POORNIMA UNIVERSITY

SCHOOL OF COMPUTER SCIENCE & ENGINEERING

BACHELOR OF COMPUTER APPLICATIONS (MA&FSD)

TEACHING SCHEME & SYLLABUS

(Batch 2023-26)

INDEX

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

Student Details

Name of Student:

Name of Program:

Semester: Year: Batch:

Faculty of:

Your Dreams Our Goal

POORNIMA UNIVERSITY

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

VISION

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

Mission

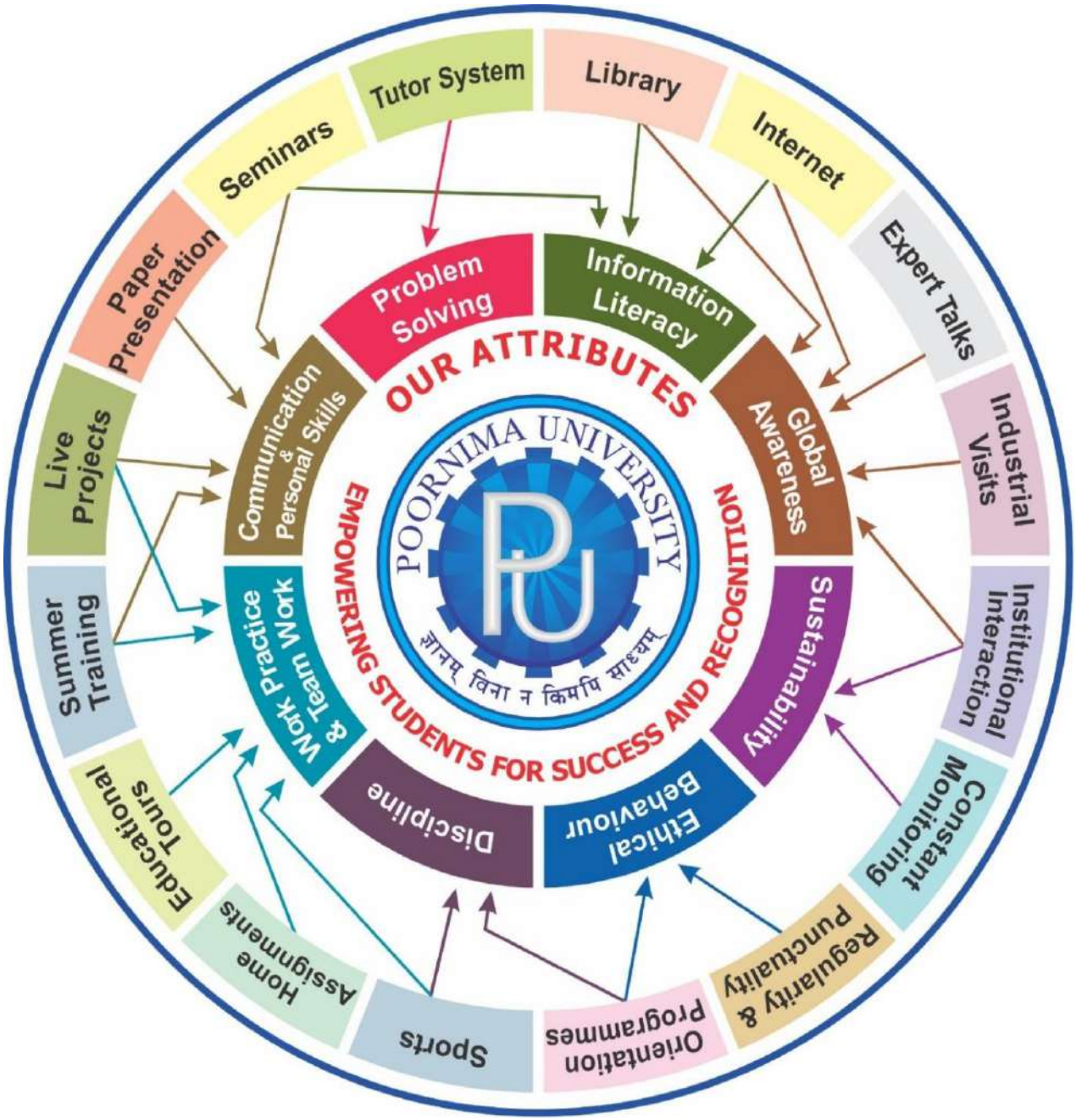
To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

Quality Policy

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

Knowledge Wheel

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



About Program and Program Outcomes (PO):

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

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

Program Outcomes (PO) :

Graduates will be able to:

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

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

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

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

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

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

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

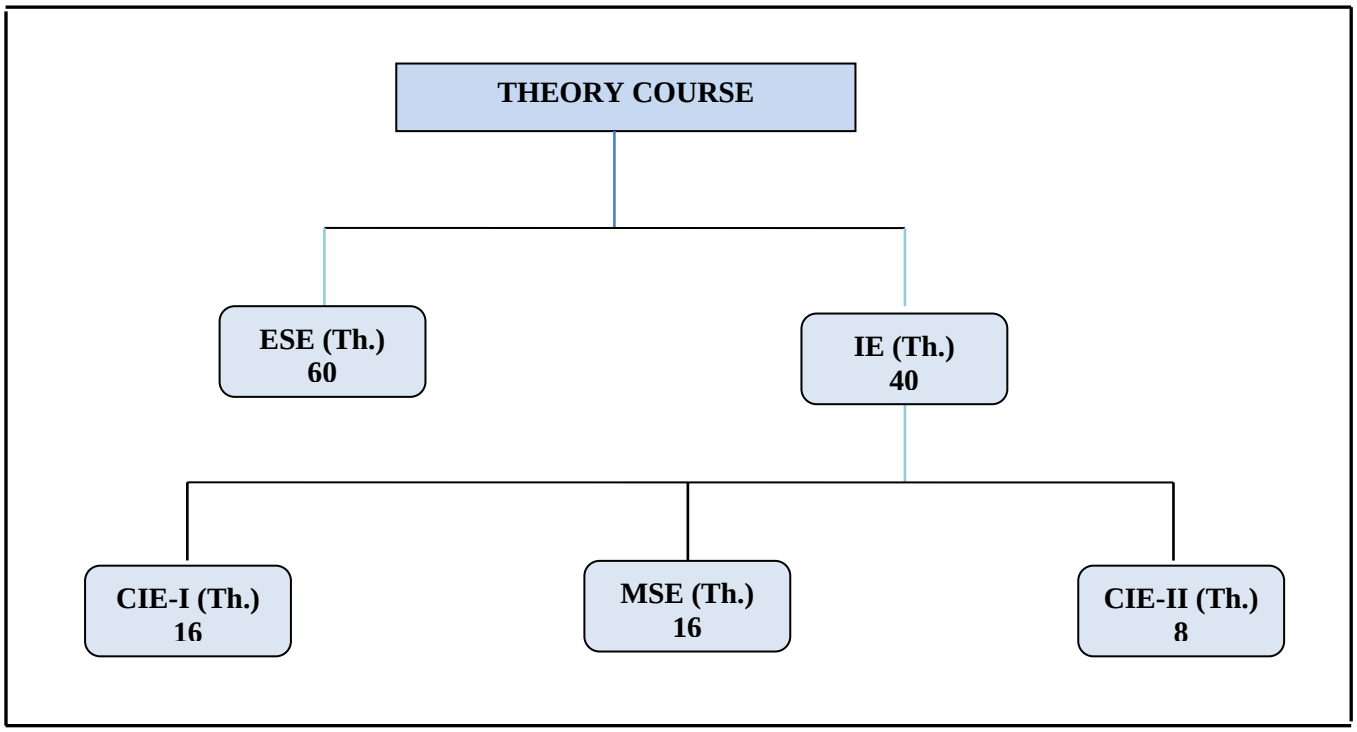
PO8: Individual and team work: Ability to job as a part or manager in various teams in multidisciplinary situations.

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

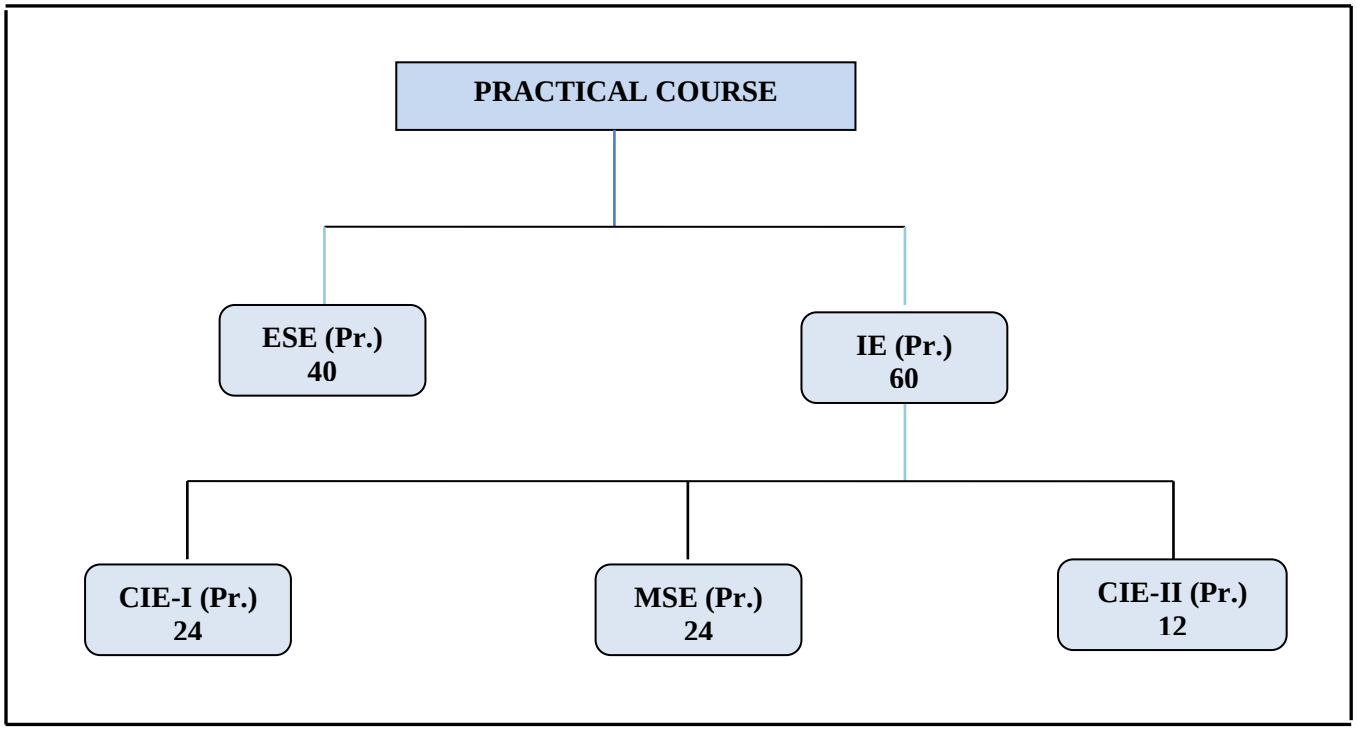
PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Examination System :

A. Marks Distribution of Theory Course:



B. Marks Distribution of Practical Course :



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

CO Wise Marks Distribution:

Exam Entity	Theory Subject		Practical/ Studio Subject	
	Maximum Marks	CO to be Covered	CO to be Covered	Maximum Marks
CIE-I	16 (8 + 8)	1 & 2	1 & 2	24 (12 + 12)
MSE	16 (8 + 8)	3 & 4	3 & 4	24 (12 + 12)
CIE-II (Activity/ Assignment)	8 (8)	5	5	12 (12)
ESE	60	-	-	40
TOTAL	100	-	-	100

Minimum Passing Percentage in All Exams:

S No.	Program Name	Minimum Passing Percentage in		
		IE Component	ESE Component	Total Component
1	Course Work for PhD Registration	**-**	**-**	**50%**
2	B. Arch.	**-**	**45%**	**50%**
3	MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH	**-**	**40%**	**40%**
4	MBA, MCA, M.Des., M.Tech., M.Plan, MHA, MPH	**-**	**35%**	**35%**

SGPA Calculation

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

$$SGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i,

G_i is the Grade Point for the subject I and i = 1 to n,

n = number of subjects in a course in the semester

CGPA Calculation

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

$$CGPA = \frac{\sum_i C_i \times G_i}{\sum_i C_i}$$

where (as per teaching scheme & syllabus):

C_i is the number of credits of subject i,

G_i is the Grade Point for the subject I and i = 1 to n,

n = number of subjects in a course of all the semesters up to which CGPA is computed

Grading Table:

Applicable for B.Arch. & Ph.D. Courses

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	90≤ x ≤100
Excellent	A+	9	80≤ x <90
Very Good	A	8	70≤ x <80
Good	B+	7	60≤ x <70
Above Average	B	6	50≤ x <60
Fail	F	0	x <50
Absent	Ab	0	Absent

Applicable for All Courses except B.Arch. & Ph.D.

Academic Performance	Grade	Grade Point	Marks Range (in %)
Outstanding	O	10	90≤ x ≤100
Excellent	A+	9	80≤ x <90
Very Good	A	8	70≤ x <80
Good	B+	7	60≤ x <70
Above Average	B	6	50≤ x <60
Average	C	5	40≤ x <50
Pass	P	4	35≤ x <40
Fail	F	0	x <35
Absent	Ab	0	Absent

CGPA to percentage conversion rule:

Equivalent % of Marks in the Program = *CGPA* *10

Award of Class

CGPA	Percentage	Equivalent Division
7.50 ≤ CGPA	75% or more	First Division with Distinction
6.00 ≤ CGPA < 7.50	60% ≤ x <75%	First Division
5.00 ≤ CGPA < 6.00	50% ≤ x <60%	Second Division
4.00 ≤ CGPA < 5.00	40% ≤ x < 50%	Pass Class

Guidelines for Massive Open Online Courses (MOOCs)

(Session 2023-24)

Poornima University, in its never ending endeavor to equip students with best-of-class learning and knowledge, has undertaken to include MOOC courses as part of its credit scheme from session 2023-24 onwards. The objective behind this is to enable students to study courses designed by the best teachers in the country and to scale their knowledge base with the rest of learners from the nation. The MOOCs which are included under this scheme is can be chosen from SWAYAM and NPTEL.

1. Introduction of MOOCs: SWAYAM and NPTEL

About SWAYAM:

SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

This is done through a platform that facilitates hosting of all the courses, taught in classrooms to be accessed by anyone, anywhere at any time. All the courses are interactive, prepared by the best teachers in the country and are available, free of cost to any learner. However learners wanting a SWAYAM certificate should register for the final proctored exams that come at a fee and attend in-person at designated centers on specified dates. Eligibility for the certificate will be announced on the course page and learners will get certificates only if this criteria is matched.

The courses hosted on SWAYAM are in 4 quadrants – (1) video lecture, (2) specially prepared reading material that can be downloaded/printed (3) self-assessment tests through tests and quizzes and (4) an online discussion forum for clearing the doubts. Steps have been taken to enrich the learning experience by using audio-video and multi-media and state of the art pedagogy / technology.

In order to ensure that best quality content is produced and delivered, nine National Coordinators have been appointed. They are:

1. AICTE (All India Council for Technical Education) for self-paced and international courses
2. NPTEL (National Programme on Technology Enhanced Learning) for Engineering
3. UGC (University Grants Commission) for non-technical post-graduation education
4. CEC (Consortium for Educational Communication) for under-graduate education
5. NCERT (National Council of Educational Research and Training) for school education
6. NIOS (National Institute of Open Schooling) for school education
7. IGNOU (Indira Gandhi National Open University) for out-of-school students
8. IIMB (Indian Institute of Management, Bangalore) for management studies
9. NITTTR (National Institute of Technical Teachers Training and Research) for Teacher Training programme

Two types of courses are offered on SWAYAM platform: Credit Courses and Non- Credit Courses. Credit courses are offered for each semester in January and July every year. The list is available on SWAYAM official website: https://onlinecourses.swayam2.ac.in/

About NPTEL:

NPTEL (National Programme on Technology Enhanced Learning), is a joint venture of the IITs and IISc, funded by the Ministry of Education (MoE) Government of India, and was launched in 2003. Initially started as a project to take quality education to all corners of the country, NPTEL now offers close to 600+ courses for certification every semester in about 22 disciplines.

Some highlights:

- Largest online repository in the world of courses in engineering, basic sciences and selected humanities and management subjects
- YouTube channel for NPTEL – most subscribed educational channel, 1.3 billion views and 40+ lakhs subscribers
- More than 56000 hours of video content, transcribed and subtitled

- Most accessed library of peer-reviewed educational content in the world
- Translation of more than 12000 hrs of English transcripts in regional Indian languages

NPTEL Online Certification:

The objective of enabling students obtain certificates for courses is to make students employable in the industry or pursue a suitable higher education programme. Through an online portal, 4, 8, or 12-week online courses, typically on topics relevant to students in all years of higher education along with basic core courses in sciences and humanities with exposure to relevant tools and technologies, are being offered. Enrolment to and learning from these courses is free. Following these online courses, an in-person, proctored certification exam is conducted and a certificate is provided through the participating institutions and industry, as applicable.
Some statistics regarding the open online courses since March 2014 till Dec 2021
Completed courses: 3496;
Enrollments across courses: 1.58 CRORE +
Number of exam registrations: 15.1 LAKH +
All the statistics pertaining to completed courses are available at https://beta.nptel.ac.in/courses. All courses are completely free to enroll and learn from. The certification exam is optional and comes at a fee of Rs 1000/course exam.

2. MOOCs at Poornima University:

MOOCs envelops best in class teaching - learning processes along with meeting the requirements of various courses in terms of quality of teaching and evaluation system. To promote the MOOCs among students of Poornima University, it is decided to consider the credits earned through MOOCs.

(a) Options for MOOCs at Poornima University

(For this document, only those MOOCs will be considered which are available on SWAYAM & NPTEL platforms)

- Credit and Non-credit SWAYAM MOOCs can be opted by anyone, anytime, anywhere and in any language. However, prior-permission of the University Authorities is mandatory if the credits are to be transferred to regular degree.
- In case of credit courses, there are two ways to opt these courses for the purpose of credit transfer to PU system as given below:

OPTION–I: As Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards):

Open Elective (for batches entered till 2022) / Multidisciplinary Courses (for batches admitted from 2023-24 onwards) are available at University level in offline mode for which relevant booklets are already published. **These courses carries 02 credits.** These category/type of courses (similar/different) are also available as MOOC courses. The respective Deans / HODs shall provide both the options to all the students to either select offline courses or MOOCs as per details given below:

- Deans / HODs shall prepare a list of upto 05 appropriate MOOC courses of 02/03 credits each, well in advance (at-least 15 days prior to commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.
- After approval, the respective Deans / HODs shall circulate a notice to all their respective students so that they can select any one course from the list, the credits **(only 02)** of which will be counted against Open Elective/ Multidisciplinary courses pertaining to that particular semester.
- If the students are not willing to opt for MOOC Open Elective/ Multidisciplinary course, they can proceed with the current offline practice of opting for Multidisciplinary courses.
- The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean.

OR

OPTION–II: As Major / Minor Courses:

- Deans / HODs shall identify a course of **03 credits** for each semester, well in advance (at-least 15 days prior to

commencement of semester) and take approval from the Office of Dean, Academics / Pro-President, PU.

- After approval, the respective Deans / HODs shall circulate a notice to all their respective students citing that the particular course will be conducted through MOOCs only and is compulsory for all respective students. The credits of this course will be counted against Major/Minor courses pertaining to that particular semester.
- The tutor of the class shall monitor the progress (assignments, feedback, any problem etc.) on weekly basis and report to Head/Dean.
- This is to be noted that if Deans / HODs decide to conduct any major/minor course in any semester through MOOCs, no offline course will be conducted against that.

(b) Important points related to MOOCs at Poornima University

- Only one MOOC shall be allowed in a particular semester for the purpose of credit transfer in the beginning.
- No attendance will be taken for MOOC courses.
- Last period of T/T/S shall be taken for MOOC courses which shall be in self-study mode.
- The method of assessments of MOOC such as assignments and examination are completely associated with that particular MOOC and no exam will be conducted by the department as well as by the Examination Cell.
- The respective Dean / HOD must submit the detail of course i.e., code, name and credit of MOOC opted against that particular course in particular semester attached with highlighting in the related examination scheme of syllabus of that semester signed by BOS Convener / HoD and Dean of Faculty to the office of Pro-President before commencement of the classes.
- SWAYAM will award a certificate to all the students passing the examination along with the credit earned. The center of examination for SWAYAM MOOCs will be finalized by SWAYAM. All the responsibility related to registration for MOOCs, timely submission of assignments, examinations etc. will be borne by the students only.
- The list of registered students in MOOC along with name of course will be submitted to the Examination Cell by the Deans / HoDs before commencement of the classes.
- Any student who would not be able to register/present/clear/pass the MOOC in the stipulated time, it is the choice of the student that he or she may register in next semester (odd or even) with MOOC again or appear as a back exam candidate of the University as per PU norms.
- There will be no provision of re-evaluation of MOOC.
- The scorecard and related certificate of MOOC along with a consolidated list of students with marks of assignment and final exam will be submitted to the examination cell by the concerned Dean / HOD for further process. It is also recommended that alteration/changes/scaling in marks obtained by the students in any MOOC will not be considered.
- The exam registration fee of MOOC up to Max. INR 1000/- will be reimbursed to the student only after successful completion of the course in first attempt and submission of the fee receipt, score-card and certificate of the MOOC to the concerned department within stipulated time after declaration of the results.

NOTE: This is to be noted that the procedure for getting approval from BOS, Faculty Board, Academic Council and BoM is to be followed as per regular process.

Attached Items:

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

POORNIMA UNIVERSITY, JAIPUR

Faculty of Computer Science and Engineering

Name of Program :BCA with Minor in Mobile Application and Full Stack Development

Duration: 3 years Total Credits: 131

Teaching Scheme for Batch 2023-26

Semester-I

Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	
A.	**Major (Core Courses)**								
A.1	**Theory**								
BCACCA1101	Programming Fundamentals of C	**3**	**-**	**-**	**1+ 1***	**40**	**60**	**100**	**3**
BCACCA1102	Operating System	**3**	**-**	**-**	**1***	**40**	**60**	**100**	**3**
BCACCA1103	Computer Fundamental and Office Automation	**3**	**-**	**-**	**1***	**40**	**60**	**100**	**3**
BCACCA1104	Introduction to Web Technology	**3**	**-**	**-**	**2***	**40**	**60**	**100**	**3**
A.2	**Practical**								
BCACCA1201	Programming Fundamentals of C Lab	**-**	**-**	**2**		**60**	**40**	**100**	**1**
BCACCA1202	Operating System Lab	**-**	**-**	**2**		**60**	**40**	**100**	**1**
BCACCA1203	Office Automation Lab	**-**	**-**	**2**		**60**	**40**	**100**	**1**
BCACCA1204	Web Technology Lab			**2**		**60**	**40**	**100**	**1**
B.	**Minor Stream Courses**/Department Elective								
B.1	**Theory**								
BMFCCA1101	Fundamentals of Mobile Application Development	**3**			**1***	**40**	**60**	**100**	**3**
B.2	**Practical**								
	-	-	-	-		-	-	-	
C	**Multidisciplinary Courses**								
	-	**-**	-	-		-	-	-	**-**
D	**Ability Enhancement Courses (AEC)**								
BULCHU1202	Foundation English	**-**	**-**	**2**		**60**	**40**	**100**	**1**
E	**Skill Enhancement Courses (SEC)**								
BULCSE1201	Skill Enhancement Generic Course –I	**-**	**-**	**2**		**60**	**40**	**100**	**1**
F	**Value Added Courses (VAC)**								
BUVCSA1102	Environmental Studies	**2**	**-**	**-**		**40**	**60**	**100**	**2**
G	**Summer Internship / Research Project / Dissertation**								
Total		**17**	**-**	**12**	**1+6***				
Total Teaching Hours		**30/36**							**23**

SH: Supporting Hours

- Classes will be conducted fortnightly.

POORNIMA UNIVERSITY, JAIPUR

Faculty of Computer Science and Engineering

Name of Program : BCA with Minor in Mobile Application and Full Stack Development

Duration: 3 years Total Credits: 131

Teaching Scheme for Batch 2023-26

Semester-II

Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	
A.	**Major (Core Courses)**								
A.1	**Theory**								
BCACSA2101	Basic of Mathematics	**3**			**1***	**40**	**60**	**100**	**3**
BCACCA2102	Computer Networks	**3**			**1***	**40**	**60**	**100**	**3**
BCACCA2103	Python Programming	**3**			**1***	**40**	**60**	**100**	**3**
BCACCA2104	Linux and Shell Script	**3**			**1***	**40**	**60**	**100**	**3**
BCACCA2105	Software Engineering	**3**			**1***	**40**	**60**	**100**	**3**
A.2	**Practical**								
BCACCA2201	Computer Networks Lab			**2**		**60**	**40**	**100**	**1**
BCACCA2202	Python Programming Lab			**2**		**60**	**40**	**100**	**1**
BCACCA2203	Linux and Shell Script Lab			**2**		**60**	**40**	**100**	**1**
BCACCA2204	**Software Enginee**ring Lab			**2**		**60**	**40**	**100**	**1**
B.	**Minor Stream Courses/**Department Elective								
B.1	**Theory**								
B.2	**Practical**								
C	**Multidisciplinary Courses**								
BCAEMC2121	MOOC Course-I	1	-	-	1*	**40**	**60**	**100**	**1**
D	**Ability Enhancement Courses (AEC)**								
BULCHU2204	Language Lab	-	-	2		60	40	100	1
E	**Skill Enhancement Courses (SEC)**								
BULCSE2201	Skill Enhancement Generic Course –II	**-**	**-**	**2**		**60**	**40**	**100**	**1**
F	**Value Added Courses (VAC)**								
BUVCSA2102	Environment & Sustainability	**2**	**-**	**-**		**40**	**60**	**100**	**2**
G	**Summer Internship / Research Project / Dissertation**								
	-	-	-	-		-	-	-	-
Total		**18**	-	**12**	**6***				
Total Teaching Hours		**30/36**							**24**

SH: Supporting Hours

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Teaching Scheme for Batch 2023-26

Semester-III

Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	
A.	**Major (Core Courses)**								
A.1	**Theory**								
BCACCA3101	Relational Database Management System	**3**			**1***	**40**	**60**	**100**	**3**
BCACCA3102	OOPS with Java	**3**			**1***	**40**	**60**	**100**	**3**
BCACCA3103	Data Structure and Algorithm	**3**	**-**	**-**	**1***	**40**	**60**	**100**	**3**
BCACCA3104	Computer Organization and Architecture	**3**	**-**	**-**	**1***	**40**	**60**	**100**	**3**
A.2	**Practical**								
BCACCA3201	Relational Database Management System Lab	-	-	**2**		**60**	**40**	**100**	**1**
BCACCA3202	OOPS with Java Lab	-	-	**2**		**60**	**40**	**100**	**1**
BCACCA3203	Data Structure and Algorithm Lab	-	-	**2**		**60**	**40**	**100**	**1**
B.	**Minor Stream Courses**/Department Elective								
B.1	**Theory**								
BMFCCA3101	Java Script Frame Work with Angular JS	3	-	-	**1***	**40**	**60**	**100**	**3**
B.2	**Practical**								
BMFCCA3201	Java Script Frame Work with Angular JS Lab	-	-	**2**		**60**	**40**	**100**	**1**
C	**Multidisciplinary Courses**								
BCAEMC3121	MOOC Course-II	**1**	_	_	1*				**1**
D	**Ability Enhancement Courses (AEC)**								
BULCHU3208	Communication Skills-I	**-**	**-**	**2**		**60**	**40**	**100**	**1**
E	**Skill Enhancement Courses (SEC)**								
BULCSE3201	Skill Enhancement Generic Course –III	-	-	2		**60**	**40**	**100**	**1**
F	**Value Added Courses (VAC)**								
BUVCCE3101	Digital Marketing	**2**	-	-		**60**	**40**	**100**	**2**
G	**Summer Internship / Research Project / Dissertation**								
	NIL	-	-	-		-	-	-	-
Total		**18**	-	**12**	6*				
Total Teaching Hours		**30/36**							**24**

SH: Supporting Hours

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Faculty of Computer Science and Engineering

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Teaching Scheme for Batch 2023-26

Semester-IV

Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	
A.	**Major (Core Courses)**								
A.1	**Theory**								
BCACCA4101	Big Data Analysis	**3**	-	-	**1***	**40**	**60**	**100**	**3**
BCACCA4102	Design and Analysis of Algorithm	**3**	-	-	**1***	**40**	**60**	**100**	**3**
A.2	**Practical**								
BCACCA4201	Big Data Analysis Lab	-	-	**2**		**60**	**40**	**100**	**1**
BCACCA4202	Design and Analysis of Algorithm Lab	-	-	**2**		**60**	**40**	**100**	**1**
B.	**Minor Stream Courses**/Department Elective								
B.1	**Theory**								
BMFCCA4101	Back Development with Node JS	**3**	-	-	**1+1***	**40**	**60**	**100**	**3**
BMFCCA4102	Introduction to Android Application Development	**3**	-	-	**1***	**40**	**60**	**100**	**3**
B.2	**Practical**			-					
BMFCCA4201	Back Development with Node JS Lab	-	-	**2**		**60**	**40**	**100**	**1**
BMFCCA4202	Introduction to Android Application Development Lab	-	-	**2**		**60**	**40**	**100**	**1**
C	**Multidisciplinary Courses**								
BCAEMC4121	MOOC Course-III	**1**	-	-	1*	-	-		**1**
D	**Ability Enhancement Courses (AEC)**								
BULCHU4109	Negotiation skills & Persuasive Communication	**2**	-	-		**40**	**60**	**100**	**2**
E	**Skill Enhancement Courses (SEC)**								
BULCSE4201	Skill Enhancement Generic Course –IV	-	-	**2**		**60**	**40**	**100**	**1**
F	**Value Added Courses (VAC)**								
BUVCCE4102	Business Intelligence	**2**	-	-		**40**	**60**	**100**	**2**
G	**Summer Internship / Research Project / Dissertation**								
BCACCA4401	Industrial Training Seminar-I	-	-	**2**	**1***	**60**	**40**	**100**	**1**
Total		**17**	-	**12**	**1+6***	-	-	-	
Total Teaching Hours		**30/ 36**							**23**

SH: Supporting Hours

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POORNIMA UNIVERSITY, JAIPUR

Faculty of Computer Science and Engineering

Name of Program: BCA with Minor in Mobile Application and Full Stack Development

Duration: 3 years Total Credits: 131

Teaching Scheme for Batch 2023-26

Semester-V

Course Code	Name of Course	Teaching Scheme				Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	SH	IE	ESE	Total	
A.	**Major (Core Courses)**								
A.1	**Theory**								
BASCCA5101	Advanced Data Structure	**3**	-	-		**40**	**60**	**100**	**3**
A.2	**Practical**								
B.	**Minor Stream Courses**/Department Elective								
B.1	**Theory**								
BMFCCA5101	Advanced Android Application Development	**3**		-	**1***	**40**	**60**	**100**	**3**
BMFCCA5102	NOSQL database with MONGO DB	**3**		-	**1***	**40**	**60**	**100**	**3**
BMFCCA5103	Front End Development with React JS	**3**		-	**1***	**40**	**60**	**100**	**3**
BMFCCA5104	Introduction to UI/UX	**3**		-	**1***	**40**	**60**	**100**	**3**
B.2	**Practical**								
BMFCCA5201	Advanced Android Application Development Lab	-	-	**2**		**60**	**40**	**100**	**1**
BMFCCA5202	NOSQL database with MONGO DB Lab	-	-	**2**		**60**	**40**	**100**	**1**
BMFCCA5203	Front End Development with React JS Lab	-	-	**2**		**60**	**40**	**100**	**1**
C	**Multidisciplinary Courses**								
BCAEMC5121	MOOC Course-IV	**1**	-	-	1*	60	40	100	**1**
D	**Ability Enhancement Courses (AEC)**								
BULCHU5115	Entrepreneurial & Managerial Skills	**2**	-	-		**60**	**40**	**100**	**2**
E	**Skill Enhancement Courses (SEC)**								
BULCSE5201	Skill Enhancement Generic Course –V	-	-	**2**		**60**	**40**	**100**	**1**
F	**Value Added Courses (VAC)**								
BUVCCE5102	Internet of Things	**2**	-	-		**60**	**40**	**100**	**2**
G	**Summer Internship / Research Project / Dissertation**								
BCACCA5401	Industrial Training Seminar-II			**2**	**1***	**60**	**40**	**100**	**1**
Total		**20**	-	**10**	**6***				
Total Teaching Hours		**30/36**							**25**

SH: Supporting Hours

- Classes will be conducted fortnightly.

POORNIMA UNIVERSITY, JAIPUR

Faculty of Computer Science and Engineering

Name of Program : BCA with Minor in Mobile Application and Full Stack Development

Duration: 3 years Total Credits: 131

Teaching Scheme for Batch 2023-26

Semester-VI

Course Code	Name of Course	Teaching Scheme			Marks Distribution			Credits
		Lecture (L)	Tutorial (T)	Practical (P)	IE	ESE	Total	
A.	**Major (Core Courses)**							
A.1	**Theory**							
BCACCA6101	IPR and Patent	**3**	-	-	**40**	**60**	**100**	**3**
A.2	**Practical**							
B.	**Minor Stream Courses**/Department Elective							
B.1	**Theory**							
BMFCCA6101	Mobile Application Security	**3**	-	-	**40**	**60**	**100**	**3**
B.2	**Practical**							
BMFCCA6201	Mobile Application Security Lab	-	-	**2**	**60**	**40**	**100**	**1**
C	**Multidisciplinary Courses**							
D	**Ability Enhancement Courses (AEC)**							
BULCHU6120	Presentation and Interview Skills	2	-	-	**40**	**60**	**100**	**2**
E	**Skill Enhancement Courses (SEC)**							
BULCSE6201	Skill Enhancement Generic Course –VI	-	-	**2**	**60**	**40**	**100**	**1**
F	**Value Added Courses (VAC)**							
	NIL							
G	**Summer Internship / Research Project / Dissertation**							
BCACCA6501	Project/Internship	**-**	**-**	**4**	**60**	**40**	**100**	**2**
Total		**8**	-	**8**				
Total Teaching Hours		**16**						**12**

SH: Supporting Hours

- Classes will be conducted fortnightly.

Major (Core Courses)
Theory

Code: BCACCA1101 Programming Fundamentals of C 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

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

	• Introduction of Unit • Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers. • Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to • functions, structure pointers, arrays and structures within structures, typedef. • Unions – Declaration, uses • Enumerated data-types • Conclusion of the Unit
5.	**File handling Additional features &**
	• Introduction of Unit • File Handling – The file pointer, file accessing functions-fopen, fclose, putc, getc, fprintf, reading and writing into a file • Advance features- storage classes and dynamic memory allocation • C Preprocessor- #define, #include, #undef, Conditional compilation directives. • C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions. • Conclusion of the Unit

A. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	3		-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	3	1	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BCACCA1102 **Operating System** **3 Credits [LTP: 3-0-0]**

COURSE OUTCOME

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

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

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

A. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3		-	2	2	-	-	-	-	-	-	-	-	-	-	-
CO4	2	-	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5		3	2	3	1	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BCACCA1103 Computer Fundamental and Office Automation 3 Credit [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

CO1: Understand the basics of computer systems and its components.
CO2: Possess the knowledge of operating systems.
CO3: Understand and apply the basic concepts of a word processing package.
CO4: Understand and apply the basic concepts of electronic spreadsheet software.
CO5: Understand and create a presentation using PowerPoint tool.

A. **OUTLINE OF THE COURSE**

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Fundamentals of computer	08
2.	Operating system (Windows XP)	06
3.	Word Processing	08
4.	Excel Spreadsheet	08
5.	PowerPoint Presentations	06

A. DETAILED SYLLABUS

Unit	Unit Details
1.	**Fundamentals of computer**
	• Introduction to Fundamentals of computer • Overview Of a Computer • Functional Components of a computer (Working of each unit) • Evolution Of Computers, Generations Of Computers, Classification Of Computers, Applications Of Computers • Hardware: Block diagram of computer, Input and Output devices, Memory and storages devices, Different ports and its uses, Different type of printers • Conclusion of unit
2.	**Operating system (Windows XP)**
	• Introduction to Operating system (Windows XP) • Windows concepts, Features • Windows Structure, Desktop, Task bar, Start Menu, My Computer, Recycle Bin • Windows Accessories, calculator, Notepad, Paint, Word pad, Character Map • Windows Explorer, Entertainment, • Installation of Hardware and Software • Using scanner, system tools, communication, sharing information between computers • Conclusion of unit
3.	**Word Processing**
	• Introduction to Word Processing • Typing, Editing, Proofing & Reviewing • Formatting Text & Paragraphs • Automatic Formatting and Styles • Working with Tables, Graphics and Frames • Mail Merge • Automating Your Work • printing Documents • Conclusion of unit
4.	**Excel Spreadsheet**
	• Introduction to Excel Spreadsheet • Working & Editing In Workbooks • Creating Formats & Links • Formatting a Worksheet & creating graphic objects • Creating Charts (Graphs) • Formatting and analyzing data • Organizing Data in a List (Data Management)

	• Sharing & Importing Data, Printing. • Conclusion of unit
5.	**Power Point Presentations**
	• Introduction to PowerPoint Presentations • Getting started in PowerPoint • Creating a presentation, Creating & editing slides • Previewing a slide show • Adding picture & graph • Adding sound & video • Adding auto shape • Animating objects. • Conclusion of unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Digital Logic and Computer Design	M.M. Mano	Thirteenth Impression	Pearson Education
2.	Fundamentals of Computers	V. Rajaraman	3rd Edition	PHI New Delhi
Reference Book				
1.	Microsoft Office 2003: The Complete Reference, McGraw-Hill Inc.			
2.	T.C. Bartee, 1991, Computer Architecture and Logical Design, McGraw Hill.			
3.	Microsoft Office 2000- Training Guide, Maria Reid-Karl Schwartz, Diana Rain, BPB Publications			
Online Resources				
1.	https://www.tutorialspoint.com/computer_fundamentals/index.htm			
2.	https://onlinecourses.swayam2.ac.in/cec19_cs06/preview			

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	2		2		2	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BCACCA1104 Introduction to Web Technology 3 Credits [LTP: 3-0-0]

COURSE OUTCOME:

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

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

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

C. RECOMMENDED STUDY MATERIAL:

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	3	2	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	3	3	2	2		-	-	-	-	-	-	-	-	-
CO5	-	-	3		-	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

PRACTICAL

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

Course Outcome: -
Students will be able to:

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

A. LIST OF EXPERIMENTS:

1	Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x
2	Write a program that reads a floating point number and then displays the right-most digit of the integral part of the number.
3	Write a C program to calculate the sum of digits of given number.
4	Program to find largest and smallest number from four given number.
5	Program to find whether a year is leap or not
6	Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number.
7	Write a C Program to convert Decimal number to Binary number
8	Find the sum of this series upto n terms 1+2+3+4+5+6+……..
9	Program to print Armstrong‘s numbers from 1 to 100.
10	Write a program to convert years into Minute, Hours, Days, Months, Seconds using switch () statements
11	Write a C menu driven program
12	Write a program to generate the various pattern of numbers
13	Write a C Program to print the reverse of an integer number
14	Write a C program to perform the factorial of given number
15	Write a C program in which a function prime that returns 1 if its argument is a prime and return zero otherwise.
16	Write a C program to calculate factorial of a number using recursion.
17	Write a C program in which enter 10 elements by the user and perform the operation of sorting in ascending order
18	Write a C program to perform to perform Matrix addition and multiplication operations.
19	Write a program to determine the length of the string and find its equivalent ASCII codes.
20	Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line
21	Write a program to maintain the library record for 100 books with book name, author‘s name, and edition, year of publishing and price of the book.

B. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	2	3	2	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BCACCA1202	Operating System Lab	1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able to:

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

A. LIST OF EXPERIMENTS:

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

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Operating system concepts	Silberschatz, Galvin, Gagne	8th Edition	John Wiley and Sons
2.	Modern Operating System	A.S.Tanenbaum	2nd Edition	Pearson
Reference Book				
1.	Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.			
Online Resources				

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	2	2	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	2	1	1	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BCACCA1203	Office Automation Lab	1 Credit [LTP: 0-0-2]

Course Outcome: -
Students will be able to:

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

A. LIST OF EXPERIMENTS:

1	**MS Word** Prepare a document about any tourist destination of your choice with appropriate pictures and editing features.
2	**Prepare a News Paper Layout. Insert appropriate pictures wherever necessary. Use the following** Features: • Three Column and Four Column setting • Set One or Two Advertisements • Use Bullets and Numbering.
3	**Create a Document consisting of Bio-data. It includes** • A table giving your qualification and /or experience of work. Table should be Bordered and Shaded. • A Multilevel list giving your areas of interest and further areas of interest. The sub areas should be numbered as 'a','b', etc while the area should be numbered as '1','2',etc. • The information should be divided in ―General‖ and ―Academic‖ sections. • The header should contain ―BIO-DATA ‖while the footer should have page numbers in the format Page1of 10. • Assign a password for the document to protect it from unauthorized access.
4	Assume that you are coordinating a seminar in your organization. Write a letter to 10 different IT companies asking them to participate in the seminar using mail merge facility.
5	Prepare a document which contains template of marks card of students. Assume that there are 10 students. The footer for the document should be 'Poornima University Jaipur'.
6	Prepare a document about any topic In mathematics which uses mathematical symbols. (At least 5 mathematical symbols should be used). Assign a password for the document to protect it from unauthorized access. Demonstrate the use of Hyperlink Option. Sets margins to your document, a font of size and double spaced document
7	**MS-Excel** Open a new work book, save it as JavaCoffeeBar.xls. In sheet 1 write following sales data for JavaCoffee bar to show their first 6 months sales. • Select cell B4:D4 and change the horizontal alignment to center and text to 90degree. • All titles should be in bold • Format all cells numbers to currency style and adjust width as necessary. • Add border to data..
8	Prepare a worksheet to maintain student information. The work sheet should Contain Roll Number, Name and marks in 5 subjects. (Max Marks is 100).Validate the marks. Calculate the total marks. Assign the grade according to the following. Assign grade 'A' if the total marks is above 450. From 401 to 449 assign the grade as 'B'. From 351 to 400 assign the Grade as 'C'. From 300 to 350 the grade to be assigned is 'D'. For the total marks less than 300 No grade is assigned. A student is eligible to get a grade only when he gets 40 and above in all the subjects. In such cases the grade is―FAIL‖.(Assume that there are 10 students)
9	Prepare a pay-bill using a worksheet. The work sheet should contain Employee Id, Name ,Designation,
	Experience and Basic Salary and Job ID. If Job Id is 1 then DA is 40% of the basic salary. HRA is Rs. 4500. If Job Id is 2 then DA is 35% of the basic salary. HRA is Rs.3500. If Job Id is 3 then DA is 30% of the basic salary. HRA is Rs. 2500. If Job Id is 4 then DA is 25% of the basic salary and HRA is RS.2500. For all the other Job ids DA is 20% of the basic salary and HRA is Rs. 1500. For all the above Job ids PF to be deducted is 4%. For the job ids between1-4 Rs.100 to be deducted as Professional Tax. Find the netpay.
10	For the above employee worksheet perform the following operations

	• Use filter to display the details of employees whose salary is greater than 10,000. • Sort the employees on the basis of their net pay • Use advance filter to display the details of employees whose designation is "Programmer‖ and Net Pay is greater than 20,000 with experience greater than 2yrs
11	Using Excel project the Products ales for any five products for five years. • Compute the total sales of each product in the five years. • Compute the total sales of all the products in five year. • Compute the total sales of all products for each year. • Represent annual sale of all the products using Pie-Chart. • Represent annual sales of all products using Bar Chart. • Represent sale of a product for five years using Pie-Chart. • Label and format the graphs
12	Create a statement of Telephone Bill Charge for a customer. • Telephone Calls • Up to150calls- free • 151to500calls-0.80percall • 501 to1000calls-1.00percall • 1001to2000-1.25percall • Above2000- 1.40percall
13	Perform Following: • Using Excel write sales data with columns product, month and sales. Write at least 5 records. Create Pivot Table chart and Report for the data. • Create a macro to change the name of worksheet as Macro Example, merge first three columns of first row and write heading as DATA in green color with yellow background • Link word document in excel worksheet to show the usage of linking and embedding.
14	MS Power Point Assume that you are going to give a presentation about Information Technology. (Choose some latest technologies). The presentation should have minimum 10 slides. Insert appropriate images wherever necessary. Use proper formatting, Diagrams and tables. Show the usage of action buttons, hyperlinks, and animations.

MAPPING OF CO VS PO/PSO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	3	1	1	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

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

Course Outcome: -
Students will be able to:

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

A. LIST OF EXPERIMENTS:

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

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Practical Web Design for Absolute Beginners	AdrianW. West	2016	Apress 2016
2.	Introducing Web Development	Jorg Krause	2017	Apress2017
3.	HTML & CSS: The Complete Reference	Thomas Powell	2010, FifthEdition	McGrawHill
Reference Book				
1.	HTML and CSS: Design and Build Websites – by Jon Duckett			
2.	Head First HTML and CSS: A Learner‘s Guide to Creating Standards-Based Web Pages – by Elisabeth Robson & Eric Freeman Publisher- ORELLY			
Online Resources				

1.	https://www.w3schools.com/html/html_links.asp
2.	https://www.tutorialrepublic.com/html-tutorial/html-links.php

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	-	-	-	-								
CO2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	2	2	1	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Minor Courses
Theory

Code: BMFCCA1101 Fundamentals of Mobile Application Development 3 Credit [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Create a basic Android Application using various controls.
- Accomplish the tasks at background using Async Task and Services.
- Store the data in the background using Shared Preference, Firebase and SQLite
- Develop an application using Services, Content Provider and SQLite.
- Develop applications with the Functionality of cross platform Application Development

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Mobile Application Development**	07
2.	**Mobile Application Architectures**	08
3.	**User Interface**	08
4.	**Android Application**	07
5.	**iOS Application**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Mobile Application Development**
	• Introduction of Unit • Brief history of mobile applications • Introduction to Android Development &The Android Platform • Android SDK • Operating system platforms: Android, Apple iOS. • Types of Mobile Apps : Native, Web, &Hybrid • Conclusion of Unit
2.	**Mobile Application Architectures:**
	• Introduction of Unit • Client-Server-Connection • Mobile Infrastructure: Mobile Device Types, Mobile Device Components • Mobile Client Applications: Thin Client-Fat Client-Web Page Hosting. • Frameworks and Tools • Conclusion of Unit
3.	**User Interface**
	• Introduction of Unit • User Interface Screen elements • User Interfaces Designing with Layouts • VUIs and Mobile Apps • Text-to-Speech Techniques • Designing the Right UI • Multichannel and Multimodial UIs • Conclusion of Unit
4.	**Android Application**

	• Introduction of Unit • History of Android OS • Understanding the Android OS platform • Architecture of Android-based devices • Understanding basics of Java • Architecture of Android-based devices • Understanding Android application structure • Conclusion of Unit
5.	**iOS Application**
	• Introduction of Unit • History of iOS platform • Architecture of Apple devices • Understanding basics of Swift • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Professional Mobile Application Development	Jeff McWherter	1st edition	Wrox
2.	Android Programming with Kotlin for Beginners	John Horton	Latest	Packt
Reference Book				
1.	Android Wireless Application Development by Lauren Darcey and Shane Conder 2nd edition, pearson education			
2	Xamarin Cross-platform Application Development, 2nd Edition by Jonathan Peppers			
3	Head First Android Development: A Brain-Friendly Guide, by Dawn Griffiths & David Griffiths			
Online Resources				
1.	https://developer.android.com/training/basics/firstapp			
2.	https://www.tutorialspoint.com/mobile_development_tutorials.htm			
3.	https://www.udacity.com/course/new-android-fundamentals--ud851			

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	1	-	-	-	-								
CO2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	1	1	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	2	1	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Ability Enhancement Courses (AEC)

CODE: BULCHU1202	Foundation English	1 Credit [LTP: 0-0-2]

COURSE OUTCOMES

Students would be able to:

CO1: Demonstrate the grammar skills involved in writing sentences and short paragraphs.

CO2: Build up a good command over English grammar and vocabulary to be able to ace error spotting.

CO3: Define unknown words in sentence level context using a picture dictionary or by creating a memory link for support.

CO4: Understand, analyze and effectively use the conventions of the English language.

CO5: Develop their interest in reading and enhance their oral and silent reading skills along with sharpen their critical and analytical thinking

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Basics of Grammar**	**8**
2	**Spotting the Grammatical Errors and Rectification**	**2**
3	**Vocabulary Building**	**4**
4	**Basics of Writing Skills**	**2**
5	**Reading Comprehension**	**8**

B. LIST OF EXPERIMENTS

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

Skill Enhancement Courses (SEC)

CODE: BULCSE1201	Skill Enhancement Generic Course -I	1 Credit [LTP: 0-0-2]

COURSE OUTCOMES:

Students will be able to:

CO.1: Enhance problem solving skills.
CO.2: Prepare for various public and private sector exams & placement drives
CO.3: Communicate effectively & appropriately in real life situation.
CO.4: Improve verbal ability skill among students.
CO.5: Enrich their knowledge and to develop their logical reasoning thinking ability.

LIST OF ACTIVITIES	
1	SMART Goals,Goal Setting (IKIGAI), Wheel of Satisfaction, Exchanging pleasantries
2	Root Words, Prefix-Suffix, Antonyms, Synonyms & Analogies, Sentence Correction-1
3	Numbers,Relations & Functions, HCF & LCM, Average & Divisibility
4	Resume Tips & Resume Review
5	How to win friends & Influence people, Sentence Correction-2
6	Series & Progressions
7	Number Series & Letter Series, Crypto-arithmetic, SWOT/SWOC
8	Percentage, Profit & Loss, Ratio Proportion, CI & SI
9	Mixtures and Allegations, Short Cut Tricks, Seating Arrangement, Sequencing & Ranking
10	Surds & Indices, Problem on ages,Solving Equations - Quadratic & Linear
11	Time & Distance, Boats & Streams, Clocks and Calendars
12	GD, Practice of GD, Reading and Comprehension

Value Added Courses (VAC)

CODE: BUVCSA1102 Environment Studies 2 Credit [LTP: 2-0-0]

COURSE OUTCOMES:

Students would be able to:

CO1: Understand the scope of environmental studies and explain the concept of ecology, ecosystemand biodiversity.
CO2: Implement innovative ideas of controlling different categories of Environmental Pollution. CO3: Explain different environmental issues together with various EnvironmentalActs, regulations and International Agreements.
CO4: Summarize social issues related to population, resettlement and rehabilitation of project affected persons and demonstrate disaster management with special reference to floods, earthquakes, cyclones ,landslides.
CO5: Determine the local environmental assets with simple ecosystems and identify local flora and fauna.

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

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

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

C.RECOMMENDED STUDY MATERIAL:

S. No	Reference Book	Author	Edition	Publication
1	Environmental Studies	Erach Barucha	Latest	UGC
2	Environmental Studies	Benny Joseph	Latest	Tata Mcgraw Hill
3	Environmental Studies	R. Rajagopalan	Latest	Oxford University Press
4	Principles of Environmental Science and Engineering	P. Venugoplan Rao	Latest	Prentice Hall of India.
5	Environmental Science and Engineering	Meenakshi	Latest	Prentice Hall India.

Semester-II

Code: BCACSA2101	Basic Mathematics	3Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- To analyze and prove relationships between matrices, rank of matrix and systems of equations, Inverses.
- Analyze the correlation and regression with their properties
- Determine the basic concepts of matrix Algebra
- Analyze the equal and unequal intervals for Interpolation problem
- Analyze the numerical methods to solve differential equations

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Data representation and Analysis**
	• Introduction of Unit • Statistical diagram: scattered diagram, histogram, ogiecurve, pilchard • Measure of Central Tendency, Mean, Median, Mode. • Measure of Dispersion : Range, Quartile Deviation • Standard Deviation • Conclusion & Real Life Application
2.	**Regression and Correlation**
	• Introduction of Unit • Measure of association between two variables Types of correlation , Karl Pearson‘s Coefficient of correlation • Spearman‘s Rank correlation and its interpretations • Regression Analysis: Concept and difference between correlation and regression, linear regression equations, • Properties of regression coefficients • Conclusion & Real Life Application
3.	**Matrices**
	• Introduction of Unit • Definition of Matrix • Types of Matrices • Arithmetic operations of Matrices (Addition, Scalar Multiplication, Matrix Multiplication) • Determinants • Computation of Inverse • Conclusion of Unit
4.	**Interpolation Methods**
	• Introduction of Unit • Finite difference, Forward and backward differences, Interpolation and Extrapolation, • Newton‘s forward interpolation formula, Newton‘s back ward interpolation formula, • Lagrange‘s interpolation formula • Newton‘s divided difference formula • Conclusion & Real Life Application
5.	**Numerical Integration and differentiation**

	• Introduction of Unit • Numerical integration, Gaussian integration Trapezoidal Method, Simpson's rule (1/3,3/8), • Numerical differentiation Euler's method, Modified Euler's method, Runge Kutta 4th order method,. • Conclusion & Real Life Application

C. RECOMMENDED STUDY MATERIAL

S.No	Text Books:	Author	Edition	Publication
1.	Business Mathematics	V.K. Kapoor	Latest	S. Chand and Sons Publications
2.	Introductory Methods of Numerical Analysis	S.S. Sastry	Latest	Prentice Hall of India
3.	Computer Oriented Numerical Methods	V. Rajaraman	Latest	Prentice Hall of India
Reference Book				
1.	HigherEngineeringMathematics,GrewalB.S.andGrewalJ.S,KhannaPublishers,NewDelhi, Latest Edition			
2.	A textbook of Computer based numerical and Statistical Techniques: A.K. Jaiswal & Anju Khandelwal, New Age International Publishers			
OnlineResources				
1.	https://www.udemy.com/course/computer-oriented-numerical-techniques/			
2.	https://onlinecourses.swayam2.ac.in/cec22_ma02/preview			

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3		-	-	-	-	-	-	-	-	-	-	-
CO2		3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO3		3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4		3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5		3	1	1	-	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BCACCA2102	Computer Networks	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Networking Fundamentals & Internet**
	• Basics of Network & Networking, Types of Networks: LAN, MAN, WAN, Peer-to-Peer & Client/Server, Workgroup V/S. Domain, Network Topologies. The Internet, Network Devices- NIC, Hub, Switch, Bridge, Router, Gateways, Firewall, Repeater, CSU/DSU, and modem, Introduction of OSI model, and TCP/IP Model, Comparison between OSI model & TCP/IP model. Physical Layer: Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, Media connectors (Fiber optic, Coaxial, and TP etc.) Switching Methods (Circuit/Packet Switching) Uni-cast, Multicast, Broadcast • Conclusion &Real Life Application
2.	**Basics Presentation &Application Layer**
	• Presentation Layer protocols:-TLS, SSL, MIME • Application Layer: Functions and support, Application Layer Protocols: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP. • Conclusion &Real Life Application
3.	**Basics of Transport layer &Network, Layer**
	• Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets • Network Layer: Internet Protocol (IP), IP standards, versions, functions, The IPv4 Datagram Format, IPv4 addressing, IPv4 address Classes, IPv4 address types, Default Gateway, Public & Private IP Address, methods of assigning IP address, Subnet Mask and sub-neting, IPv6 address, types, assignment, Data encapsulation, Introduction to Routing and Switching concepts. • Conclusion &Real Life Application
4.	**Basics of Data Link Layer**
	• Application of Data Link Layer: Framing and Error detection and correction. Stop and Wait protocol, Sliding Window protocols Go-Back-N Protocol, Channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols. Wireless Networking, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless security Protocols: WEP,WPA, 802.1X. • Conclusion &Real Life Application
5.	**Basics of WAN Technology**

	• What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fibre, Cellular Technologies • Connecting LANs: Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual LAN, Virtual Private Networking • Conclusion &Real Life Application

C. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	2	2	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code:BCACCA2103	Python Programming	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Python Programming**
	• Introduction to Unit • What is Python, • Uses of Python Programming Language / Python Applications • Features of Python Programming Language • Python-2 and Python-3 differences • Python environment setup — Installation and working of IDE • Running Simple Python scripts to display 'welcome' message. • Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of data types • Python building blocks — Identifiers, Keywords, Indention, Variables, Comments • Conclusion of unit
2.	**Python Operators and Control Flow statements**
	• Introduction to Unit • Basic Operators: Arithmetic, Comparison/ Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence • Control Flow: • Conditional Statements (if, if ... else, nested if) • Looping in python (while loop, for loop, nested loops) • loop manipulation using continue, pass, break, else. • .Conclusion of Unit
3.	**Data Structures, Python Functions and Packages**
	• Introduction to Unit • Lists, Tuple, Sets, Dictionaries • String and Slicing • Use of Python builtUser defined functions and its types • Command-line Arguments • Python Packages: Introduction, Writing Python packages • Using standard packages (e.g. math, scipy, Numpy, matplotlib, pandas etc.) • user defined packages • Conclusion of Unit
4.	**Object Oriented Programming**

	• Introduction of Unit • Creating Classes and Objects • Inheritance • Method Overloading and Overriding • Data Hiding • Data abstraction, Abstract classes • Types of Methods : Instance Methods , Static Methods , Class Methods • Accessing attributes , Built-In Class Attributes • Destroying Objects • Conclusion of Unit
5.	**File I/O Handling and Exception Handling**
	• Introduction of Unit • Types of File • File Objects, File Built-in Function, File Built-in Methods • File Built-in Attributes • Read/write operations Reading Text • Moving cursor in file inbuilt -functions • Errors in Python : Compile-Time Errors ,Runtime Errors , Logical Errors • What is Exception? • try….except…else, try-finally clause • Regular expressions • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Core Python Programming	Chun, JWesley	2007	Pear son,
2.	Head First Python	Barry,Paul	2010	ORielly,
Reference Book				
1	Learning Python Lutz, Mark O Rielly, 2009			
Online Resources				
1	https://www.learnpython.org/			
2	https://realpython.com/start-here/			
3	https://www.programiz.com/python-programming			

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	3	2	2	3	-	-	-	-	-	-	-	-	-	-
CO3		3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-		3		-	-	-	-	-	-	-	-	-	-
CO5	-	1	3	-	2	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code:BCACCA2104	Linux and Shell Script	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

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

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

C. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	3	3	2	2	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BCACCA2105	Software Engineering	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

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

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

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Fundamentals of Software Engineering,	RajibMall	PHI	2018
2.	Software Engineering	I.Sommerville	Pearson Education	Asia
Reference Book				
1	Software engineering, Roger SPressman			
2	An Integrated Approach to Software Engineering, Pankaj Jalote			
Online Resources				
1	https://www.javatpoint.com/software-engineering-tutorial			
2	https://www.geeksforgeeks.org/software-engineering/			
3	https://www.tutorialandexample.com/software-engineering-tutorial			

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	3	2	2	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	3	2	3	1	-	-	-	-	-	-	-	-	-	-
CO5	-	2	-	2	-	-	-	-	3	-	3	1		-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Practical

Code:BCACCA2201	Computer Network Lab	1 Credit [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

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

A. List of Programs:

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	-	-	2	2	-	-	-	-	-	-	-	-	-	-	2

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code:BCACCA2202	Python Programming Lab	1 Credit [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

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

A. LIST OF EXPERIMENTS:

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

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Core Python Programming	Chun, JWesley	2007	Pearson,
2	Head First Python	Barry,Paul	2010	ORielly,
Reference Book				
1	Learning Python Lutz, Mark, O Rielly, 2009			
Online Resources				
1	https://www.learnpython.org/			
2	https://realpython.com/start-here/			

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	2	1	-	-	-	-	-	-	-	-	-	-
CO5	-	-	3	-	-	-	-	-	-	-	-	-	-	-	2

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code:BCACCA2203	Linux and Shell Script Lab	1 Credit [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

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

A. LIST OF EXPERIMENTS:

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

B. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	2		-	-	-	-	-	-	-	-	-	-	-
CO3	-	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	2	1	-	-	-	-	-	-	-	-	-	-
CO5	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code:BCACCA2204	Software Engineering Lab	1 Credit [LTP: 0-0-2]

A. List of programs

Part - A	
	Below list of experiments focuses on Project Development and Project Management Skill. It gives you complete understanding of scratch to end scenario of any project. **Experiment 1:** Library Management System: The library management system is software, which automates the job of a librarian. **Task-1**: The user can inquire about the availability of a book in which he can search by entering the author's name or by entering the title of the book. **Task -2**: The user can borrow a book. He / She must provide the username and the card number, which is unique and confidential to each user. By confirming the authenticity of a user, the library management system provides information about the number of books already borrowed by the user and by referring to the database whether the user can borrow books or not. The library management system allows the user to enter the title and the author of the book and hence issues the book if it is available. **Task-3**: By entering the user details and the book details the user can return the borrowed book. **Experiment 2:** To develop an AUTOMATED BANKING SYSTEM, which is required to perform the following functions: **Task-1:** The customer logs into the system using card number and pin number. The system checks for validation. **Task-2:** The system queries the customer for the type of account either fixed deposit or credit account. After getting the type of account the system shows the balance left. **Task-3:** The system queries the customer for the transaction type either withdrawal or deposit and the required amount. The user enters the amount and the transaction if carries out. **Experiment 3:** AIRLINE RESERVATION SYSTEM: Ticket reservation system for airlines has to be developed. The system developed should contain the following features: **Task-1:** Search for information about the flight by means of flight number and destination **Task-2:** While displaying information about the flight it has to provide availability of seats. **Task-3:** While reserving tickets the system obtain following information from the user Passenger Name, Sex, Age, Address. Credit Card Number, Bank Name. Flight number, Flight name, Date of Journey and number of tickets to be booked. **Task-4:** Based on the availability of tickets, the ticket has to be issued. The ticket issued should contain the following information –ticket number, flight no, flight name, date of journey, number of passengers, sex, age and departure time. **Task-5:** Cancellation of booked tickets should be available.
Part - B	**Experiment 4:** EMPLOYEE MANAGEMENT APPLICATION: A payroll application is to be developed which is required to perform the following functions:
	Task-1: It must provide a user in employee mode with the details of an employee, which includes his name, department, date of joining and salary. **Task-2:** It must validate an user to enter in administrator mode using password. It must provide a user to enter in administrator mode to view or modify an employee's details using his employee ID. It must also allow the user to add a new employee and delete records of an existing employee. **Experiment 5:** HOSPITAL MANAGEMENT APPLICATION: A hospital application is to be developed which is required to perform the following functions: **Task-1:** It must provide a user in admin mode with the details of a patient, doctor. **Task-2:** It must provide a user in doctor mode who can modify the details of the illness and the treatment.

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	2	1	-	-	-	-	-	-	-	-	-	-
CO5	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Ability Enhancement Courses (AEC)

Code:BULCHU2204	LANGUAGE LAB	1 Credit [LTP:0-0-2]

COURSE OUTCOMES:

The students would be able to

CO 1: Identify common errors in spoken and written communication.
CO 2: Get familiarized with English vocabulary and language proficiency.
CO 3: Improve nature and style of sensible writing, acquire employment and workplace communication skills.
CO 4: Improve their Technical Communication Skills through Technical Reading and Writing practices.
CO 5: Perform well in campus recruitment, engineering and all other general competitive examinations.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	Everyday Conversations	8
2.	Asking for	7
3.	Reporting/ Describing	7
4.	Meeting People	7
5.	Expressing & Talking about	7

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Everyday Conversations**
	• Introduction to the Unit • Introducing self / others • Weather • Classroom • Asking about facilities around • Describing a person / thing • Points to cover: Vocabulary, grammar, Construction of sentences, listening • Methodology: Role plays, Videos, Classroom conversation, worksheets • Conclusion & Real Life Application
2.	**Asking for**
	• Introduction to the Unit • Help/ Suggestion/ ideas • Clarification/ Directions • Time/ food • Advice • Uses • Points to cover: Vocabulary, grammar, Construction of sentences, listening • Methodology: Role plays, Videos, Classroom conversation, worksheets • Conclusion & Real-Life Application
3.	**Reporting/ Describing**

	• Introduction to the Unit • Incidences • Personalities • Experiences • Wants/Needs • Intentions • Points to cover: Vocabulary, grammar, Construction of sentences, listening • Methodology: Role plays, Videos, Classroom conversation, worksheets • Conclusion& Real-Life Application
4.	**Meeting People**
	• Introduction to the Unit • Greetings • Starting the Conversation • Small talks • Closing the conversation • Points to cover: Vocabulary, Grammar, Construction of sentences, listening • Methodology: Role plays, Videos, Classroom conversation, worksheet • Conclusion& Real-Life Application
5.	**Expressing & Talking about**
	• Introduction to the Unit • Happiness/Displeasure • Preferences • Doubts • Views • Unawareness • Points to cover: Vocabulary, grammar, Construction of sentences, listening • Methodology: Role plays, Videos, Classroom conversation, worksheetsInterests • Different Cultures, Clothes, cars, institutes, situations • Schedules, prices • Points to cover: Vocabulary, grammar, Construction of sentences, listeningMethodology: Role plays, Videos, Classroom conversation, worksheets • Conclusion& Real-Life Application

RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Publication
1.	Speak Now Level I & II	Jack C Richards & David Bohlke	Oxford Press
2.	Business Benchmark, Level –	Guy Brook-Hart	Upper Intermediate by Cambridge University Press
3.	Practical English Usage	Michel Swan	Oxford University Press
4.	Cambridge Grammar for English: A comprehensive Guide for spoken & written English	Ronald Carter, Michael McCarthy	(South Asian edition), Cambridge University Press

Skill Enhancement Courses (SEC)

Code:BULCSE2201	Skill Enhancement Generic Course -II	1 Credit [LTP: 0-0-2]

COURSEOUTCOMES:

Students will be able to:

CO.1: Enhance problem solving skills.
CO.2: Prepare for various public and private sector exams & placement drives
CO.3: Communicate effectively & appropriately in real life situation.
CO.4: Improve verbal ability skill among students.
CO.5: Enrich their knowledge and to develop their logical reasoning thinking ability.

LIST OF LABS	
1	Types of Interviews, Interview Practice
2	Time & Work, Syllogisms
3	Critical Reasoning
4	Mensuration, Cubes & Dices
5	Para Jumble, Permutations & Combinations
6	Blood Relations & Direction Sense, Manners & Etiquette
7	Idiom & Phrases, Prefix-Suffix
8	Probability. Puzzles
9	Data Sufficiency, Logical Choices & Connectives
10	Date Interpretations, Deductions
11	Essay Writing, E-mail Writing
12	Personal Grooming

Value Added Courses (VAC)

Code: BUVCSA2102 Environment and Sustainability 2 Credits [LTP: 2-0-0]

COURSE OUTCOMES

Students would be able to:

CO1: Understanding of the concept of sustainable development

CO2: Classification of energy resources depending upon their origin and their conservation

CO3: Understanding of the Disaster Management

CO4: Summarize social issues related to population, resettlement and rehabilitation of project affected persons

CO5: Understanding of the local environmental assets with simple ecosystems and identify local flora and fauna.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Introduction of Sustainable development concept**	5
2.	**Energy resources and conservation**	5
3.	**Disaster Management**	5
4.	**Role of Environment in Human Society**	5
5.	**Field Work**	4

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction of Sustainable development concept**
	• Introduction of Unit • Concept of sustainability and sustainable development. • Ecosystem: Structure and function of ecosystem • Energy flow in an ecosystem: food chains, food webs and ecological succession. • Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems • Biodiversity and Conservation • Conclusion & Real Life Application
2.	**Energy resources and conservation**
	• Introduction of Unit • Energy resources: Renewable and non-renewable energy sources, use of alternate energysources, growing energy needs, case studies. • Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution)Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. • International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD) • Conclusion & Real Life Application
3.	**Disaster Management**
	• Introduction of the Unit • Disaster management: floods, earthquake, cyclones and landslides. • Climate change, global warming, ozone layer depletion

	• Acid rain and impacts on human communities and agriculture • Conclusion & Real Life Application
4.	**Role of Environment in Human Society**
	• Introduction of Unit • Human population growth: Impacts on environment, human health and welfare. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management: floods, earthquake, cyclones and landslides. • Conclusion & Real Life Application
5.	**Field Work**
	• Introduction of Unit • Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, birds and basic principles of identification. • Study of simple ecosystems-pond, river, dissert etc. • Conclusion & Real Life Application

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Natural Resource Conservation – Management for Sustainable Future	Owen, O.S, Chiras, D.D, &Reganold, J.P.	1998	Prentice Hall.
2.	Fundamentals of Materials for Energy and Environmental Sustainability.	Ginley, D.S. &Cahen,D	2011	Cambridge University Press.
3.	Environmental Science.	Miller, T.G.	2012	Wadsworth Publishing Co
4.	Conservation of Natural Resources	Klee, G.A	2001	Prentice Hall Publication .

Semester-III

Major (Core Courses)
Theory

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

COURSE OUTCOME

Students will be able to:

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

A.OUTLINE OF THE COURSE

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

A. DETAILED SYLLABUS

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

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

C. RECOMMENDED STUDY MATERIAL:

S. No	Text Books:	Author	Edition	Publication
1.	Database System Concepts	S. Sudarshan, Henry F. Korth, Avi-Silberschatz	6th Edition	McGraw Hill
2.	SQL, PL/SQL	Ivan Bayross	Latest	BPB
3.	Oracle Complete Reference	Kevin Loney	Latest	BPB
Reference Book				
1.	PL/SQL, best practices, BPB Publications, Steven Feuerstein			
2.	The Oracle Cook Book, BPB Publications, Liebschuty			
3.	Oracle A Beginners Guide, TMH Publication, Michael Abbey, Michael J.Corey			
Online Resources				
1.	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm			
2.	https://nptel.ac.in/courses/106106093			
3.	https://www.coursera.org/learn/introduction-to-relational-databases			

MAPPING OF CO VS PO/PSO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2	1		-	-	-	-	-	-	-	2	-	-
CO2	3	2	2			-	-	-	-	-	-	-	-	-	-
CO3	2			3	2	-	-	-	-	-	-	-	-	-	-
CO4	2	3	1	1	2	-	-	-	-	-	-	-	-	-	-
CO5			2	1		-	-	-	-	-	-	-	-	-	-

Course Code: BCACCA3102	OOPS with Java	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

. Acquire the concepts and features of object oriented programming

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

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

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

A. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	The complete reference Java –2	Herbert Schildt	V Edition,	TMH.
2.	SAMS teach yourself Java – 2	Rogers Cedenhead and Leura Lemay	3rd Edition,	Pearson Education

Reference Book	
1.	Object Oriented Programming with Java PUBLISHER PHI by M.T. Somashekara(Author), D.S.Guru(Author), K.S. Manjunatha(Author)
2.	"Head First Java‖ by Kathy Sierra

Online Resources	
1.	https://www.programiz.com/java-programming/online-compiler/
2.	https://www.tutorialspoint.com/compile_java_online.php
3.	https://onecompiler.com/java

MAPPING OF CO VS PO/PSO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					-	-	-	-	-	-	-	2	-	-
CO2	3					-	-	-	-	-	-	-	-	-	-
CO3		2	2	2		-	-	-	-	-	-	-	-	-	-
CO4		2	3		2	-	-	-	-	-	-	-	-	-	-
CO5		2	3	2		-	-	-	-	-	-	-	-	-	-

Code: BCACCA3103 Data Structure and Algorithm 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

DETAILED SYLLABUS

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

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

C.RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3				-	-	-	-	-	-	-	2	-	-
CO2		3		2		-	-	-	-	-	-	-	-	-	-
CO3		3		2		-	-	-	-	-	-	-	-	-	-
CO4		2	3			-	-	-	-	-	-	-	-	-	-
CO5		3	2			-	-	-	-	-	-	-	-	-	-

Code: BCACCA3104 Computer Organization and Architecture 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

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

A. OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

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

5.	**Computer Arithmetic.**
	• Introduction of Unit • Modes of Data Transfer: Priority Interrupt, Direct Memory Access, • Introduction, Addition and Subtraction, • Multiplication Algorithms (Booth algorithm), Division Algorithms, • Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors. • Conclusion & Real Life Application

B. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		2		3	-	-	-	-	-	-	-	2	-	-
CO2			2			-	-	-	-	-	-	-	-	-	-
CO3			2			-	-	-	-	-	-	-	-	-	-
CO4	2		3		2	-	-	-	-	-	-	-	-	-	-
CO5	3		2		3	-	-	-	-	-	-	-	-	-	-

Practical

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

COURSE OUTCOME

Students will be able to:

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

A. LIST OF EXPERIMENTS:

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

8	**Multi-table queries(JOIN OPERATIONS)** Simple joins (no INNER JOIN) Aliasing tables – Full/Partial name qualification Inner-joins (two and more (different) tables) Inner-recursive-joins (joining to itself) Outer-joins (restrictions as part of the WHERE and ON clauses) Using where & having clauses
9	**Write Nested queries to retrieve the name of each employee who has a dependent with the same first name and same sex as the employee using following Nested queries.** In, Not In Exists, Not Exists Dynamic relations (as part of SELECT, FROM, and WHERE clauses)
10	**Write a query to make a list of all project numbers for projects that involve an employee whose last name is _Smith', either as a worker or as a manager of the department that controls the project using the following Set Oriented Operations** Union Difference Intersection Division
11	**PL/SQL Programming using the following** Programs using named and unnamed blocks Programs using Cursors, Cursor loops and records
12	**PL/SQL Programming using** Creating stored procedures, functions and packages Error handling and Exception Triggers and auditing triggers

B. RECOMMENDED STUDY MATERIAL

S. No	**Text Books:**	**Author**	**Edition**	**Publication**
1	Database System Concepts	S. Sudarshan, Henry F. Korth, AviSilberschatz	6th Edition	McGraw Hill
2	SQL, PL/SQL	Ivan Bayross	Latest	Bpb
3	Oracle Complete Reference	Kevin Loney	Latest	Bpb
Reference Book				
1	PL/SQL-Best practices,BPB Publications, Steven Feuerstein			
2	The Oracle Cook Book,BPB Publications, Liebschuty			
Online Resources				
1	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm			
2	https://nptel.ac.in/courses/106106093			
3	https://www.coursera.org/learn/introduction-to-relational-databases			

MAPPING OF CO VS PO/PSO:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1			2	1		-	-	-	-	-	-	-	2	-	-
CO2	3	2				-	-	-	-	-	-	-	-	-	-
CO3	2			3	2	-	-	-	-	-	-	-	-	-	-
CO4	2		1		2	-	-	-	-	-	-	-	-	-	-
CO5			2	1		-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Code: BCACCA3202	OOPS with Java Lab	1Credit [LTP: 0-0-2]

Course Outcome:-

Students will be able to:

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

A. LIST OF EXPERIMENTS:

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

C. RECOMMENDED STUDY MATERIAL

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

3	https://onecompiler.com/java

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1				-	-	-	-	-	-	-	2	-	-
CO2		2	2			-	-	-	-	-	-	-	-	-	-
CO3		2	1			-	-	-	-	-	-	-	-	-	-
CO4		2	1	1		-	-	-	-	-	-	-	-	-	-
CO5				2	2	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

•

Code: BCACCA3203	Data Structure and Algorithm Lab	1Credits [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

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

C. LIST OF EXPERIMENTS:

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

A. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Data Structures and Algorithm Analysis in C	Weiss	2001	Pearson Education
2.	Schaum's outline series Data structures	Lipschutz		Tata McGraw-Hill
3.	Data Structures and program designing using 'C'	Robert Kruse		Pearson
4.	Data Structures Using C	Bandyopadhyay	1999	Pearson Education
Reference Book				
5.	Data Structures Using C, Pearson Education, Tenenbaum.			
6.	Introduction to Data Structures in C, Pearson Education 2005, Kamthane			
7.	Data Structures using C and C++, Pearson Education, Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron.			

Online Resources	
8.	https://www.programiz.com/dsa
9.	https://www.geeksforgeeks.org/data-structures/
10.	https://www.codechef.com/certification/data-structures-and-algorithms/prepare

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					-	-	-	-	-	-	-	2	-	-
CO2		3	1			-	-	-	-	-	-	-	-	-	-
CO3		2	2			-	-	-	-	-	-	-	-	-	-
CO4		2		2		-	-	-	-	-	-	-	-	-	-
CO5			2	2	2	-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Minor Stream Courses
Theory

Code: BMFCCA3101	Java Script Frame Work with Angular JS	3 Credits [LTP: 3-0-0]

COURSE OUTCOME:

Students will be able to:

- Explain the JavaScript and technical concepts behind Node JS
- Structure a Node application in modules
- Apply Concepts of Angualrjs to build single page web application
- Apply jquery in customized web application
- Design web application using node.js and mean java script framework

A. OUTLINEOFTHECOURSE

UnitNo.	Titleof theunit	TimerequiredfortheUnit(Hours)
1	**Introduction of Java Script Frameworks**	8
2	**Working with Node.js**	7
3	**Angular JS**	7
4	**jQuery**	7
5	**Introduction to the MEANStack**	7

B. DETAILEDSYLLABUS

Unit	Unit Details
1	**Introduction to Java Script Frameworks**
	• Java Script frame works, Need for frame works, • Types of Java Script Frameworks, Comparison of frame works, • Node.js, Angular JS, BackboneJS, Dojo,jQuery • Conclusion of Unit
2	**Express.js**
	• Introduction to Express.Js • working of Express.js • Installation • Middleware • Routing • Request Response handling • Using Database with Express.js • Conclusion of Unit
3	**Angular JS**
	• Introduction to AngularJS, MVC, Setup the environment, • Directives, Expressions,Controllers,Filters,Tables, • Modules, Forms,Views,Scopes,Services, • Dependency Injection,CustomDirectives,Routes,Factories • Conclusion of Unit
4	**jQuery**

	• Introduction to jQuery, Selectors,Attributes, • Traversing ,CSS, DOM, Events, AJAX-load, GET and POST; • Effects-show, hide, slide,fade,animate;jQueryUI-Interactions,Widgets, Theming • Conclusion of Unit
5	**Introduction to the MEAN Stack**
	• MEAN stack,Features, • How to setup, Serverside-Node.js,Express; • Database-Mongo DB; Front-end-AngularJS

C. RECOMMENDED STUDYMATERIAL:

S. No	Text Books:	Author	Edition	Publication
1.	—JavaScript: The Good Parts‖	Douglas Crockford	2012	O-Rellay
2.	—JavaScript: The Definitive Guide‖	David Flanagan	2021	O-Rellay
3.	The Comprehensive Book on Express.js	Azat Mardan	2014	Lean Publishing
Reference Book				
1.	Full Stack JavaScript Development with Mean, Colin J Ihrig, Adam Bretz, Shroff Publications			
2.	Node.js in Action, Mike Cantelon, Marc Harter, TJ Holowaychuk, Nathan Rajlich, Manning Publications			
3.	Jump Start Node.js, Don Nguyen, O'Reilly Media			
Online Resources				
1.	https://www.youtube.com/watch?v=BLl32FvcdVM			
2.	https://www.youtube.com/watch?v=zKkUN-mJtPQ&list=PL6n9fhu94yhWKHkcL7RJmmXyxkuFB3KSl			
3.	https://developer.mozilla.org/en-US/docs/Learn/Tools_and_testing/Client-side_JavaScript_frameworks			
4.	https://www.coursera.org/courses?query=front-end%20javascript%20frameworks:%20angularjs			

Minor Stream Courses
Practical

Code: BMFCCA3201 Java Script Frame Work with Angular JS Lab 1 Credit [LTP: 0-0-2]

COURSE OUTCOME

Students will be able to:

- Route web pages and retrieve data.
- Manage web pages using jQuery.
- Develop the web application.
- Apply different effects using jQuery.
- Deploy the application.

A. LIST OF EXPERIMENTS:

1	Install Node.js
2	Create web servers
3	Using NPM command, install dependencies or modules in the application web
4	Press frame work to route web pages and retrieve values from the form.
5	Add Social networks to your web projects, to authenticate and read or send your account information.
6	Using Angular JS create an navigation menu that highlights the selected entry
7	Create an order for using AngularJS. It should have a search option and a Switchable grid
8	Manipulate a web page using jQuery
9	Attach different event to the elements of a web page using jQuery
10	Provide different effects using jQuery
11	Install MongoDB and create local data base and remote database
12	Create a Web application, full stack Java Script to enlist employees.
13	Create a web application which count the occurrence of keys and convert the result into array of objects where each object belongs to one key and its occurrence (count).

A. RECOMMENDED STUDY MATERIAL:

S. No	Text Books:	Author	Edition	Publication
1.	—JavaScript: The Good Parts‖	by Douglas Crockford	2012	O-Rellay
2.	—JavaScript: The Definitive Guide‖	David Flanagan	2021	O-Rellay

	by			
Reference Book				
1.	Full Stack JavaScript Development with Mean, Colin J Ihrig, Adam Bretz, Shroff Publications			
2.	Node.js in Action, Mike Cantelon, Marc Harter, TJ Holowaychuk, Nathan Rajlich, Manning Publications			
3.	Jump Start Node.js, Don Nguyen, O'Reilly Media			
Online Resources				
1.	https://www.youtube.com/watch?v=BLl32FvcdVM			
2.	https://www.youtube.com/watch?v=zKkUN-mJtPQ&list=PL6n9fhu94yhWKHkcL7RJmmXyxkuFB3KSl			
3.	https://developer.mozilla.org/en-US/docs/Learn/Tools_and_testing/Client-side_JavaScript_frameworks			

Multidisciplinary Courses
Ability Enhancement Courses (AEC)

Code: BULCHU3208 Communication Skills-I 1 Credit [LTP: 0-0-2]

Course Outcomes:

Students would be able to:

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

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1. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1	**Intrapersonal/Interpersonal Skills**	8
2	**Reading Skills**	2
3	**Writing Skills**	4
4	**Listening Skills**	2
5.	**Speaking Skills**	8

A. DETAILED SYLLABUS

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

Skill Enhancement Courses (SEC)

Code: BULCSE3201	Skill Enhancement Courses -III	1 Credit [LTP: 0-0-2]

COURSEOUTCOMES:

Students will be able to:

- Enhance problem solving skills.
- Prepare for various public and private sector exams & placement drives
- Communicate effectively & appropriately in real life situation.
- Improve verbal ability skill among students.
- Enrich their knowledge and to develop their logical reasoning thinking ability.

1. Objective Building, Parts of speech, Nouns, Numbers & Genders, Importance of soft skills
2. Logarithms, Number Theory
3. Tenses
4. Number system- Fractions & Decimals
5. Stress Management Techniques, Critical Thinking
6. Modal Verbs & Conditional Tense, Working under pressure
7. Boosting brain power for fast learning & unlearning
8. Pronouns, Adverbs & Adjectives
9. Emotional Intelligence, 5 levels of listening
10. Remainder Theoram
11. Points, lines & angles
12. Article Writing

Value Added Courses (VAC)

Code: BUVCCE3101 DIGITAL MARKETING 2 Credits [LTP: 2-0-0]

COURSE OUTCOMES

Students would be able to:

- have an adequate analyzing of Digital Marketing, its scope, objectives, opportunities andit challenges.
- help students develop create toward Digital Strategy building & its effectiveness.
- applying alternatives for Dynamic organization to ensure their success in highlycompetitive sale environment and to analyze the concept of Internet marketing and itsapplications
- analyze the digital tools effectively for Social Media Marketing.
- help students develop an understanding toward E-mail marketing and its variousapplication

A.OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time Required for the Unit (Hours)
1	An Overview of Digital Marketing	05
2	Digital Marketing Planning and Structure	04
3	Internet Marketing	05
4	Social Media Marketing	05
5	E-mail marketing and Applications	05

B. DETAILED SYLLABUS

Unit	Unit Details
1	**An Overview of Digital Marketing**
	• Introduction of Unit • Introduction to Digital Marketing • Different Ways to Market Your Business Online • Evolution of Digital Marketing • Status of Digital Marketing in India • How Digital Marketing Works • Traditional vs. Digital Marketing • New Trends for Online Marketers • Digital Marketing Strategies • 6 Cs of Digital Marketing • Impact of Digital Marketing on Business • Benefits of Digital Marketing • Drawbacks of Digital Marketing • Internet Marketing in India – Challenges • Conclusion of Unit
2	**Digital Marketing Planning and Structure**
	• Introduction of Unit • Creating initial digital marketing plan • Target group analysis, In bound vs Outbound Marketing, • Content Marketing, Understanding Traffic, Understanding Leads Strategic Flow for • Marketing Activities. • WWW, Domains, Buying a Domain, Website Language & Technology, Core • Objective of Website and Flow • One Page Website, Strategic Design of Home Page, Optimization of Web sites, • Application of Word Press in Digital Marketing, Application of CSS, HTML & Java Script • for web page design • Conclusion of Unit
3	**Internet Marketing**
	• Introduction of Unit • Marketing and Internet • Market place to Marketspace

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

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Digital Marketing	Dave Chaffey	7 th	Pearson
2	Social Media Marketing All-in-one Dummies	Jan Zimmerman, Deborah Ng	4 th	John Wiley & SonsInc

Semester-IV

Major (Core Courses)
Theory

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

COURSE OUTCOME

Students will be able to:

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

A.OUTLINE OF THE COURSE

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

B.DETAILED SYLLABUS

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

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

D. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					-	-	-	-	-	-	-	2	-	-
CO2	2	2				-	-	-	-	-	-	-	-	-	-
CO3		2	2			-	-	-	-	-	-	-	-	-	-
CO4	3					-	-	-	-	-	-	-	-	-	-
CO5		2	3	2		-	-	-	-	-	-	-	-	-	-

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

COURSE OUTCOME

Students will be able to:

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

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A.OUTLINE OF THE COURSE

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

B.DETAILED SYLLABUS

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

	• Introduction of Unit. • ProbabilisticAnalysis&RandomizedAlgorithms:LasVegasalgorithm,MonteCarlo algorithms for Min-Cut, randomized algorithm for 2- SAT. • Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity • Assignment problems. • Conclusion of Unit
5.	NP-Hard and NP-Complete Problem
	• Introduction of Unit. • Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Proving NP-Complete Problems - Satisfiability problem and Vertex Cover Problem. • Approximation Algorithms for Vertex Cover and Set Cover Problem • Conclusion of Unit

B. RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1			3			-	-	-	-	-	-	-	2	-	-
CO2	3					-	-	-	-	-	-	-	-	-	-
CO3	2	3	2			-	-	-	-	-	-	-	-	-	-
CO4		2	3	2		-	-	-	-	-	-	-	-	-	-
CO5						-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Practical

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

Course Outcome:-

Students will be able:

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

A. LIST OF EXPERIMENTS:

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

B.RECOMMENDED STUDY MATERIAL

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

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3			2	-	-	-	-	-	-	-	2	-	-
CO2	1	2	3		1	-	-	-	-	-	-	-	-	-	-
CO3	1	2	3		1	-	-	-	-	-	-	-	-	-	-
CO4	1	2	3		1	-	-	-	-	-	-	-	-	-	-
CO5						-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

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

Course Outcome: -

Students will be able to:

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

A.LIST OF EXPERIMENTS:

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

B.RECOMMENDED STUDY MATERIAL

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

2.	https://www.thecrazyprogrammer.com/2015/03/c-program-for-n-queens-problem-using-backtracking.html

MAPPING OF CO VS PO/PSO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2	3			-	-	-	-	-	-	-	2	-	-
CO2		3				-	-	-	-	-	-	-	-	-	-
CO3	1	2	3			-	-	-	-	-	-	-	-	-	-
CO4	1	2	3			-	-	-	-	-	-	-	-	-	-
CO5	1	2	3			-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Minor Stream Courses
Theory

Code: BMFCCA4101 Backend Development with Node JS 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Explain basics of Node.js
- Applying different modules of Node.js
- Creating web server using node.js
- Establishing connection with the database using node.js
- Deploying on the server using node.js

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A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	Introduction to Node JS	07
2.	Node JS Modules	08
3.	File System	07
4.	Creating Web server	08
5.	Database connectivity	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Node JS**
	• Introduction of Unit • Introduction to Node JS • Features of Node.js • Who Uses Node.js? • Advantages of Node JS • Traditional Web Server Model • Node.js Process Model • Conclusion of Unit
2.	**Node JS Modules**
	• Introduction of Unit • Functions, • Buffer- Creating Buffers, Writing to Buffers, Reading from Buffer, Convert Buffer to JSON, Concatenate Buffers, Compare Buffers, Copy Buffer, Slice Buffer, Buffer Length • Module, Module Types -Core Modules, Local Modules, Module.Exports • Conclusion of Unit
3.	**File System**
	• Introduction of Unit • Open a File, Get File Information – Reading a File, Writing a File, • Closing a File, Truncate a File, Delete a File • Create a Directory, Read a Directory, Remove a Directory • Conclusion of Unit
4.	**Creating Web server**

	• Introduction of Unit • Creating web server using Node • Handling http requests • Sending requests
	• Conclusion of Unit
5.	**Database connectivity**
	• Introduction of Unit • Connection string • Configuring • Working with select command • Updating records, Deleting records • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Node.js in Action	Mike Cantelon, Marc Harter	Latest	Manning
2.	Mastering Node.js: Build robust and scalable real-time server-side web applications efficiently	Sandro Pasquali (Author), Kevin Faaborg	Latest	Packt
Reference Book				
1. 2.	Beginning Node.js by Basarat Ali Syed 2014 (Apress) Advanced Node.js Development by Mead Andrew, (Packt)			
Online Resources				
1.	https://www.tutorialspoint.com/nodejs/nodejs_tutorial.pdf			
2.	https://riptutorial.com/Download/node-js.pdf			
3.	https://www.simplilearn.com/tutorials/nodejs-tutorial/nodejs-backend			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3			-	-	-	-	-	-	-	2	-	-
CO2		3				-	-	-	-	-	-	-	-	-	-
CO3	1	2	3			-	-	-	-	-	-	-	-	-	-
CO4	1	2	3			-	-	-	-	-	-	-	-	-	-
CO5	1	2	3			-	-	-	-	-	-	-	-	-	-

Code: BMFCCA4102 Introduction to Android Application Development 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Create a basic Android Application using various controls.
- Run the tasks at background using Async Task and Services.
- Store the data in the background using Shared Preference, Firebase and SQLite.
- Test and debug an application using various testing techniques like activity and service testing.
- Develop an application using Services, Content Provider and SQLite.

- **OUTLINE OF THE COURSE**

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to Android**	**07**
2.	**User Experience**	**08**
3.	**Background Processing**	**08**
4.	**Data Management**	**07**
5.	**Testing**	**07**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Android**
	• Introduction of unit • This unit covers the Android platform, installing an IDE, apprehension project structure, • Building a simple application, creating activities, testing an application, and using the Android Support Library. • Introduction to the Android platform, Programming paradigms • Application Components - Part 1: Manifest File, Activities, and Intents. Introduction to the Android Development environment. Getting started building and testing • simple app – Resources, Layouts, Text &Scroll Views • Conclusion of unit
2.	**User Experience**
	• Introduction of unit • This unit covers user interaction, user interface design principles and testing of the user interface. • User Interface Design part 1: Model-View-Presenter (MVP), User Input Controls : Button, Text Field, Seek bar, Checkbox, Radio Button, Toggle Button, Spinner, Image View, Switcher. Event Handling, Listeners. Layouts, Adapters, Navigation. User Interface • Design part 2: Menus, Navigation, Action Bars, and Notifications: Status, Toasts and Dialogs, Styles and Themes, Focus, Touch Mode, Gestures. • Conclusion of unit
3.	**Background Processing**
	• Introduction of unit • Creating background tasks: AsyncTask, AsyncTaskLoader; Network Connections. Programming paradigms • Application Components Part 2: Services – bound/unbound services, Starting and stopping services, Broadcast receivers, Content providers. • Triggering, scheduling and optimizing background tasks: Notifications, Alarms, transferring data between apps. • Conclusion of unit

4.	**Data Management**
	• Introduction of unit • Data Access and Storage: Shared Preferences, App settings, Files &the Android File system, • SQLite Database, Loaders, Firebase. Programming paradigms
	• Application Components Part 3: Content Providers and Content Resolvers • Conclusion of unit
5.	**Testing**
	• Introduction of unit • Testing: Testing and Commercializing Applications - Basics of Testing, Testing from an IDE (Eclipse), • Activity testing, Service testing, Content provider testing, Test Classes, Debugging using DDMS, • How to get your app on the app store. • Conclusion of unit

A. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Hello, Android Introducing Google's Mobile Development Platform	Ed Burnett	4th	The Pragmatic Bookshelf
2	Teach Yourself Android Application Development in 24 Hours	Lauren Darcey and Shane Conder	2nd	SAMS
Reference Book				
1	Android Application Development (With Kitkat Support), Black Book by PRADEEP KOTHARI and KOGENT LEARNING SOLUTIONS INC , John Wiley			
2	Android Application Development All-In-One for Dummies, 3ed Paperback – 1 January 2021			
Online Resources				
1	https://www.tutorialspoint.com/android/index.htm			
2	https://developer.android.com/training/basics/firstapp			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3			-	-	-	-	-	-	-	2	-	-
CO2		2				-	-	-	-	-	-	-	-	-	-
CO3	1	2	1			-	-	-	-	-	-	-	-	-	-
CO4	1	1	3			-	-	-	-	-	-	-	-	-	-
CO5	1	2	3			-	-	-	-	-	-	-	-	-	-

Minor Stream Courses
Practical

Code: BMFCCA4201 Backend Development with Node JS Lab 1 Credit [LTP: 0-0-2]

Course Outcome: -

Students will be able:

- Develop dynamic web application
- Develop database application using hibernate
- Develop IOC and DI using springs
- Develop web application using springs.
- Identify where and when to use MVC design pattern Create custom tag in JSP

A. LIST OF EXPERIMENTS:

1	Develop dynamic web application to display current system date and time using servlets
2	Develop dynamic web application to display login page with proper HTML UI elements using servlets.
3	Implement a servlet to authenticate login details, which is created previously (user name and password should be accepted using HTML and displayed using a Servlet)
4	Develop dynamic web application to manage product (prodId, name, category, price) details using servlets. This app must have following pages a. Home page b. Product adding page c. Product editing page d. Product displaying page
5	Develop dynamic web application to manage product (prodId, name, category, price) details using servlets. This app must have following pages a. Home page b. Product adding page c. Product editing page d. Product displaying page
6	Write JSP program to implement custom tag with name <product>, which display product (prodId, name, category, price) details
7	Enhance previous JSP program to fetch data from database
8	Develop Rich Internet Applications to manage product and user details using struts and database
9	Develop Hibernate application to manage product details like insert, update, delete and display from database using HQL
10	Develop Spring based dynamic web application to manage courses, students in a college environment using Web MVC framework and JDBC
11	Transfer a file from one system to another system by the network
12	Develop Chat Server using Java.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Advanced Java Programming	B.Prasanalakshmi	1st	CH Publishers
2.	Advanced Java Programming	Uttam K Roy	1st	Oxford University Press
3.	Advanced Java Technology -A Conceptual Approach	A.A.Puntambekar	1st	Technical Publications
Reference Book				
1.	—Advanced Java Coding Problems: Best Advanced Coding Problems with Explanation and Solutions‖,byPratapDivyansh			
2.	—Advanced Java Optimization Techniques‖, by Jason Arnold			
Online Resources				
1.	https://www.simplilearn.com/resources-to-learn-java-programming-article			
2.	https://www.docdroid.net/mY1yTPu/advancedjavaprogrammingbyuttamkumarroy-pdf			

Code: BMFCCA4202 Introduction to Android Application Development Lab 1 Credit [LTP: 0-0-2]

Course Outcome:-

Students will be able:

- Explain to build android applications.
- Apply different designing based on user requirement
- Use google api to make the app more useful
- Interacting with the database by the application
- Deploying the application on the server.

LIST OF EXPERIMENTS:

1	Subject List Application Students will learn how to ● Use the Recycler View class to display items in a scrollable list. ● Dynamically add items to the Recycler View as they become visible through scrolling. ● Perform an action when the user taps a specific item. ● Show a floating action button and perform an action when the user taps it.
2	Notifications app Students will learn how to ● Create a Notification using the Notification Builder. ● Use Pending Intents to respond to Notification actions. ● Update or cancel existing Notifications ● Change
3	Weather application Students will learn how to ● Create an HTTP connection to server & get the connection status ● Fetch information from a web service
4	Simple Game application Students will learn how to ● Create a view with different shapes ● Change shape and color based on user input ● Remove specific shapes from the view when user clicks on them ● Keep track of user score
5	Ball Bounce Animation application Students will learn how to ● Create a view with different moving shapes ● Make the shapes rotate or bounce based on user input
6	Animated Picture app Students will learn how to ● Use camera APIs to click and save a picture ● Set the picture as the wallpaper. ● Use media APIs to record audio or select a clip ● combine the picture and clip and save as an animated picture

7	TrackMe App Students will learn how to ● Use location APIs to detect current location ● Use Google Maps APIs to show current location on map ● Use SMS API to send SMS with current location
8	Permissions & Preferences app Students will learn how to ● Check whether required permissions are granted ● Request for run-time permission ● Create a shared preferences file for their app. ● Save data to shared preferences, and read those preferences back again. ● Clear the data in the shared preferences..
9	SSO Application Students will learn how to ● Create user login and registration forms. ● Store user registration details in the local database. ● Authenticate users on login
10	Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity.
11	Create a screen that has input boxes for User Name, Password, Address, Gender(radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout)

A. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Professional Android (Meier Reto)	John Wiley & Sons Inc	2012	WROX
Reference Book				
1.	Google Android Developer Fundamentals Course – Concepts, Dec 2016 https://developers.google.com/training/courses/android-fundamentals			
2.	Hello, Android Introducing Google‘s Mobile Development Platform, Ed Burnette, The Pragmatic Bookshelf, 4th Editions, 2015			
Online Resources				
1.	https://www.javatpoint.com/android-tutorial			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3			-	-	-	-	-	-	-	2	-	-
CO2	1	1				-	-	-	-	-	-	-	-	-	-
CO3	1	2	2			-	-	-	-	-	-	-	-	-	-
CO4	1	1	3			-	-	-	-	-	-	-	-	-	-
CO5	1	2	2			-	-	-	-	-	-	-	-	-	-

Multidisciplinary Courses
Ability Enhancement Courses (AEC)

Code : BULCHU4109 Negotiation skills & Persuasive Communication 2 Credit [LTP: 2-0-0]

COURSE OUTCOMES:

Students would be able to:

- Develop the ability to identify the role of Negotiation skills in everyday life.
- Strengthen the Communication with the proper guidance regarding ethics and role of Human behavior in Negotiation Process.
- Cultivate the habit of reading between the lines and develop the habit of engaging in persuasive communication accordingly.
- Understanding the problems in decision making process and factors hindering the wise and thoughtful decision making.
- Develop the skills to take measured risks in life and to abide by the decisions taken.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Introduction to Negotiation	6
2.	Ethics & Secrets of Powerful Negotiation	6
3.	Trust, Human behavior and Psychology for Negotiation	4
4.	Persuasive Communication	4
5.	Decision Making	5

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Negotiation**
	• Introduction to the Unit • Defining Negotiation • Identify the qualities of successful and unsuccessful negotiators. • Identify different negotiation situations to practice during class • Conclusion & Real-life applications
2.	**Ethics & Secrets of Powerful Negotiation**
	• Introduction to the Unit • Reciprocity. • Publicity • Trust & Universality. • Conclusion & Real-life applications

3.	**Trust, Human behavior and Psychology for Negotiation**
	• Introduction to the Unit • Choosing a negotiation strategy based on relationship and results. • Positional bargaining & identifying the differences between "Soft" and "Hard" negotiating. • Practice Sessions • Conclusion & Real-Life Application
4.	**Persuasive Communication**
	• Introduction to the Unit • Persuasive Communication • Need and Objectives • Difference • Advantages and dis advantages • Conclusion & Real-life applications
5.	**Decision Making**
	• Introduction of the Unit • Meaning and process • Effect of perception on decision making • situations in decision making, Rationality and Bounded rationality. • Conclusion & Real-life applications

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Effective Communication	John Adir	2003	London: Pan Macmillan Ltd.
2.	The Quick and Easy Way to Effective Speaking	Dale Carnegie	1977	New York: Sterling
3.	Speak with Power and Confidence	Collins, Patrick	2009	New York: Sterling
4.	Common Mistakes in English	Fitikides, T. J.	1984	London: Orient Longman

Skill Enhancement Courses (SEC)

Code: BULCSE4201	Skill Enhancement Generic Course -IV	2 Credits [LTP: 0-0-1]

COURSE OUTCOMES:

On completion of the course a student will be able to:

- Understand basic problems based on arithmetic and soft skills area which are asked in aptitude test taken by companies
- Effectively solve these problems by applying the knowledge earned.
- Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
- Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
- Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality

LIST OF ACTIVITIES	
1	Averages, Mean, Median and Mode
2	Cognitive learning theory, Body Language basics
3	Heights & Distances
4	Sitting Arrangements
5	Fill Ups(Grammar based)
6	Error Detection, Confusing words
7	Alphanumeric Series
8	Verbal Analogy, One word substitution
9	Dices
10	Sentence Correction, Subject-Verb agreement
11	Statement & Assumptions, Setting SMART goals,
12	Persuasion Skills, Interview Preparation

Value Added Courses (VAC)

Code: BUVCCE4102 Business Intelligence 2 Credit[LTP: 2-0-0]

COURSE OUTCOMES:

Students would be able to:

- Gain knowledge of Business Intelligence
- Elements of Business Intelligence Solutions
- Build business projects
- Generate and manage BI reports
- BI Deployment, Administration & Security.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	**Introduction to Business Intelligence**	**4**
2.	**Elements of Business Intelligence Solutions**	**5**
3.	**Building the BI Project**	**5**
4.	**Reporting Authoring**	**5**
5.	**BI Deployment, Administration & Security**	**5**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Business Intelligence**
	• Introduction of the Unit • Understanding the scope of today's BI solutions and how they fit into existing infrastructure. Describe BI, its components & architecture. • The future of BI, better experience for all business users. • The Functional Area of BI Tools, Query Tools and Reporting. • OLAP and Advanced Analytic • Conclusion of the Unit
2.	**Elements of Business Intelligence Solutions**
	• Introduction of the Unit • Reports & ad hoc queries. • Dashboards & Scorecards development. • Metadata, Real time monitoring capabilities. • BI portals, web applications, Desktop applications. • Conclusion & Real life applications • Conclusion of the Unit
3.	**Building the BI Project**

	• Introduction of the Unit • Planning the BI project, Project Resources, • Collecting User Requirements, • Validating BI Requirements • BI Design and Development • Conclusion of the Unit
4.	**Reporting Authoring**
	• Introduction of the Unit • Building reports with relational vs Multidimensional data models. • Types of Reports – List, crosstabs, Statistics, Chart, map, financial etc. • Data Grouping & Sorting, Filtering Reports. • Conditional formatting, Adding Summary Lines to Report • Conclusion of the Unit
5.	**BI Deployment, Administration & Security**
	• Introduction of the Unit • BI Architecture • Expanding BI Authentication Authorization, Access Permissions, Groups and Roles. • Manage Status & Monitoring. • Back Up and Restore • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Business Intelligence	Mark Whitehorn , Mary Whitehorn	Ist	(IBM ICE Publication).
2	Data Strategy: How To Profit From A World Of Big Data, Analytics And The Internet Of Things	Bernard Marr	2nd	Kogan Page
3	The Data Detective: Ten Easy Rules to Make Sense of Statistics	Tim Harford	Latest	Riverhead Books
4	From Big Data to Big Profits: Success with Data and Analytics	Russell Walker	Latest	Oxford University Press

Semester-V

Major (Core Courses)
Theory

Code : BCACCA5101 Advanced Data Structure 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

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

A.OUTLINE OF THE COURSE

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

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Hashing**
	• Introduction to Hashing • Hash Function • Separate Chaining • Hash Tables without linked lists: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Hash Tables in the Standard Library • Universal Hashing • Extendible Hashing. • Conclusion of Unit
2.	**Priority Queues (Heaps)**
	• Introduction to Priority Queues (Heaps) • Model • Simple implementations • Binary Heap: Structure Property, Heap Order Property, • Basic Heap Operations: insert, delete, Percolate down • Other Heap Operations • Introduction toBinomial Queues • Binomial Queue Structure • Binomial Queue Operations • Implementation of Binomial Queue • Priority Queues in the Standard Library. • Conclusion of Unit

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

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Data Structures and Algorithm Analysis in C++	Mark Allen Weiss	4 th Edition	Pearson
2.	Introduction to Algorithms	Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	3 rd Edition	The MIT Press.

Reference Book	
1.	Fundamentals of Computer Algorithms, 2nd Edition, 2009, University Press Pvt. Ltd, Ellis Horowitz, Satraj Sahani and Raja sekharam.
2.	Advanced Data Structures, Oxford University Press, 2018, ReemaThareja, S. Rama Sree.
Online Resources	
1.	https://www.coursera.org/learn/advanced-data-structures
2.	https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					-	-	-	-	-	-	-	2	-	-
CO2	3	2				-	-	-	-	-	-	-	-	-	-
CO3		2	2			-	-	-	-	-	-	-	-	-	-
CO4		2	2			-	-	-	-	-	-	-	-	-	-
CO5		2	2			-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Minor Course Stream
Theory

Code: BMFCCA5101 Advanced Android Application Development 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Create a basic Android Application using various controls.
- Run the tasks at background using Async Task and Services.
- Store the data in the background using Shared Preference, Firebase and SQLite.
- Test and debug an application using various testing techniques like activity and service testing.
- Develop an application using Services, Content Provider and SQLite

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**User Interface**	**08**
2.	**Web Applications**	**10**
3.	**Networking**	**10**
4.	**Native Capabilities**	**6**
5.	**Commercializing applications**	**7**

A. DETAILED SYLLABUS

Unit	Unit Details
1.	**User Interface**
	● Introduction of Unit ● Multi Touch applications, touch events, gestures; Creating Custom Widgets, Handling Screen Orientation. ● Developing for different android platforms including Tablets, Fragments, Optimizing applications for high screen resolution, combining fragments into a multilane UI. ● Creating Resources, Managing application resources and assets, Resource-Switching in Android. Localization, Localization Strategies ● Conclusion of unit
2.	**Web Applications**
	● Introduction of Unit ● Web Apps &Web Services: Web Applications - Web View, ViewPort, Page navigation, Debugging web applications, ● Android Server Communication: communication protocols, interacting with server-side applications, develop clients for web services, ● Exchanging Data over the Internet using JSON and XML. Web Services, Integrating with 3rd party Apps using Web Services ● Conclusion of unit
3.	**Networking**

	● Introduction of Unit ● Android Interface Definition Language, Handler and Messenger, Passing objects over IPC, Networking: ● Introduction Android networking capabilities, Android SDK networking packages, ● Android Socket programming, Proxy Settings, Broadcasting, SMS application. ● Android Xml remote procedure calls on android, what is XML-RPC, History, Data types ● Conclusion of unit
4.	**Native Capabilities**
	● Introduction of Unit ● Integrating with native Android capabilities such as Camera, Audio, Phone, SMS, ● Bluetooth, Sensors and Location. ● Android Media API: Playing audio/video, Media recording. Sensors, Bluetooth. ● Maps &Location: Working with Location Manager, Location Updates, Selecting a ● Location Provider, Finding Your Location, Location based Services. ● Working with Google Maps, Map - Based Activities, how to load maps, finding map API key. ● Conclusion of unit
5.	**Commercializing applications**
	● Introduction of Unit ● APKs, Registering and publishing on the Play Store ● Permissions, Performance, Security - Kernel, ● Application level Security, Using permissions, designing for Performance &Usability ● How to monetize your application Conclusion of unit

A. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Professional Android (Meier Reto)	John Wiley &Sons Inc	Latest	WROX
2.	Android Programming: The Big Nerd Ranch Guide	Bill Phillips, Chris Stewart, Kristin Marsicano	Latest	
Reference Book				
1.	Google Android Developer Fundamentals Course – Concepts, Dec 2016 https://developers.google.com/training/courses/android-fundamentals			
2.	Hello, Android Introducing Google's Mobile Development Platform, Ed Burnette, The Pragmatic Bookshelf, 4th Editions, 2015			
Online Resources				
1. 2.	https://www.javatpoint.com/android-tutorial https://www.udacity.com/course/advanced-android-app-development--ud855			

Code: BMFCCA5102 NOSQL database with MONGO DB 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Describe, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column-oriented and Graph).
- Explain detailed architecture, define objects, load data, query data and performance tune Column- oriented NoSQL databases Get knowledge in work with menus and validation controls.
- Explain detailed architecture, define objects, load data, query data and performance tune Document- oriented NoSQL databases.
- Analyse the detailed architecture, define objects, load data, query data and performance tune Key-Value Pair NoSQL databases.
- Describe detailed architecture, define objects, load data, query data and performance tune Graph NoSQL databases.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction to NoSQL**	**07**
2.	**MongoDB**	**08**
3.	**Key-Value & Document Based Databases**	**08**
4.	**Column-Oriented & Graph Based Databases**	**07**
5.	**Search Engine**	**06**

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to NoSQL**
	• Introduction of Unit • Understanding NoSQL Databases, History of NoSQL, Features of NoSQL, Scalability, Cost, Flexibility, NoSQL Business Drivers, Classification and Comparison of NoSQL Databases, Consistency – Availability -Partitioning (CAP), Limitations of Relational Databases, Comparing NoSQL with RDBMS Managing Different Data Types, Columnar, Key-Value Stores, Triple and Graph Stores, Document, Search Engines, Hybrid NoSQL Databases, Applying Consistency Methods, ACID, BASE, Polyglot persistence, Need for NoSQL, Advantages • Conclusion of unit
2.	**Mongo DB**
	• Introduction of Unit • Introduction to MongoDB , Advantages of Mongo DB, Data Modelling • Program using MongoDB, Constructing Queries, Replication • Deployment • Conclusion of unit
3	**Key-Value & Document Based Databases**

	• Introduction of Unit • Introduction to Key-Value Databases, Key Value Store, Essential Features, Consistency, Transactions, Partitioning, Scaling, Replicating Data, Versioning Data, How to construct a Key, Using Keys to LocateValues, Hash Functions, Store data in Values, Use Cases. • Introduction to Document Databases, Supporting Unstructured Documents, Document Databases Vs. Key-
	Value Stores, Basic Operation on Document database, Partition, Sharding, Features, Consistency, Transactions, Availability, Scaling, Use Cases. • Conclusion of unit.
4.	**Column-Oriented & Graph Based Databases**
	• Introduction of Unit • Introduction to Column Family Database, Features, Architectures, Differences and Similarities to Key Valueand Document Database, Consistency, Transactions, Scaling, Use Cases, Introduction to Graph Databases, Advantages, Features, Consistency, Transactions, Availability, Scaling, Graph &Network Modelling, Properties of Graphs and Noes, Types of Graph, Undirected and directed Graph, Flow Network, Bipartite Graph, Multigraph, Weighted Graph • Conclusion of unit
5.	**Search Engine**
	• Introduction of Unit • Common Feature of Search Engine, Dissecting a Search Engine, Search versus query, Web crawlers, Indexing, Searching, indexing Data Stores, Altering, Using Reverse queries, Use Cases, Types of SearchEngine, Elastic Search • Conclusion of unit

A. RECOMMENDED STUDY MATERIAL

S. No	**Text Books:**	**Author**	**Edition**	**Publication**
1	PROFESSIONAL NoSQL	Shashank Tiwari		Wrox
2	MongoDB in Action	KYLE BANKER PETER	Second Edition	Manning
Reference Book				
1	NoSQL for Dummies, Adam Fowler, John Wiley & Sons, Inc			
2	NoSQL Distilled, Pramod J. Sadalage & Martin Fowler, Pearson Education, Inc.			
3	Making Sense of NoSQL, Dan McCreary&Ann Kelly, Manning Shelter Island			
4	NoSQL for Mere Mortals, Dan Sullivan, Pearson Education			
Online Resources				
1	https://www.javatpoint.com/nosql-databases			
2	https://www.tutorialspoint.com/mongodb/index.htm			

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1				1	-	-	-	-	-	-	-	2	-	-
CO2	1	2			1	-	-	-	-	-	-	-	-	-	-
CO3		2	2	1		-	-	-	-	-	-	-	-	-	-
CO4		2	2		1	-	-	-	-	-	-	-	-	-	-
CO5		2	2			-	-	-	-	-	-	-	-	-	-

Code: BMFCCA5103 Front End Development with React JS 3 Credits [LTP: 3-0-0]

COURSE OUTCOME

Students will be able to:

- Explain the Web Development
- Explain CSS and Implement
- Explain Java Script and Implement
- Explain React
- Explain a Project and build with React

B. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Intro To Web Development**	06
2.	**Advanced CSS &Bootstrap**	07
3.	**JavaScript**	08
4.	**React – Part 1**	07
5.	**React – Part 2**	08

C. DETAILED SYLLABUS

Unit	Unit Details
1.	**Intro To Web Development**
	• Introduction of Unit • What is web development? How websites work? ,Advantages of learning web • Development, History of web development. • HTML- What is HTML? Structure of Webpage, HTML Tags ,Adding and formatting texts, title, paragraph, body ,Lists – Ordered/Unordered ,Images, Forms • Links ,Tables ,Iframes, Videos, Anchor tags ,HTML Divs, CSS Introduction ,Inline vs Internal vs External styling ,CSS Display • Conclusion of Unit
2.	**Advanced CSS &Bootstrap**
	• Introduction of Unit • CSS Backgrounds, Borders, Margins, Padding ,CSS Font Styling , Stylings Lists ,Styling Tables, Forms • ,Gradients ,Font Awesome Compare and contrast the use cases for CSS Grid and Flexbox,Structure the layout of a web page using grid columns and rows • Bootstrap: Bootstrap containers, Tables, Images, Colors ,Alerts, Buttons, Spinners, • Cards, Pagination, Drop Down, Carousel, • To-do App – Develop To-do App Frontend using Bootstrap • GitHub Overview • Conclusion of Unit
3.	**JavaScript**

	• Introduction of Unit • Introduction to JavaScript ,Variables, scoping, Data type, Strings and • Numbers,Operators and loops, Functions • Data Structures: Arrays, Linked List, Stacks, Queues, Maps, Hashing • Apprehension and working with DOM, Developer tools in Browsers , Prototypes, • Closures. Local Storage, jQuery ,Promises, • ES5 vs Es6 vs Es7, Event loop in JavaScript • Conclusion of Unit
4	**React – Part 1**
	• Introduction of Unit • React Intro,Install node ,Create an app using create-react-app, apprehension basics of react app, explaining JSX, explaining virtual DOMS, Single page apps • React Lifecycle,States ,Class components vs functions components, Event handling, Props, Building a basic Forms using React • Routes, Conditional Rendering, Pure Components, High Order components, Controlled vs Uncontrolled components Conclusion of Unit
5	**React – Part 1**
	• Introduction of Unit • Redux, Babel, webpack, Add Redux in a Project and build using webpack • SASS Overview, Tools for code review, Standard coding conventions, • Deploy using Netlify, Get code reviewed by Software developers and deploy projects Conclusion of Unit

D. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Learning React: Functional Web Development with React and Redux	Alex Banks and Eve Porcello	Latest	O;Reilly
2	The Road to React	Robin Wieruch	Latest	
Reference Book				
1.	Fullstack React: The Complete Guide to ReactJS by Anthony Accomazzo (Author), Nate Murray (Author), Ari Lerner (Author)			
2.	React in Action by Mark Tielens Thomas ,‖Mark TielensThomas‖,Manning			
Online Resources				
1.	https://www.tutorialspoint.com/reactjs/reactjs_tutorial.pdf			
2.	https://www.udemy.com/course/react-js-a-complete-guide-for-frontend-web-development/			
3.	https://learning.shine.com/course/it-information-technology/frontend-developer-in-reactjs/pd-6820			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1					-	-	-	-	-	-	-	2	-	-
CO2	3	1				-	-	-	-	-	-	-	-	-	-
CO3		2	2	1		-	-	-	-	-	-	-	-	-	-
CO4		2	3			-	-	-	-	-	-	-	-	-	-
CO5		2	3			-	-	-	-	-	-	-	-	-	-

Code: BMFCCA5104	Introduction to UI/UX	3 Credits [LTP: 3-0-0]

Student will able to

- Gain knowledge about the critical importance of user interface design
- Use learned skills to solve problems of various layouts of User Experience Design
- Apply the functionality of different design in web designing
- Properly select and utilize design thinking processes and UX/UI tools
- Develop ideas and various app designs and website pages.

A. OUTLINE OF THE COURSE

Unit No.	Title of The Unit	Time required for the Unit (Hours)
1.	**Introduction To HCI**	08
2.	**UX Introduction**	09
3.	**Mobile UI Design**	09
4.	**Best Practices In UI Design**	07
5.	**Prototype & Test**	07

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to HCI**
	• Introduction of Unit • Introduction to HCI • HCI and Software Engineering • Models of HCI — Cognitive, Interactive • Fitt's Law • Communication & Collaboration Models • Programming Interactive System • Task Analysis • Guidelines in HCI • Conclusion of unit
2.	**UX Introduction**
	• Introduction of Unit • User Interaction with the products, applications and services • Why User Experience Design • What is User Experience (UX) Design? • Core elements of User Experience. • How these elements work together. • Defining the UX Design Process and Methodology • Visual Design Principles • Information Design and Data Visualization • Conclusion of Unit
3.	**Mobile UI Design**

	• Introduction of Unit • Mobile Interaction Styles: Keypads, Touchpads, Gestures • Disruption & Innovation • Screen Design and Layouts • UX Tools for Wire framing and Prototyping • UX Tools for User Research and User Testing • UX Tools for Organizing Information • Conclusion of Unit
4.	**Best Practices in UI Design**
	• Introduction of Unit • Introduction to Perl • Mobile UI Best practices — HTML & CSS • HTML Tags and forms • CSS - Properties • Mobile UI Best practices —JS • Conclusion of Unit
5.	**PROTOTYPE & TEST**
	• Introduction of Unit • What is Usability Testing? • Types of Usability Testing • Usability Testing Process • How to prepare and plan for the Usability Tests? • Prototype your Design to Test? • Quality assurance • Alpha testing • Launching you project • Support • Post launch activities • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Human Computer Interaction	Alan Dix, Janet Finlay	3rd edition 2004	Pearson Education
2.	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques	Wilbert 0. Galitz	3rd edition 2007	Wiley
3.	Human Computer Interaction	Alan Dix, Janet Finlay	3rd edition 2004	Pearson Education
Reference Book				
1.	UX for Dummies, Donald Chesnut , Kevin P. Nichols , 2014,Wiley India Pvt. Ltd			
2.	UX for beginners, Mekkie Bansil,2016,O Really			
Online Resources				
1.	https://learnui.design/			
2.	https://www.skillshare.com/browse/ui-ux-design			
3.	https://www.youtube.com/watch?v=LupF26_Zs5Y			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					-	-	-	-	-	-	-	2	-	-
CO2	3	2				-	-	-	-	-	-	-	-	-	-
CO3		2	2			-	-	-	-	-	-	-	-	-	-
CO4		2	2			-	-	-	-	-	-	-	-	-	-
CO5		2	2			-	-	-	-	-	-	-	-	-	-

Minor Course Stream
Practical

Code: BMFCCA5201 Advanced Android Application Development Lab 1 Credit [LTP: 0-0-2]

Course Outcome:-
Students will be able:

- Explain to build android applications.
- Apply different designing based on user requirement
- Use google api to make the app more useful
- Interacting with the database by the application
- Deploying the application on the server.

A. LIST OF EXPERIMENTS:

1	Subject List Application Students will learn how to ● Use the Recycler View class to display items in a scrollable list. ● Dynamically add items to the Recycler View as they become visible through scrolling. ● Perform an action when the user taps a specific item. ● Show a floating action button and perform an action when the user taps it.
2	Notifications app Students will learn how to ● Create a Notification using the Notification Builder. ● Use Pending Intents to respond to Notification actions. ● Update or cancel existing Notifications ● Change
3	Weather application Students will learn how to ● Create an HTTP connection to server & get the connection status ● Fetch information from a web service
4	Simple Game application Students will learn how to ● Create a view with different shapes ● Change shape and color based on user input ● Remove specific shapes from the view when user clicks on them ● Keep track of user score
5	Ball Bounce Animation application Students will learn how to ● Create a view with different moving shapes ● Make the shapes rotate or bounce based on user input

6	Animated Picture app Students will learn how to ● Use camera APIs to click and save a picture ● Set the picture as the wallpaper. ● Use media APIs to record audio or select a clip ● combine the picture and clip and save as an animated picture
7	TrackMe App Students will learn how to ● Use location APIs to detect current location ● Use Google Maps APIs to show current location on map ● Use SMS API to send SMS with current location
8	Permissions & Preferences app Students will learn how to ● Check whether required permissions are granted ● Request for run-time permission ● Create a shared preferences file for their app. ● Save data to shared preferences, and read those preferences back again. ● Clear the data in the shared preferences..
9	SSO Application Students will learn how to ● Create user login and registration forms. ● Store user registration details in the local database. ● Authenticate users on login
10	Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity.
11	Create a screen that has input boxes for User Name, Password, Address, Gender(radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout)

RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Professional Android (Meier Reto)	John Wiley & Sons Inc	2012	WROX
Reference Book				
1.	Google Android Developer Fundamentals Course – Concepts, Dec 2016 https://developers.google.com/training/courses/android-fundamentals			
2.	Hello, Android Introducing Google‘s Mobile Development Platform, Ed Burnette, The Pragmatic Bookshelf, 4th Editions, 2015			
Online Resources				
1.	https://www.javatpoint.com/android-tutorial			

Code: BMFCCA5202	NOSQL database with MONGO DB Lab	1 Credit [LTP: 0-0-2]

Course Outcome:-

Students will be able:

- Analyze, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column-oriented and Graph).
- Create detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
- Create objects, load data, query data and performance tune Document-oriented NoSQL databases by analyzing the detailed architecture
- Implement NoSQL database development tools and programming languages.
- Perform hands-on NoSql database lab assignments that will allow students to use the four NoSQL database types via products such as Cassandra, Hadoop Hbase, MongoDB, Neo4J and Riak.Contents

A. LIST OF EXPERIMENTS:

1	Prepare and install infrastructure for setting up MongoDBlab. •InstallMongoDBCommunityEdition • Download MongoDBCommunityEdition • Run the Mongo DBinstaller • Follow theMongoDBCommunityEditioninstallation wizard •RunMongoDB Community Edition as a Windows Service •RunMongoDB Community Edition from the Command InterpreterItis advised to follow below URL: https://docs.mongodb.com/manual/tutorial/install-mongodb-on-windows/
2	Perform/execute below sets of basic commands on Mongo DB lab environment. • Loginto Lab • Show all Databases • Select data base to work with • Authenticate and Logout from databases • List down Collections, Users, Roles • Create Collection
3	Perform/execute below sets of basic commands on MongoDB lab environment. • Insert Document • Save Document • Update Document • Display Collection Records • Drop Function
4	Perform/execute below sets of advanced commands on Mongo DB lab environment. • Administrative Commands • Projection • Limit Method • Skip Method • Sort Records • Indexing • Aggregation • Interacting with cursors
5	Execute below steps by inserting some data which we can work with. Paste the following into your terminal to create a petshop with some pets in it use petshop

	db.pets.insert({name:"Mikey", species:"Gerbil"}) db.pets.insert({name:"DaveyBungooligan",species:"Piranha"}) db.pets.insert({name: "Suzy B", species: "Cat"}) db.pets.insert({name:"Mikey", species:"Hotdog"}) db.pets.insert({name: "Terrence", species: "Sausagedog"}) db.pets.insert({name:"PhilomenaJones",species: "Cat"}) • Add an other piranha,and an akedmolerat called Henry. • Use find to listall the pets. Find the ID of Mikey the Gerbil. • Use find to find Mikey by id. • Use find to find all the gerbils. • Find all the creatures named Mikey. • Find all the creatures named Mikey who are gerbils. • Find all the creatures with the string "dog" in their species.

6	AirPhone Corp is a famous telecom company. They have customers in all locations. Customers use AirPhone Corp's network to make calls. Government has brought in a regulation that all telecom companies should store call details of their customers. This is very important from asecurity point of view and all telecom companies have to retain this data for 15 years. AirPhone Corpal
	ready stores all customer details data,for their analytics team.But due to a surge in mobile users in recent years, their current data base cannot handle huge amounts of data. Current data base stores only six months of data. AirPhone Corp now wants to scale their database and wants to store15years of data.
	
	Datacontains following columns:
	Source: Phone number of caller
	Destination:Phone number of call receiver Source_location: Caller's city
	Destination_location : Call receiver's city
	Call_duration: phone call duration
	Roaming: Flag to check if caller is in roaming
	Call_charge: Money charged for call
	SampleData:
	{
	source:"+919612345670",
	destination: "+919612345671",source_location:
	"Delhi",destination_location:"Mumbai",call_duration:2
	.03,
	roaming: false,call_charge:2.03
	}
	
	After discussing the requirements with database and architecture team, it has been decided that they should use MongoDb. You have been given the task to Setup a distributed system(database)suchthat datafrom different locationsgo to differentnodes (to distributethe load)
	• Import data to sharded collection
	• Checkdataon eachshardfordistribution

7	Execute below sets of problem by taking reference of Experiment Number 06 and find out: • Add additional node to existing system (to test if we can add nodes easily when data increases) • Checkthe behavior of cluster (data movement) on adding ashard.

	• Check the behavior of query for finding a document with source location Mumbai

8	Anand Corp is a leading corporate training provider. A lot of prestigious organizations send their employees to Anand Corp for training on different skills. As a distinct training provider, Anand Corp has decided to share analysis report with their clients. This report will help their clientsknow the employees who have completed training and evaluation exam, what are their strengths,and what are the areas where employees need improvement. This is going to be a unique selling feature for the Anand Corp. As Anand Corp is already doing great business and they give training to a large number of people every month, they have huge amount of data to deal with. They have hired you as an expert and want your help to solve this problem.
	Attributes of data:
	Id:idofthepersonwhowastrained
	Name: name of the person who was trained Evaluation: evaluation
	term
	Score: score achieved bythe personfor the specific term
	A person can undergo multiple evaluations. Each evaluation will have a unique result score. You can see the sample data below.
	Sample Data
	{
	"_id":0,
	"name":"Andy","results":[
	{"evaluation":"term1","score":1.463179736705023},
	{"evaluation":"term2","score":11.78273309957772},
	{"evaluation":"term3","score":6.676176060654615}
	]
	}
	PQR Corp has assigned the following tasks to you to analyze the results:
	Find count and percentage of employees who failed in term1, the passings core being 37.

9	Execute below sets of problem by taking reference of Experiment Number 08 and find out: • Find employees who failed in aggregate(term1+term2+term3). • Find the Average score of trainees for term1.
10	Execute below sets of problem by taking reference of Experiment Number 08 and find out: • Find the Averages core of trainees for aggregate (term1+term2+term3). • Find number of employees who failed in all the three (term1+term2 +term3). • Find the number of employees who failed in any of the three (term1+term2+term3).
11	Case study on 5 different IT Companies who are working on MongoDB. Explain on the below parameters: • Why moved to NoSQL • Advantages over NOSQL Business BenefitsTechnology Adaptation

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	PROFESSIONAL NoSQL	Shashank Tiwari		Wrox
2.	MongoDB in Action	KYLE BANKER PETER	Second Edition	Manning
Reference Book				

	NoSQLfor Dummies, AdamFowler, JohnWiley&Sons,Inc
	NoSQLDistilled, PramodJ.Sadalage&Martin Fowler, PearsonEducation, Inc.
	MakingSenseof NoSQL, DanMcCreary& Ann Kelly, ManningShelterIsland
	NoSQLforMereMortals, DanSullivan, PearsonEducation
Online Resources	
	https://www.javatpoint.com/nosql-databases
	https://www.tutorialspoint.com/mongodb/index.htm

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1					-	-	-	-	-	-	-	2	-	-
CO2	3	2				-	-	-	-	-	-	-	-	-	-
CO3		1	2			-	-	-	-	-	-	-	-	-	-
CO4		2	3			-	-	-	-	-	-	-	-	-	-
CO5		2	1			-	-	-	-	-	-	-	-	-	-

Code: BMFCCA5203 Front End Development with React JS 1 Credit [LTP: 0-0-2]

Course Outcome:

Students will be able to:

- Explain the Web Development
- Explain CSS and Implement
- Explain Java Script and Implement
- Explain a Project and build with React

.

A. LIST OF EXPERIMENTS:

1	Use table tag to format web page. Also create the Time Table of your class using table tag.
2	Create Style sheet to set formatting for text tags and embed that style sheet on web pages created for your site.
3	Write a JavaScript program to determine whether a given year is a leap year in the Gregorian calendar.
4	Write a JavaScript program to convert temperatures to and from celsius, Fahrenheit.
5	Introduction to Dreamweaver and setting up site using Dreamweaver.
6	WAP to create table and list using CSS.
7	To create a web page that displays college information using various Style sheets.
8	Write a program to Use different font, styles: In the style definition you define how each selector should work (font, color etc.).
9	Create a Dropdown Button Filter with React.
10	Write a program in React, for this output: **Who lives in my garage?** • I am a Ford • I am a BMW • I am a Audi

A. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Learning React: Functional Web Development with React and Redux			O;Reilly
2.	The Road to React by Robin Wieruch	Robin		
3.	React in Action by Mark Tielens Thomas	Mark Tielens Thomas		Manning
Reference Book				
1.	FullStack React			
2.	HTML To React: The Ultimate Guide			
Online Resources				
1.	https://www.w3schools.com/REACT/DEFAULT.ASP			
2.	https://www.javatpoint.com/reactjs-tutorial			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					-	-	-	-	-	-	-	2	-	-
CO2	3	2				-	-	-	-	-	-	-	-	-	-
CO3		2	2			-	-	-	-	-	-	-	-	-	-
CO4		2	2			-	-	-	-	-	-	-	-	-	-
CO5		2	2			-	-	-	-	-	-	-	-	-	-

Multidisciplinary Courses
Ability Enhancement Courses (AEC)

Code: BULCHU5115 Entrepreneurial and Managerial Skills 2Credits [LTP: 2-0-0]

COURSE OUTCOMES:

Students would be able to:

- Demonstrate an integrated awareness of Entrepreneurship and its link to professional life.
- Understand and analyze the concepts of Entrepreneurship Development and various Entrepreneurship models.
- Understand the role of effective leadership in organizational strategy & propose appropriate leadership styles and approaches through evaluation of dynamic leadership
- Comprehend the behaviors and issues relating to leadership.
- Develop practical, ethically-informed leadership skills that can be applied in a range of situations.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Entrepreneurship	7
2.	Entrepreneurship Development	8
3.	Leadership Styles: Effective Vs Successful Managers.	7
4.	Behavioral Theory of Leadership.	5
5.	Leadership Styles: Case Study and Adaptation.	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Entrepreneurship**
	• Introduction to the Unit • Concept of Entrepreneur. Intrapreneur, Entrepreneurship and Manager • Difference between Entrepreneur and Intrapreneur, Entrepreneur and Entrepreneurship. Attributes and Characteristics of successful entrepreneurs. Functions of an Entrepreneur • Classification of Entrepreneurs. Role of Entrepreneur in Indian Economy, Developing entrepreneurial culture, Factors influencing Entrepreneurship Growth - Economic, Non-Economic Factors, For profit or Not for profit entrepreneurs, Constraints for the Growth of Entrepreneurial Culture, Entrepreneurship as a career • Entrepreneurship as a style of management, Emerging Models of Corporate Entrepreneurship, India's start up revolution–Trends, Imperatives, benefits; the players involved in the ecosystem, Business Incubators-Rural • entrepreneurship, social entrepreneurship, women entrepreneurs, Cases of Tata, Birlas, Kirloskar and new generation entrepreneurs in India. • Conclusion & Real-life applications
2.	**Entrepreneurship development**

	• Introduction to the Unit • Entrepreneurial Competencies, Developing Competencies. • Concept of entrepreneurship development, Entrepreneur Training and developing, Role of Entrepreneur Development Programs (EDP) • Objectives – contents – methods - execution. Role of Mentors • Innovation and Entrepreneurship, Design Thinking Process. Role of consultancy organizations in promoting Entrepreneurs • Problems and difficulties of Entrepreneurs - Marketing Finance, Human Resource, Production; Research - external problems • Mobility of Entrepreneurs, Entrepreneurial change, occupational mobility - factors in mobility • Conclusion & Real-life applications
3.	**Leadership Styles: Effective Vs. Successful Managers**
	• Introduction to the Unit • Types of Leadership Style • Types of Management Styles • Distinction between Effective Leadership and Effective Management • Conclusion & Real-life applications
4.	**Behavioral theory of Leadership**
	• Introduction to the Unit • Definition of Behavioral Theory • Classification of Behavioral theory • Conclusion & Real-life applications
5.	**Leadership Styles: Case Study and Adaptation**
	• Introduction to the Unit • Peter Weaver Case Study • Dealing with Crisis: Case Study • Arsenic and Old Lace Case Study • Conclusion & Real-life applications

C. RECOMMENDED STUDY MATERIAL:

Sr. No	Reference Book	Author	Edition	Publication
1	Leadership Development	John Mitchell	*2012*	Mitchell Leadership Consulting
2.	Leading Minds: An Anatomy of Leadership	Howard E. Gardner and Emma Laskin	*2011*	Kogan Page
3.	Start with Why: How Great Leaders Inspire Everyone to Take Action,	Simon Sinek	2011	Portfolio
4.	Strengths-Based Leadership	Tom Rath and Barry Conchie	2009	Gallup Press

Skill Enhancement Courses (SEC)

Course Code:BULCSE5201 Skill Enhancement Generic Course –V 1 Credit[LTP: 0-0-2]

COURSE OUTCOMES:

On completion of the course a student will be able to:

- Understand basic problems based on arithmetic and soft skills area which are asked in aptitude test taken by companies
- Effectively solve these problems by applying the knowledge earned.
- Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
- Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
- Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality

LIST OF ACTIVITIES	
1	Problems on Age, Cause & Effect
2	Career Development, Stress Management
3	Conflict Management, Data Interpretation
4	Sitting Arrangements
5	Written Communication, Behavioral interview skills
6	Error Detection, Confusing words
7	Number series, Speed, Time & distance
8	Linear Equations, Points, lines & angles
9	Allegations & Mixtures, Data sufficiency
10	Articles & Prepositions, Modal Verbs & Conditional Tense
11	Pronouns, Adverbs & Adjectives, Emotional Intelligence
12	Managing pressure & maintaining balance

Value Added Courses (VAC)

Code: BUVCCE5102 INTERNET OF THINGS 2 Credits [LTP: 2-0-0]

COURSE OUTCOME

Students would be able to

- Describe general concepts of Internet of Things (IoT) and identify various devices, sensors and applications
- Understand the design concept of sensors and sensor networks
- Apply different wireless technologies for IoT
- Apply technologies for basic IoT applications
- Understand the design concept of sensors and sensor networks

A.OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time Required for the Unit (Hours)
1	**Introduction to IOT**	5
2	**Sensor Networks**	5
3	**Wireless Technologies**	5
4	**IOT Application Development**	5
5	**Applications of IOT**	4

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction to IOT**
	• Introduction of the Unit • IoT Definition, Characteristics of IoT • Functional Blocks, Physical design of IoT, Logical design of IoT • Communication models & APIs • Networking basics • Communication Protocols • Conclusion of the Unit
2	**Sensor Networks**
	• Introduction of the Unit • Types of Sensors, Types of Actuators, Examples and Working • IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit • Wireless Sensor Networks: History and Context, The node, Connecting nodes, • Networking Nodes, WSN and IoT • Conclusion of the Unit
3	**Wireless Technologies**
	• Introduction of the Unit • WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE • Remote monitoring and sensing • Communication pattern, 6LoWPAN • Conclusion of the Unit
4	**IOT Application Development**
	• Introduction of the Unit • Introduction to Node MCU • Node MCU Pin Description • Programming of NodeMCU using Arduino IDE • IP Based Protocols for IoT IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT. • Bigdata, Types of data, Characteristics of Big data • Cloud Computing Platforms for IoT • Conclusion of the Unit

5	**Applications of IOT**
	• Introduction of the Unit • Home Automation, Smart Cities, Energy, Retail Management, Logistics • Agriculture, Health and Lifestyle, Industrial IoT, • Legal challenges, IoT design Ethics, • IoT in Environmental Protection • Conclusion of the Unit

C. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1	Internet of Things: Architectures, Protocols and Standards	Simone Cirani, Gianluigi, Marco, and Luca Veltri	Latest	Wiley
2	Internet of Things	RMD SundaramShriramKVasudevan, Abhishek S	Latest	Wiley
3	Designing the Internet of Things	Adrian McEwen, Hakim Cassimall Y	Latest	John Wiley and Sons
4	Internet of Things (A Hands-on Approach)	Vijay Madisetti and ArshdeepBahga	2014	VPT

Semester-VI

Major (Core Courses)
Theory

Code:BCACCA6101	IPR and Patent	3 Credits [LTP: 3-0-0]

COURSE OUTCOME

- This course is an overview of the intellectual property law: patents, copyrights, trade secrets, and trademarks.
- It examines the fundamental principles of these bodies of law, their underlying policies, and how the laws inter-relate.
- Pupils will learn about patents and its importance and how to apply & get approval.
- Study will understand about trademarks and intellectual property law.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time Required for the Unit (Hours)
1	**Introduction to IPR**	7
2	**Types of IPR and WIPO**	7
3	**Legal and Commercial Aspects of IPR**	7
4	**Introductions to Patents**	7
5	**Patent Procedures**	8

B. DETAILED SYLLABUS

Unit	Unit Details
1	**Introduction to IPR**
	• Introduction of Unit • General Regime of Intellectual Property Rights, Concept of Property vis-à-vis Intellectual Property, Concept of Property and Theories of Property - An Overview. • Theories of Intellectual Property Rights, Intellectual Property as an Instrument of Development, Need for Protecting Intellectual Property- Policy Consideration- National Perspectives and International demands • Conclusion of Unit
2	**Types of IPR and WIPO**
	• Introduction of Unit • Types of Intellectual Property- Origin and Development- An Overview, Intellectual Property Rights as Human Right, Role of International Institutions, World Intellectual Property Organization (WIPO), Function of WIPO, Membership of WIPO, Agreement between the WIPO and the WTO • Conclusion of Unit
3	**Legal and Commercial Aspects of IPR**
	• Introduction of Unit • Dispute Settlement- New Treaties, Commercialization of Intellectual Property Rights by Licensing • Determining Financial Value of Intellectual Property Rights, Negotiating Payments Terms in Intellectual Property Transaction • Intellectual Property Rights in the Cyber World • Conclusion of Unit
4	**Introductions to Patents**
	• Introduction of Unit • Introduction to Patent Law, Paris Convention, Patent Cooperation Treaty, WTO-TRIPS, Harmonization of CBD and TRIPs, Indian Patent Law, The Patents Act, 1970, Amendments to the Patents Act, Patentable Subject Matter, Patentability Criteria

	• Conclusion of Unit
5	**Patent Procedures**
	• Introduction of Unit • Procedure for Filing Patent Applications, Patent Granting Procedure, Revocation, Patent Infringement and Remedies, Relevant Provisions of the Biological Diversity Act, 2002, Access and Benefit Sharing Issues • Conclusion of Unit

C. RECOMMENDED STUDY MATERIAL

S. N.	Book	Author	Publication
1	Intellectual Property Rights in India	VK Ahuja	Lexis Nexis, butter worth, s wadhwa
2	Intellectual Property Rights	NeerajPandey (Author), KhushdeepDharni	PHI Learning

MAPPING OF CO VS PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					-	-	-	-	-	-	-	2	-	-
CO2	2	3				-	-	-	-	-	-	-	-	-	-
CO3	3					-	-	-	-	-	-	-	-	-	-
CO4	3					-	-	-	-	-	-	-	-	-	-
CO5						-	-	-	-	-	-	-	-	-	-

Note: On the basis of mapping of COs with POs, this course is related to Employability/Skill Development

Minor Stream Courses
Theory

Code: BMFCCA6101	Mobile Application Security	3 Credits [LTP: 3-0-0]

COURSE OUTCOME:

- To gain knowledge of Mobile Risk & Security
- To learn about various types of attacks, attackers and security threats and vulnerabilities present in the android app development .
- To gain knowledge about SQL Injection and Attacks.
- To examine how social engineering can be done by attacker to gain access of useful & sensitive information about the confidential data.
- To learn about various types of Mobile Device Management techniques.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	**Introduction to Mobile Risks & Security**	6
2	**Android**	6
3	**Web and iOS**	8
4	**Mobile Malware and Secure Mobile Development**	8
5	**Mobile Device Management**	8

A. DETAILED SYLLABUS

Unit	Unit Details
1.	**Introduction to Mobile Risks & Security**
	• Introduction to unit • Mobile Risk Model, Primary Risks, Threats and Vulnerabilities, Identity Management, Device Security, Privacy, App Stores, Risk Mitigation Strategies and Controls, Forensics. • Conclusion of unit
2.	**Android**
	• Introduction to unit • Android Security Model, Common Android vulnerabilities, Models to develop secure Android applications: Code obfuscation, authentication, protecting Android databases and data in transit • Secure third party integration, device security. Conclusion of unit
3.	**Web and iOs**

	• Introduction to unit • Introduction to Web Attacks & Trends, Common Threats : URL Interpretation attacks, Input Validation attacks, SQL Injection
	attacks, cross site scripting, request forgery, session hijacking, Cookies, Impersonation attacks & Buffer Overflow attacks PHP Security Best practices, Content Security policy, Secure session management, secure storage, secure forms, form validation and user account registration, Common Authentication and Authorization Frameworks: OAuth, SAML, secure AJAX e-commerce transactions, iOS Security Framework, security risks of jailbreaking. Conclusion of unit
4.	Win Mobile Malware and Secure Mobile Development
	Introduction to unit Mobile malware: Trojans, worms, ransomware, phishing, pharming, protecting against malware and other security risk user and developer perspective, Security Testing Tools and Utilities Secure coding standards and practices, security testing, database security and audits, best practices in the software development lifecycle Conclusion of unit
5.	Mobile Device Management
	• Introduction to unit • Overview of Mobile Device Management, Company owned vs BYOD • Implementing enterprise policies, enabling secure email, web browsing and application use, evolution of MDM, MDM platforms. • Conclusion of unit

RECOMMENDED STUDY MATERIAL:

Sr.No	Reference Book	Author	Publication
1	Information Systems Security: Security Management, Metrics, Frameworks and Best Practices	Nina Godbole..	Wiley 2008
2	Mobile Application Penetration Testing	Vijay Kumar Velu	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					-	-	-	-	-	-	-	2	-	-
CO2	2	3				-	-	-	-	-	-	-	-	-	-
CO3	3					-	-	-	-	-	-	-	-	-	-
CO4	3					-	-	-	-	-	-	-	-	-	-
CO5						-	-	-	-	-	-	-	-	-	-

Minor Stream Courses
Practical

Code: BMFCCA6201	Mobile Application Security Lab	1 Credit [LTP: 0-0-2]

Course Outcome:-

Students will be able:

- Understand Intrusions and intrusion detection.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security audit.

A. LIST OF EXPERIMENTS:

1	Find out the static security issues in android application of Mobile by using the Mob SF(Mobile Security Framework) .
2	Identify the issues of a mobile application as it is in running form by using the Android Debug Bridge (ADB)
3	Perform testing on mobile by using Frida.
4	How to analysis the source code of republic application by using the APK tool.
5	Find the security vulnerabilities in mobile application by using OWASP ZAP tool.
6	Find out potential security vulnerabilities in android apps by using the QARK (Quick android Review Kit).
7	How to fix the issues instantly in mobile application, as they writing the code in Android studio by using the Appkknox plan.
8	By using Drozer testing tool scan the android application through inter-process Communication (IPC) mechanism.
9	Check the MITM (Man in the Middle attack) attack in aaps of mobile with the help of Mitmproxy.
10	How iOS app protect itself in a hostile environment or jailbreak really works in term of iMAS security appliance.

B. RECOMMENDED STUDY MATERIAL

S. No	Text Books:	Author	Edition	Publication
1.	Assessing Information Security (strategies, tactics, logic and framework)	Assessing Information Security (strategies, tactics, logic and framework) by A Vladimirov, K.Gavrilenko, and A.Michajlowski	Third Edition	Elsevier
2.	The Art of Computer Virus Research and Defense.	Peter Szor	Latest	
Reference Book				
1.	Introduction to Computer Theory with Cyber Audit, Daniel I.A. Cohen, John Wiley.			

2.	Michael Simpson, Kent Backman, James Corley, “Hands-On Ethical Hacking and Network Defense”, Cengage Learning.
Online Resources	
1.	https://informer.io/resources/top-5-open-source-mobile-application-security-testing-tools
2.	https://www.nowsecure.com/blog/2022/04/13/popular-mobile-app-security-testing-tools/

Multidisciplinary Courses
Ability Enhancement Courses (AEC)

Code: BULCHU6120 Presentation and Interview Skills 2 Credits [LTP: 2-0-0]

Course Outcome:-

Students will be able

- On successful completion of the course, the students will be able to:
- Compare the professional and personal approaches to any task and demonstrate their understanding by displaying a professional attitude in the assigned tasks.
- Recognize, explain, and use the formal elements of specific genres of organizational communication: reports, proposals, memorandums, web pages, wikis, blogs, business letters, promotional documents, etc
- Prepare and deliver a clear and fluent demonstrative, informative, and persuasive presentation and enlarge their vocabulary by keeping a vocabulary journal.
- Demonstrate preparedness for any type of interview from classic one-on-one interviews to panel interviews, Phone/Skype interviews, Behavioral/Situational, etc. along with sharpening the ability to critically analyze a given piece of information and collectively work in a group to arrive at a solution or develop a perspective.

A. OUTLINE OF THE COURSE

UNIT NO.	UNIT NAME	Hours
1	**Professional Attitude & Approach**	4
2	**Professional Writing-I**	6
3	**Presentation Skills: Structure Study**	4
4	**Interview Skills & Group Discussion**	6
5	**Negotiation Skills & Time Management**	5

B. DETAILED SYLLABUS

UNIT	UNIT NAME
1	**Professional Attitude & Approach**
	• Introduction to the Unit • Understanding Human behavior • Relationships between truth and beliefs • Positive Thinking • Adaptability and resilience • Adaptability in the workplace • Self -Awareness • Conclusion &Real-Life Application
2	**Professional Writing**

	• Introduction to the Unit • Technical Writing • Formal Letter Writing • Job applications • Notice Agenda and Minutes of Meeting • CV preparation (differences between Bio-Data, CV, and Resume) • Report Writing (Business Reports, Memo Reports) • Email Communication • Conclusion &Real-Life Application
3	Presentation Skills: Structure Study
	• Introduction to the Unit • Oral Presentation: Voice modulation, tone, describing a process • Presentation Skills: Oral presentation and public speaking skills • Business presentations • Preparation: organizing the material, Self-Introduction, introducing the topic, answering questions, individual presentation practice, and presenting visuals effectively. • Conclusion &Real-Life Application
4	**Interview Skills & Group Discussion**
	• Introduction to the Unit • Interview Skills: types of interviews, successful interviews, • Interview etiquette, dress code, body language • Online Job Interview: Telephone/online (skype) interviews • Offline Job Interviews: One-to-one interviews & panel interviews • Mock Interviews • Introduction to Group Discussion (GD) • Differences between GD and debate • Participating in GD, understanding GD, brainstorming the topic, questioning and clarifying • GD strategies

	• Conclusion &Real-Life Application
5	**Negotiation Skills & Time Management**
	• Introduction to theUnit • Recognizing differences between groups and teams • Time Management • Stress Management • Networking professionally • Respecting social protocols • Understanding career management • Develop a long-term career plan • Points of view • Agreement-Disagreement • Discussion techniques • Situations and negotiators • Difficulties in negotiation and reaching an agreement • Conclusion &Real-Life Application

B. Recommended Readings:

Sr. No	Reference Book	Author	Edition	Publication
1.	English for Engineers and Technologists		(Combined edition, Vol. 1 and 2)	1. Orient Blackswan 2010.
2.	The Elements of Style	William Strunk Jr. & E.B. White	4th Edition	Pearson, 1999.
3.	Technical Communications	Raman Sharma	London, 2004	Oxford Publication
4.	Success in Interview	Anand Ganguly	5 Edition, 2016	RPH

Skill Enhancement Courses (SEC)

Code: BULCSE6201	Skill Enhancement Generic Course –VI	1 Credit [LTP: 0-0-2]

COURSE OUTCOMES:

On completion of the course a student will be able to:

- Understand basic problems based on arithmetic and soft skills area which are asked in aptitude test taken by companies
- Effectively solve these problems by applying the knowledge earned.
- Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
- Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
- Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality

LIST OF ACTIVITIES	
1	Work & Wages, Ratio & Proportions
2	Effective Communication and Managing Conflict, Story telling
3	Heights & Distances, Probability
4	Comprehension & Para Jumble,
5	Written Communication, Behavioral Interview Skills
6	Effective Presentation skills, How to become more approachable
7	Odd one out, Order & Ranking
8	Deductive Reasoning, Divergent Thinking
9	How to brainstorm effectively, Mirror & Water images
10	Mind Mapping, Closing deals
11	Project Management, Team Management
12	Emotion Management, Delivering constructive feedback