histograms, box plots), Identifying outliers and anomalies, Techniques for exploratory data analysis (EDA), Data Transformation: Normalization and scaling of data. Aggregation, pivoting, and reshaping data for visualization, Working with Time-Series Data: Handling time-series data: Indexing, resampling, and smoothing , Plotting trends and seasonality with line charts, Case Study: Using Pandas to clean and prepare data, Visualizing the cleaned data through static charts.		
Unit IV	**Interactive Data Visualization**	**(6 Hours)**
Introduction to Interactive Visualization: Benefits of interactivity: Engaging users, allowing exploration, and enabling deeper insights, Tools and libraries: Plotly, Bokeh, Dash, Creating Interactive Visualizations with Plotly: Overview of Plotly: Installation and setup, Creating interactive charts: Line, scatter, bar, and pie charts, Adding interactivity: Hover information, zoom, and click events, Building Interactive Dashboards with Dash: Introduction to Dash for building web-based data applications, Creating layouts with Dash components (graphs, sliders, dropdowns), Using callbacks to link interactive elements (e.g., buttons, sliders) to visualizations, Bokeh for Interactive Plots: Introduction to Bokeh and its interactive capabilities, Creating plots with zoom, pan, and hover effects, Adding widgets for user interactivity (e.g., sliders , checkboxes), Web Deployment of Interactive Visualizations: Embedding visualizations in web pages and reports, Hosting interactive visualizations on platforms like Heroku and GitHub Pages, Case Study and Project: Hands-on project: Build an interactive dashboard using Dash or Plotly, Deploy the project on a cloud platform.		
Unit V	**Advanced Visualization Techniques and Data Storytelling**	**(6 Hours)**
Advanced Visualization Techniques: Geospatial Data Visualization:-visualizing geographic data with maps using Folium and GeoPandas,Creating choropleth maps and other geospatial visualizations, Network and Graph Visualizations:-Visualizing networks and relationships with NetworkX and Gephi, Creating force-directed graphs and hierarchical visualizations,3D Visualizations:-Using Plotly and Matplotlib for 3D plotting, Creating interactive 3D scatter plots and surface plots. Data Storytelling with Visualizations: The art of data storytelling: Combining visuals with narrative, Designing for storytelling: Focus on flow, context, and clarity, Using animation to enhance storytelling, Building Complex Dashboards: Advanced interactivity: Multiple views, linked charts, and dynamic filtering, Integrating data sources for live dashboards, User interface (UI) and user experience (UX) considerations for dashboards, Best Practices in Data Storytelling:-Crafting a narrative with data: Framing insights, not just showing number, Making data accessible: Designing for different audiences and mediums (reports, presentations, web),Case Study and Final Project:-Work on a final project: Students will create a complete data visualization story, including interactive and static elements, Incorporating advanced techniques (maps, 3D visuals, and dashboards), Final presentation of the project.		

Learning Resources
Text Books 1. "Storytelling with Data: A Data Visualization Guide for Business Professionals" Cole Nussbaumer Knaflic, Wiley; 1st edition, 2015. 2. “The Visual Display of Quantitative Information” by Edward Tufte, Graphics Press USA; 2nd edition,2001.
Reference Books: 1. "Data Visualization: A Practical Introduction" Kieran Healy, Princeton University Press, 2018. 2. "Analyzing Data with Power BI and Power Pivot for Excel", Alberto Ferrari and Marco Russo, Microsoft Press; 1st edition, 2017. 3. "Microsoft Power BI Complete Reference", Devin Knight, Brian Knight, Mitchell Pearson, and Manuel Quintana, Packt Publishing; 1st edition, 2018.
MOOC/NPTEL/YouTube Links https://www.youtube.com/watch?v=pCJ15nGFgVg&t=12s

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: IV**		
Course Code:DSE- 251(C)P- CA			**Name of Course: Data Visualization**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**4**	**-**	**-**	**2**	**-**
Examination Scheme:					
Practical	**Total**				
50 Marks	**50 Marks**				

Course Objective: The course aims to

1. To help students understand the Power BI interface, workspace elements, and the process of importing and managing different data sources.
2. To enable students to apply data cleaning and transformation techniques using Power Query Editor for preparing high-quality datasets.
3. To train students to analyze data models by creating relationships, resolving inconsistencies, and designing calculated columns and measures.
4. To guide students to create meaningful and well-formatted data visualizations using various chart types and visualization tools in Power BI.
5. To help students apply publishing workflows and evaluate report sharing, collaboration, and data refresh strategies using Power BI Service.

Course Outcome: Upon successful completion of this course, students will be able to

CC-251P.1	Describe the Power BI interface and perform basic operations like importing data from multiple sources.
CC-251P.2	Clean, transform, and shape datasets using Power Query Editor, including handling missing values and modifying data structures.
CC-251P.3	Develop data models, create relationships between tables, and use calculated fields and measures to support analysis.
CC-251P.4	Build and customize visualizations such as bar charts, line charts, area charts, pie charts, and more in Power BI.
CC-251P.5	Publish, share, and manage reports and dashboards in Power BI Service, including setting up scheduled data refresh and permissions.

Laboratory

List of Laboratory Practical

Practical No.	Content
01	Introduction to Power BI Interface and Basics 1. Installation and interface overview 2. Exploring the Power BI workspace: Ribbon, panes, and canvas. 3. Importing data from Excel and CSV files. 4. Introduction to multiple data sources 5. Basic report creation: Adding visuals and saving a report.

02	Data Transformation and Preparation 1. Using Power Query Editor 2. Cleaning data: Removing duplicates, handling missing values. 3. Transforming data: Splitting columns, changing data types, renaming columns. 4. Merging and appending queries. 5. Creating custom columns and calculated columns
03	Data Modeling 1. Creating relationships between tables 2. Identifying and resolving data inconsistencies 3. Creating calculated columns and measures
04	Creating Basic Visualizations 1. Creating various chart types (bar, column, line, pie, area, etc.,) 2. Formatting and customizing visualizations
05	Publishing and Sharing Reports 1. Publishing a report to Power BI Service. 2. Sharing reports and dashboards with team members. 3. Setting up data refresh schedules and managing permissions

Preparation:

Review Content: Ensure a thorough understanding of the theory subject and select key topics or concepts to cover during the session

Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs.

Prepare Materials: Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

Engagement Strategies:

Active Participation: Encourage all students to actively engage in discussions and activities throughout the session.

Use of Technology: Utilize multimedia presentations or online tools to enhance learning experiences and engagement.

Group Activities: Incorporate group discussions or collaborative activities to promote peer learning and interaction

Assessment and Evaluation:

Formative Assessment: Assess student understanding through informal assessments, discussions, and problem- solving activities.

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour Duration.

OR

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)			**Semester: IV**		
Course Code: DSE-251(D)T-CA			**Name of Course: Introduction to Machine Learning**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**Tutorial**	**Lecture**	**Practical**	**Tutorial**
2	**-**	**-**	**2**	**-**	**-**
Examination Scheme :					
FA	**SA**	**Total**			
25 Marks	**25 Marks**	**50 Marks**			

Course Objective: The course aims to

1. This course envisions to impart to students the understanding of basic algorithm designing paradigms.
2. This course introduces the basic knowledge on how to analyse an algorithm.
3. This course expects to enable a student to synthesize efficient algorithms in common design situations and real-life problems.

Course Outcome: Upon successful completion of this course, students will be able to

DSE-251.1	Understand the characteristics of rational agents, and the environment in which they operate, and gain insights about problem-solving agents.
DSE-251.2	Gain insights about Uninformed and Heuristic search techniques and apply them to solve search applications.
DSE-251.3	Appreciate the concepts of knowledge representation using Propositional logic and Predicate calculus and apply them for inference/reasoning.
DSE-251.4	Obtain insights about Planning and handling uncertainty through probabilistic reasoning and fuzzy sets.
DSE-251.5	Obtain a basic understanding of the AI domains and their applications and examine the legal and ethical issues of AI .

Course Contents

Unit I	**Introduction to AI and Intelligent Agents**	**(6 Hours)**

Introduction to AI : Definition, goals, and applications of Artificial Intelligence Characteristics of intelligent systems. Intelligent Agents: Agents and environments, Structure of agents, Simple reflex, Model-based, Goal-based, Utility-based, learning agents. Properties of environments: Fully/partially observable ,Deterministic/stochastic, Episodic/sequential, Static/dynamic, Discrete/continuous, Single/multi-agent, Rationality : Concept of rational agents, Performance measure and rational decision-making, Knowledge-Based Agents, Knowledge base, Inference mechanisms, The Wumpus World.

Unit II	Problem Solving & Basic Search Techniques	(6 Hours)
Problem-solving agents: Problem formulation, State space, Goal testing, Solution types. Uninformed Search: Depth First Search (DFS), Breadth First Search (BFS), Uniform search concepts, Iterative Deepening Search (IDS). Informed Search :Heuristics, Best First Search, A* Search,AO* Search.		
Unit III	**Advanced Search, Games & Evolutionary Methods**	**(6 Hours)**
Adversarial Search: Two-player zero-sum games, Game trees, Minimax algorithm, Alpha-Beta pruning. Constraint Satisfaction Problems (CSPs):Variables, domains, constraints, Backtracking search, Forward checking, Constraint propagation. Evolutionary Search Techniques: Evolutionary algorithms, Genetic algorithms (GA), Operators: selection, crossover, mutation, Applications in optimization and search.		
Unit IV	**Logic, Reasoning & Uncertainty**	**(6 Hours)**
Logic: Propositional logic, First-order predicate logic, Syntax, semantics, Inference: Propositional vs. first-order inference, Unification and lifting, Forward chaining, backward Chaining, Resolution, Truth Maintenance Systems (TMS),Planning: Introduction to planning, Blocks World, STRIPS planning system, Uncertainty Handling: Non-monotonic reasoning, Probabilistic reasoning, Introduction to fuzzy set theory.		
Unit V	**Domains, Applications, Expert Systems & Ethics**	**(6 Hours)**
Domains of AI: Machine Learning, Robotics, Natural Language Processing, Computer Vision, Deep Neural Networks. Applications: Healthcare, Finance, Education, Autonomous systems, Industry and automation. Expert Systems Architecture: Knowledge base, Inference engine, User interface, Explanation facility, Two case studies (e.g., MYCIN, DENDRAL, or domain-specific).Legal & Ethical Issues: Bias and fairness, Transparency and explain ability, Privacy and security, Accountability, Societal impacts of AI.		

Learning Resources

Text Books:

1. M.C. Trivedi, A Classical Approach to Artificial Intelligence, Khanna Book Publishing Company, 2024 (AICTE Recommended Textbook).
2. Nilsson Nils J, Artificial Intelligence: A new Synthesis, Morgan Kaufmann Publishers Inc. San Francisco, CA, ISBN: 978-1-55-860467-4.
3. Dan W Patterson, Introduction to Artificial Intelligence & Expert Systems, PHI Learning 2010.
4. Rajiv Chopra, Data Science with Artificial Intelligence, Machine Learning and Deep Learning, Khanna Book Publishing Company, 2024.

Reference Books:

1. M.C. Trivedi, Introduction to AI and Machine Learning, Khanna Book Publishing Company, 2024.
2. Russell, S. and Norvig, P., "Artificial Intelligence - A Modern Approach", 3rd edition, Prentice Hall
3. Van Hirtum, A. & Kolski, C. (2020). Constraint Satisfaction Problems: Algorithms and Applications. Springer
4. Rajiv Chopra, Machine Learning and Machine Intelligence, Khanna Book Publishing Company, 2024.

E-Resources and MOOC/NPTEL/YouTube Links:

AiTpoint – Learn to Code Smarter

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year Computer Application (2025 Pattern)			**Semester: IV**		
Course Code:DSE- 251(D)P- CA			**Name of Course: Introduction to Machine Learning**		
Teaching Scheme (Hrs/week):			**Credits: 2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
-	**4**	**-**	**-**	**2**	**-**
Examination Scheme:					
Practical	**Total**				
50 Marks	**50 Marks**				

Course Objective: The course aims to

1. To introduce the fundamental concepts of Artificial Intelligence, including intelligent agents, rationality, knowledge-based systems, and problem-solving approaches.
2. To develop the ability to formulate and solve problems using search techniques, including uninformed, informed, adversarial, and evolutionary search methods.
3. To enable students to apply logical reasoning and inference mechanisms, understand planning techniques, and handle uncertainty using probabilistic and fuzzy methods.
4. To provide a broad understanding of major AI domains, such as Machine Learning, Robotics, NLP, computer Vision, and Deep Neural Networks, along with their real-world applications.
5. To equip students with knowledge of expert system architecture, including knowledge representation, inference engines, and case-study-based implementations.
6. To create awareness about legal, ethical, and societal issues in AI, ensuring students understand responsible and safe use of AI technologies.

Course Outcome: Upon successful completion of this course, students will be able to

CC-251P.1	Apply Uninformed Search Algorithms and Implement Heuristic Search techniques
CC-251P.2	Analyze and Solve Constraint Satisfaction Problems
CC-251P.3	Develop Rule-Based Systems
CC-251P.4	Implement and Evaluate Optimization Techniques
CC-251P.5	Apply and illustrate the NLP concepts

Laboratory

List of Laboratory Practical

Practical No.	Content
01	Demonstrate basic problem-solving using Breadth-First Search on a simple grid.
02	Implement Depth-First Search (DFS) on a small graph.
03	Solve the Water Jug Problem using Breadth First Search (BFS).

04	Implement a Hill Climbing search to find the peak in a numeric dataset.
05	Apply the A* Search algorithm to find the shortest path in a 4x4 grid.
06	Implement the Minimax search algorithm for 2-player games. You may use a game tree with 3 plies.
07	Solve the 4 – Queens Problem as a CSP backtracking problem.
08	Use constraint propagation to solve a Magic Square puzzle.
09	Apply optimization techniques to find the maximum value in a list.
10	Represent and evaluate propositional logic expressions.
11	Implement a basic rule-based expert system for weather classification.
12	Implement a basic AI agent with simple decision-making rules.
13	Implement a basic Rule-Based Chatbot.
14	Using Python NLTK, perform the following Natural Language Processing (NLP) tasks for text content. a) Tokenizing b) Filtering Stop Words c) Stemming d) Part of Speech tagging e) Chunking f) Named Entity Recognition (NER)
15	Perform Image classification for a given dataset using CNN. You may use TensorFlow /Keras.

Preparation:

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Set Objectives: Define clear learning objectives that align with the course syllabus and students' learning needs. **Prepare Materials:** Gather necessary materials such as lecture notes, slides, handouts, and any supplementary resources or examples.

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Assessment and Evaluation:

Formative Assessment: Assess student understanding through informal assessments, discussions, and problem- solving activities.

Feedback Mechanism: Provide timely feedback on students' participation and comprehension to support their learning progress

Logistics and Environment:

Classroom Setup: Ensure a comfortable and conducive learning environment with adequate seating, lighting, and equipment for presentations.

Time Management: Manage time effectively to cover all planned activities within the two-hour Duration.

Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune					
Department: Second Year BCA(2025 Pattern)					**Semester: IV**
Course Code:SEC-251T-CA			**Name of Course: Design Thinking and Innovation**		
Teaching Scheme (Hrs/week):			**Credits:2**		
Lecture	**Practical**	**TW**	**Lecture**	**Practical**	**TW**
1	**-**	**1**	**1**	**-**	**1**
Examination Scheme :					
FA	**TW**	**Total**			
-	**50 Marks**	**50 Marks**			

Course objective: The Course Aims to

1. To help students understand the fundamental concepts of innovation, creative thinking, and the Design Thinking framework.
2. To enable students to analyze customer needs, empathize with users, and define real-world or wicked problems using design tools.
3. To guide students to apply ideation techniques, brainstorming methods, and prototyping approaches for developing innovative solutions.
4. To train students to evaluate prototype feasibility, scalability, ethical considerations, and the impact of innovation on customer experience.
5. To empower students to create user-centered design solutions, refine prototypes based on feedback, and present innovative, implementable concepts.

Course Outcome: Upon successful completion of this course, students will be able to

SEC-251.1	Explain the principles of innovation, creative thinking, and the Design Thinking process (Empathize, Define, Ideate, Prototype, Implement).
SEC-251.2	Apply empathy tools, observation techniques, and customer-centered approaches to identify and define complex or wicked problems.
SEC-251.3	Analyze customer experiences, problem statements, and ideation outputs in order to generate meaningful design solutions.
SEC-251.4	Develop and construct prototypes using rapid prototyping techniques and propose implementable design concepts.
SEC-251.5	Evaluate and refine solutions through feedback loops, testing, ethical considerations, and strategies for scaling innovation.

Course Content		
Unit I	**Basics of Design Thinking**	**(6 Hours)**
Understand the concept of innovation and its significance in business ,Understanding creative thinking process and problem solving approaches ,Know Design Thinking approach and its objective ,Design Thinking and customer centricity – real world examples of customer challenges, use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer, Expectations with Product , Discussion of a few global success stories like AirBnB, Apple, IDEO, Netflix etc., Explain the four stages of Design Thinking Process – Empathize, Define, Ideate, Prototype, Implement.		
Unit II	**Learning to Empathize and Define the Problem**	**(6 Hours)**
Know the importance of empathy in innovation process – how can students develop empathy using design tools ,Observing and assimilating information ,Individual differences & Uniqueness Group Discussion and Activities to encourage the understanding, acceptance and appreciation of individual differences, What are wicked problems, Identifying wicked problems around us and the potential impact of their solutions.		
Unit III	**Ideate, Prototype and Implement**	**(6 Hours)**
Know the various templates of ideation like brainstorming, systems thinking ,Concept of brainstorming – how to reach consensus on wicked problems , Mapping customer experience for ideation ,Know the methods of prototyping, purpose of rapid prototyping, Implementation.		
Unit IV	**Implementing Innovation and Scaling Solutions**	**(6 Hours)**
Turning prototypes into scalable solutions , Planning for production and launch, Strategies for scaling innovation (e.g., MVPs, agile methodologies) , Overcoming challenges in scaling and sustaining innovation Ethical considerations in innovation.		
Unit V	**Feedback, Re-Design & Re-Create**	**(6 Hours)**
Feedback loop, focus on User Experience, address ergonomic challenges, user focused design , Final concept testing, Final Presentation – Solving Problems through innovative design concepts & creative solution.		

Learning Resources

Text Books:

1. E Balaguruswamy (2023), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company.
2. Tim Brown, (2008), "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation", Harvard Business Review.
3. 8 steps to Innovation by R T Krishnan & V Dabholkar, Collins Publishing.
4. The Design of Everyday Things by Don Norman.
5. Design Thinking: Understanding How Designers Think and Work by Nigel Cross.

Reference Books:

1. Design Thinking by Nigel Cross, Bloomsbury
2. The Innovator's Dilemma by Clayton M. Christensen
3. This is Service Design Thinking by Marc Stickdorn & Jakob Schneider

MOOC/NPTEL/YouTube Links:

https://onlinecourses.swayam2.ac.in/aic25_ge11/preview

Teams Members for Course Design

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