

Study & Evaluation Scheme

Of

Bachelor of Computer Application

(With Specialization in **Mobile Application & Web Technology**)

(In Collaboration with iNurture)

[Applicable w.e.f. Academic Session – 2020-21 till revised]

[As per CBCS guidelines given by UGC]



COLLEGE OF COMPUTING SCIENCES & INFORMATION
TECHNOLOGY
TEERTHANKER MAHAVEER UNIVERSITY

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TEERTHANKER MAHAVEER UNIVERSITY
(Established under Govt. of U.P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P.)

<u>Study & Evaluation Scheme</u>						
<u>SUMMARY</u>						
Institute Name		College of Computing Sciences & Information Technology				
Programme		BCA(MAWT)				
Duration		Three Years full time(Six Semesters)				
Medium		English				
Minimum Required Attendance		75%				
<u>Credits</u>						
Maximum Credits		136				
Minimum Credits Required for Degree		132				
Assessment:						
Evaluation			Internal	External	Total	
Theory			40	60	100	
Practical/ Dissertations/ Project Reports/ Viva-Voce			50	50	100	
Class Test-1	Class Test-2	Class Test-3	Assignment(s)	Attendance& Participation	Total	
Best two out of three						
10	10	10	10	10	40	
Duration of Examination			External	Internal		
			3 Hours	1.5 Hours		
<p>To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation.(i.e. both internal and external).A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.</p> <p># Provision for delivery of 25% content through online mode.</p> <p># Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.</p> <p># Maximum Duration: Maximum no of years required to complete the program: N+2 (N=No of years for program for BCA(MAWT) N=3)</p>						
<u>Question Paper Structure</u>						
1	The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.					
2	Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.					
3	The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.					

IMPORTANT NOTES:

1	<i>The purpose of examination should be to assess the Course Learning Outcomes (CLO) that will ultimately lead to attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).</i>
2	<i>Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.</i>
3	<i>There shall be continuous evaluation of the student and there will be a provision of fortnight progress report.</i>

Program Structure-BCA(MAWT)**A.Introduction:**

High-quality Technical education is essential for the digital age and using technology is a powerful way to enhance changing requirements of the corporate, business enterprises and society. BCA students should be equipped to work across timezones, languages, and cultures. Employability, innovation, technical connectedness is the central focus of BCA curriculum. The curriculum is designed as such that the students can gain an in-depth mastery of the academic disciplines and applied functional areas necessary to meet the requirements of industry.

The institute emphasizes on the following courses ***balanced with core and elective courses***: The curriculum of BCA program emphasizes an intensive, flexible technical education with 64 credits of core courses (all types), 13 credits of electives and 18 credits of field/internship projects. Total 136 credits are allotted for the BCA degree.

The programme structure and credits for BCA(MAWT) are finalized based on the stakeholders' requirements and general structure of the programme. Minimum number of classroom contact teaching credits for the BCA(MAWT) program will be 123 credits (one credit equals 10 hours); 6 credits for comprehensive viva-voce and fieldwork/internship will be of 12 credits. However, the minimum number of the credits for award of BCA(MAWT) degree will be 132 credits. Out of 123 credits of classroom contact teaching, 64 credits are to be allotted for core courses(CC), 4 credits are allotted to ability enhancement courses (AECC), 6 credits are allotted to skill enhancement courses (SEC), 12 credits are allotted to open/generic elective courses (GEC), 2 credits are allotted to compulsory specifies course (CSC), and rest of 30 credits for discipline specific elective courses (DSEC).

The institute offers BCA with specialization in Mobile application and Web Technology. Due to dynamism in industry environment and manifold expansion of corporate in the present scenario, various industries require candidates with strong multitasking abilities. There is a massive demand for candidates who can fit into diversified roles with adequate efficiency, and BCA degree with specialization solves this demand-supply gap.

Course handouts for students will be provided in every course. A course handout is a thorough teaching plan of a faculty taking up a course. It is a blueprint which will guide the students about the pedagogical tools being used at different stages of the syllabus coverage and more specifically the topic-wise complete plan of discourse, that is, how the faculty members treat each and every topic from the syllabus and what they want the student to do, as an extra effort, for creating an effective learning. It may be a case study, a role-play, a classroom exercise, an assignment- home or field, or anything else which is relevant and which can enhance their learning about that particular concept or topic. Due to limited availability of time, most relevant topics will have this kind of method in course handout.

BCA(MAWT) : Three-Year (6-Semester) CBCS Programme			
Basic Structure: Distribution of Courses			
S.No.	Type of Course	Credit Hours	Total Credits
1	Core Course (CC)	10 Courses of 3 credits each (10 X 3) 9 Courses of 4 credits each (9 X 4)	66
2	Ability-Enhancement Compulsory Course (AECC)	7 Courses of 3 credits each (7 X 3) 1 Course of 1 credit (1 X 1)	22
3	Skill-Enhancement Elective Course (SEC)	1 Course of 4 credit (1 X 4) 1 Course of 10 credit (1 X 10)	14
4	Open/Generic Elective Course (GEC)	2 Courses of 3 Credit Hrs. each (2 X 3)	6
5	Program/Discipline Specific Elective Course (DSEC)	4 Courses of 3 Credit Hrs each (4 X 3)	12
6	Laboratory Course(LC)	6 Courses of 2 credits each (6 X 2) 4 Courses of 1 credit each (4 X 1)	16
7	Value Added Audit Course (VAAC)	2 Courses of 0 Credit Hrs. each (Total Credit Hrs. 4X0)	0
Total Credits			136

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the BCA(MAWT) program:

Core Course (CC): Core courses of BCA(MAWT) program will provide a holistic approach to technical education, giving students an overview of the field, a basis to build and specialize upon. These core courses are the strong foundation to establish technical knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase.

The core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead rather than merely know while creating a common student experience that can foster deep understanding, develop decision-making ability and contribute to the business and community at large.

A wide range of core courses provides groundwork in the basic technical disciplines: cloud technology, web technology, programming languages, information security, organizational behavior etc.

The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various business fields.

We offer core courses in semester I, II, III, IV, V & VI during the BCA(MAWT) program.



Ability Enhancement Compulsory Course (AECC): As per the guidelines of Choice Based Credit System (CBCS) for all Universities, including the private Universities, the Ability Enhancement Compulsory Course (AECC) is a course designed to develop the ability of students in communication (especially English) and other related courses where they might find it difficult to communicate at a higher level in their prospective job at a later stage due to lack of practice and exposure in the language, etc. Students are motivated to learn the theories, fundamentals and tools of communication which can help them develop and sustain in the corporate environment and culture.

Skill Enhancement Course: This course will be helpful to students to provide value-based and/or skill-based knowledge. We offer two SECs- one each in V Semester & VI Semester.

Open/Generic Elective Course (GEC): Open/Generic Elective is an interdisciplinary additional subject that is compulsory in the fifth and sixth semester of a program. The score of Generic Elective is counted in your overall aggregate marks under Choice Based Credit System (CBCS). Each Generic Elective paper will be of 3 Credits. Each student has to take Open/Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Generic Electives.

Value Added Audit Course (VAC): A value added audit course is a non-credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be one course each in Semester I & Semester II and will carry no credit, however, it will be compulsory for every student to pass these courses with minimum 45% marks to be eligible for the certificate. These marks will not be included in the calculation of CGPI. Students have to specifically be registered in the specific course of the respective semesters.

Program/Discipline Specific Elective Course (DSEC): The discipline specific elective course is chosen to make students specialist or having specialized knowledge of a specific domain like Mobile applications and Web Technology etc. It will be covered in three semesters (IV, V & VI) of second year and third year of the program relevant to chosen disciplines of core courses of the program. Each student will have to choose four discipline specific elective courses (DSECs); 1 in Semester IV and 1 in Semester V and 2 in semester VI.

C. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of three -year BCA(MAWT):

PSO – 1	Understanding the facts of basic computer technical knowledge to move for further domain specific courses
PSO – 2	Applying the facts and rules for problem-solving skills and the knowledge of computer application to solve real world problems related with the Mobile applications and web technologies.
PSO – 3	Analyzing the various Mobile/Web application reports and break down the information into components parts for complete analysis.
PSO – 4	Analyzing the facts of non-technical skills necessary to enable their successful transition into corporate roles

D. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of three -year BCA(MAWT):

PO1.Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2.Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

E. Pedagogy & Unique practices adopted: “Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept”. In addition to conventional time-tested lecture method, the institute will **emphasize on experiential learning.:**

1. Case Based Learning: Case based learning enhances student skills at delineating the critical decision dilemmas faced by organizations, helps in applying concepts, principles and analytical skills to solve the delineated problems and develops effective templates for business problem solving. Case method of teaching is used as a critical learning tool for effective learning and we encourage it to the fullest. We make it compulsory to teach at least one case study in each unit of every course in BCA(MAWT) program.

2. Role Play&Simulation: Role-play and simulation are forms of experiential learning. Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings. Role-play and simulation function as learning tools for teams and groups or individuals as they "play" online or face-to-face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their explorations and the viewpoints of the character or personality they are articulating in the environment. This student-centered space can enable learner-oriented assessment, where the design of the task is created for active student learning.

3. Video Based Learning (VBL)&Learning through Movies (LTM): These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through movies. In fact, many teachers give examples from movies during their discourses. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting VBL & LTM, wherever possible.

4. Field /Live Projects: The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other their regular classes.

5. Industrial Visits: Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

6. Special Guest Lectures (SGL)&Extra Mural Lectures (EML): Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

7. Student Development Programs (SDP): Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Android development and advanced web technologies concepts etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus

8. special assistance programe for slow learners & fast learners: write the note how would you identify slow learners, develop the mechanism to correcting knowledge gap. Terms of advance topics what learning challenging it will be provided to the fast learners

9. orientation program:

Purpose of the Student Orientation Program is to help new students adjust and feel comfortable in the new environment, inculcate in them the ethos and culture of the institution, help them build bonds with other students and faculty members, and expose them to a sense of larger purpose and self-exploration. The term induction is generally used to describe the whole process whereby the incumbents adjust to or acclimatize to their new roles and environment. In other words, it is a well-planned event to educate the new entrants about the environment in a particular institution, and connect them with the people in it. Student Orientation Program engages with the new students as soon as they come into the institution; regular classes start only after that. At the start of the induction, the incumbents learn about the institutional policies, processes, practices, culture and values, and their mentor groups are formed.

The time during the Orientation Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. These are included under Proficiency Modules. There will be a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the Orientation program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

Activities to be covered

- Physical Activity
- Creative Arts and Culture
- Mentoring & Universal Human Values
- Familiarization with College, Dept./Branch
- Literary Activity
- Proficiency Modules

- Lectures & Workshops by Eminent People
- Visits in Local Area
- Extra-Curricular Activities in College
- Feedback and Report on the Program

10. **Mentoring scheme:** Every Student shall be provided with a faculty Mentor to help him /her in their personal & Academic Issues. The mentor maintains a register of all his/her mentees with complete personal & parents 'details. It is essential to have at least to meet once in a month. The mentor enters the discussions held, advice given and efforts & improvements made by the mentee. This register of the mentor must be counter signed by the HOD once a month and by the Principal once in a semester

11. **Career & personal counseling:** Students in college, need to career & personal counseling, who are still confused about what they want to do. Career Counselling helps them understand the career options that they have, and how to pursue them. Career Counselling helps them understand their own strengths and weaknesses and lets them know what career they would be suited for.

12. **Competitive exam preparation:** Unlike school or college academic tests, competitive exams require a different approach, a focused mindset, and a thorough understanding of subjects and concepts. University or Department help students about the exam the pattern, stages and the competition. Department conduct various exam preparation activity for students.

13. **Extracurricular Activities:** Organizing & participation in extracurricular activities will be mandatory to help students develop confidence & face audience with care. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.

14. **Participation in Workshops, Seminars & writing & Presenting Papers:** Seminars and Workshops is also common when participating in extra-curricular academic and students' union activities. Seminar and Workshop is highly interactive, engaging and productive; designed to enhance both individual and group learning processes. Paper writing and research help student to develop abstract thinking and personal or professional growth.

15. **Formation of Student Clubs, Membership & Organizing & Participating events:** A club is “a group of students organized with a similar interest for a social, literary, technical, athletic, political, or other common purpose. Students have the opportunity and choose to join these groups for many reasons including: pursuit of individual interests; career networking opportunities; social camaraderie; and technical activism.

16. **Capability Enhancement & Development Schemes:** The University has these schemes to enhance the capability and holistic development of the students. The **capability enhancement** and **development schemes** are the stimulating factors in getting the **students** corporate-ready and become a responsible social citizen. To enhance the soft skills and employability skills of the students value added courses such as Communication Skills, Business Communication and Personality Enhancement are made an integral part of the curriculum of the students.

17. **Library Visit & Utilization of E-Learning Resources:** The library is the center of the intellectual and social activities of college. With its books suited to the interests and aptitude of students of different age group, with its magazines, periodicals and newspapers, it has a special call to the students who go there and quench their thirst for reading the material which cannot be provided to them in the class room. Today E-learning is a rapidly growing industry. Today's learners want relevant, mobile, self-paced, and personalized content. This need is fulfilled with the online mode of learning. E-learning offers the ability to share material in all kinds of formats such as videos, slideshows, word documents, and PDFs. Conducting webinars (live online classes) and communicating with professors via chat and message forums is also an option available to students.



BCA(MAWT) Curriculum

BCA(MAWT) -Semester I

S. No	Course Type	Course Code	Course	Periods			Credits	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	AECC-1	IMW107	English Communication-I	3	0	0	3	40	60	100
2	CC-1	IMW102	Fundamentals of Mathematics	3	1	0	4	40	60	100
3	CC-2	IMW103	Computer Fundamentals and Organization	3	0	0	3	40	60	100
4	CC-3	IMW104	Programming in C	3	1	0	4	40	60	100
5	CC-4	IMW108	Operating System	3	1	0	4	40	60	100
6	LC-1	IMW151	Programming in C (Lab)	0	0	2	1	50	50	100
7	AECC-2	TMU101	Environmental Studies	2	1	0	3	40	60	100
Total				17	4	2	22	290	410	700

Value Added Course*

S.N o.	Course Category	Course Code	Course Name	Periods			Credits	Evaluation		
				L	T	P		Internal	External	Total
1	VAC-I	TMUGA101	Foundation in Quantitative Aptitude	2	1	0	0	40	60	100

*Value Added Courses (VAC) is an audit course. The result of this course will not be added to overall result of the programme. However, it will be compulsory to pass the course with minimum 45% including both faculty continuous & end semester examination.

BCA(MAWT) -Semester II

S. No.	Course Type	Course Code	Course	Periods			Credits	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	AECC-3	IMW206	English Communication-II	3	0	0	3	40	60	100
2	CC-5	IMW207	Computer Networks	3	1	0	4	40	60	100
3	CC-6	IMW208	OOPS with Java	3	0	0	3	40	60	100
4	CC-7	IMW204	Data Structure and Algorithms	3	0	2	4	40	60	100
5	CC-8	IMW209	Database Management System	3	1	0	4	40	60	100
6	LC-2	IMW255	OOPS with Java (Lab)	0	0	2	1	50	50	100
7	LC-3	IMW256	Database Management System - (Lab)	0	0	2	1	50	50	100
Total				15	2	6	20	300	400	700

Value Added Course*

S. No.	Category code	Course Code	Course Name	Periods			Credi	Evaluation Scheme		
				L	T	P		Interna	External	Total
1	VAC-II	TMUGA201	Analytical Reasoning	2	1	0	0	40	60	100

**At the end of Semester-IV Industrial Training for at least 45 days is mandatory which is to be assessed and evaluated in Semester-V under subject code ICS553 (Industrial Training Seminar).

BCA(MAWT) -Semester III

S. No	Course Type	Course Code	Course	Periods			Credits	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	AECC-4	IMW307	Human Values & Professional Ethics	2	1	0	3	40	60	100
2	CC-9	IMW305	Software engineering	3	0	0	3	40	60	100
3	CC-10	IMW309	Introduction to Web Technology	3	0	0	3	40	60	100
4	CC-11	IMW310	Python Programming	3	0	0	3	40	60	100
5	CC-12	IMW306	Information Security Fundamentals	3	0	0	3	40	60	100
6	AECC-5	IMW312	English Communication-III	2	1	0	3	40	60	100
7	LC-4	IMW353	Introduction to Web Technology (Lab)	0	0	4	2	50	50	100
8	LC-5	IMW354	Python Programming (Lab)	0	0	4	2	50	50	100
Total				16	2	8	22	340	460	800

Value Added Course*

S.N	Category code	Course Code	Course Name	Periods			Credits	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-III	TMUGA302	Modern Algebra and Data Management	2	1	0	0	40	60	100
2	VAC-IV	TMUGS301	Managing Self	2	1	0	0	50	50	100

*Value Added Courses (VAC) is an audit course. The result of this course will not be added to overall result of the programme. However, it will be compulsory to pass the course with minimum 45% including both faculty continuous & end semester examination.

BCA(MAWT) -Semester IV

S. No	Course Type	Course Code	Course	Periods			Credits	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-13	IMW401	NoSQL Databases	3	0	0	3	40	60	100
2	CC-14	IMW406	Android Application Development	3	0	0	3	40	60	100
3	CC-15	IMW403	Server-side Scripting Languages	3	0	0	3	40	60	100
4	AECC-6	IMW408	Entrepreneurship	2	1	0	3	40	60	100
5	AECC-7	IMW409	English Communication-IV	3	0	0	3	40	60	100
6	LC-6	IMW452	Android Application Development (Lab)	0	0	4	2	50	50	100
7	LC-7	IMW451	Server-side Scripting Languages (Lab)	0	0	4	2	50	50	100
8	DSE-1	IMW402	Discipline Specific Elective - I	3	0	0	3	40	60	100
		IMW405								
			Total	17	1	8	22	340	460	800

Value Added Course*

S.N	Category code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-V	TMUGA402	Advance Algebra and Geometry	2	1	0	0	40	60	100
2	VAC-VI	TMUGS401	Managing Work and Others	2	1	0	0	50	50	100

BCA(MAWT) -Semester V

S. No.	Course Type	Course Code	Course	Periods			Credits	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-16	IMW508	Cross-Platform Application Development	3	1	0	4	40	60	100
2	CC-17	IMW505	Professional Android Application Development	3	0	0	3	40	60	100
3	CC-18	IMW503	Web Analytics	3	1	0	4	40	60	100
4	LC-8	IMW552	Professional Android Application Development(Lab)	0	0	4	2	50	50	100
5	AECC-8	IMW554	Industrial Training Seminar	0	0	2	1	50	50	100
6	SEC-1	IMW553	Mini Project(Lab)	0	0	8	4	50	50	100
7	LC-9	IMW554	Cross-Platform Application Development LAB	0	0	4	2	50	50	100
8	DSE-2	IMW502	Discipline Specific Elective - II	3	0	0	3	40	60	100
		IMW509								
9	OE-1		Open Elective-I	3	0	0	3			100
			Total	15	2	1	26	400	500	900

BCA(MAWT) -Semester VI[illegible]



5	OE-2		Open Elective-II	3	0	0	3			100
6	SEC-2	IMW651	Major Project	0	0	20	10	50	50	100
			Total	12	1	22	24	260	340	600

ELECTIVE COURSES OFFERED

Generic Elective Courses (GEC)

S.No	Code	Course	L	T	P	Credit
Semester IV (Any one)						
<u>Generic Elective-I</u>						
<u>Group-A</u>						
1	IMW406	Interactive Web Application Development	3	1	0	4
2	IMW407	User Interface Design	3	1	0	4
Semester V (Any one)						
<u>Generic Elective-II</u>						
<u>Group-B</u>						
3	IMW502	PHP & PERL Programming	3	0	0	3
4	IMW505	Enterprise Application Development	3	0	0	3
Semester VI (Any two)						
<u>Generic Elective-III</u>						
<u>Group-C</u>						
5	IMW602	Responsive Website Design	3	0	0	3
6	IMW603	Mobile Testing	3	0	0	3
<u>Generic Elective-IV</u>						
<u>Group-D</u>						
7	IMW607	Mobile Security	3	0	0	3
8	IMW605	Building Websites using HTML5	3	0	0	3

Course Code: IMW107	<div>BCA-Semester I</div> <div>English Communication-I</div>	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the common features of human language.	
CO2.	Understanding the use of grammar to form the sentence.	
CO3.	Understanding the use of functional grammar to form the sentence.	
CO4.	Understanding the transformation of sentences.	
CO5.	Applying thoughts in efficient manner.	
Course Content:		
Unit-1:	Introduction to English Language a) Common Features of Human Language b) Phonetics: Phoneme- International Phonetic Alphabet (British Received Pronunciation) and Allophones c) Importance of English Language d) Self Introduction and Introducing Others	6 Hours
Unit-2:	Basics of Grammar a) Parts of Speech: Noun and its kinds, Pronoun and its kinds, Adjective and its kinds, Verb and its kinds, Adverb and its kinds, Preposition and its kinds, Conjunction and its kinds and Interjection b) Number: Singular and Plural; Person: First, Second and Third; Case: Nominative, Possessive and Objective c) Subject and Predicate	6 Hours
Unit-3:	Functional Grammar a. Tense: Present, Past and Future b. Finite and Non Finite Verb c. Voice: Active and Passive d. Modals	6 Hours
Unit-4:	Comprehension Skills a. Role of Listening b. Reasons for Poor Comprehension c. Improving Comprehension Skills d. Reading Passages from daily News Paper and Short Stories	6 Hours

	e. Writing Short Stories with the help of incomplete sentence	
Unit-5:	Grammar Vocabulary, Course-Verb Agreement, Transformation of sentences (simple, complex and compound), Letter writing, Application Writing	6 Hours
<u>Text Books:</u>	1. Balasubramanian A Textbook of English Phonetics for Indian Students, Macmillan India Ltd., Madras. 1995.	
<u>Reference Books:</u>	1. Sethi J & Dhamija P.V., A Course in Phonetics and Spoken English, Prentice Hall of India, New Delhi. 1989. 2. Bansal, R.K. and J.B. Harrison, Spoken English, Orient Longman, New Delhi. * Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1- https://www.englishpage.com/weeklylesson/weeklylesson.html 2- https://www.languagetutorial.org/learn-english/	

Course Code: IMW102	<div>BCA-Semester I</div> <div>Fundamentals of Mathematics</div>	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of matrix, set theory, function, some elementary functions with their graphs (Exponential, logarithmic, modulus), solving system of linear equations in two or three variables using inverse of a matrix.	
CO2.	Understanding the concept of derivative and its meaning, Integral as Anti-derivative process, Indefinite Integrals, Rules of Integration, Integration by substitution, limits, continuity of a function.	
CO3.	Understanding properties of definite Integral, Cartesian Co-ordinate system, Circle, equation of tangent, Straight line, Conic Sections: (Parabola & Ellipse),	
CO4.	Understanding the Maxima and Minima of Simple Functions, areas of simple closed curves.	
CO5.	Understanding the concepts of coordinate geometry .	
Course Content:		
Unit-1:	Matrices Types of Matrices, Operations of addition, Scalar Multiplication and Multiplication of Matrices, Determinant of a Square Matrix, Minors and Cofactors, Transpose, adjoint and inverse of a matrix, solving system of linear equations, in two or three variables using inverse of a matrix	8 Hours
Unit-2:	Sets, relations and functions Definition of Set, Type of Sets, Operations on Sets, Venn diagram, Cartesian Product, Relations, Functions, Types of function, Some elementary functions with their graphs (Exponential, logarithmic, modulus), Limit & continuity of a function (Simple Problems)	8 Hours
Unit-3:	Differentiation Derivative and its meaning, Differentiation of algebraic, trigonometric, exponential & logarithmic functions, Rules of Differentiation, Differentiation by Substitution, Higher Order Differentiation, Maxima and Minima of Simple Functions	8 Hours
Unit-4:	Integration Integral as Anti-derivative process, Indefinite Integrals, Rules of Integration, Integration by substitution, Definite Integration, Properties of Definite Integral, Finding areas of Simple Closed Curves	8 Hours
Unit-5:	Coordinate Geometry 2D Cartesian Co-ordinate system, Straight line: (Equation & Slope of a line), Circle: Equation of Circle, Equation to Tangent, Conic Sections: Focus, Eccentricity, Directrix, Axis of a conic section, Parabola & Ellipse: (Definitions, equations and shape of curve only)	8 Hours

<u>Text Books:</u>	1. Mathematics for BCA by G. C. Sharma & Madhu Jain, Oscar Publication	
<u>Reference Books:</u>	1- The Elements of Co-ordinate Geometry Part-I by S. L. Loney, Book Palace, New Delhi * Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1- https://algebra.nipissingu.ca/tutorials/matrices.html 2- https://tutorial.math.lamar.edu/classes/de/LA_Matrix.aspx	

Course Code: IMW103	<div>BCA-Semester I</div> <div>Computer Fundamentals & Organization</div>	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding basic concepts of Computer components.	
CO2.	Understanding the concept of memory hierarchy and the use of various input-output devices.	
CO3.	Understanding the various computer languages, operating system functions and the application of number systems.	
CO4.	Understanding the concept of Microsoft Office and the overview of MS WORD, MS EXCEL and MS POWER POINT.	
CO5.	Understanding the basic concepts of Computer Networking and the applications of WWW, multimedia and the usage of electronic mail.	
Course Content:		
Unit-1:	General Features of a Computer General features of a computer, Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia.	8 Hours
Unit-2:	Computer Organization Computer organization, central processing unit, computer memory – primary memory and secondary memory, Secondary storage devices – Magnetic and optical media, Input and output units.	8 Hours
Unit-3:	Computer Hardware and Software Computer hardware and software, Machine language and high level language, Application software, computer program, operating system, Computer virus, antivirus and computer security, Computer arithmetic, Binary, Algorithm and flowcharts, illustrations, elements of a database and its applications, Basic Gates (DeMorgans theorems, duality theorem, NOR, NAND, XOR, XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions	8 Hours
Unit-4:	MS Office Word processing and electronic spread sheet, an overview of MSWORD, MSEXCEL and MSPowerPoint	8 Hours
Unit-5:	Introduction to Networking Network of computers, Types of networks, LAN, Intranet and Internet, Internet applications, World Wide Web, E-mail, browsing and searching,	8 Hours



	search engines, multimedia application	
<u>Text Books:</u>	1. Alexis Leon and Mathews Leon (1999): Fundamentals of information Technology, Leon Techworld Pub.	
<u>Reference Books:</u>	1. Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India 2. Hamacher, Computer Organization McGrawhill 3. Alexis Leon: Computers for everyone. Vikas, UBS * Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1- https://www.tutorialspoint.com/computer_fundamentals/index.htm 2- https://www.javatpoint.com/computer-fundamentals-tutorial	

Course Code: IMW104	<div>BCA-Semester I</div> <div>Programming in C</div>	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the use of basic concepts involved in Computer Programming.	
CO2.	Understanding the conceptual knowledge to design, implement, test, debug and document programs in C.	
CO3.	Understanding the concept of functions and functions with parameters passing option.	
CO4.	Understanding the use of programming through the use of pointers and arrays.	
CO5.	Applying algorithm using program involved in advance topics in C like file handling functions and the concept of Standard C library.	
Course Content:		
Unit-1:	Overview of Programming: Introduction to computer based problem solving , Program design and implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement, Programming environment – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters	8 Hours
Unit-2:	Fundamentals of C programming: Overview of C , Data Types, Constants & Variables, Operators & Expressions, Control constructs - if then, for, while, Arrays - single & multidimensional arrays, Functions -fundamentals – general form, function arguments, return value, Basic I/O -formatted and Unformatted I/O, Advanced features - Type modifiers and storage class specifiers for data types, Bit operators, ? operator, &operator, * operator, Type casting, type conversion.	8 Hours
Unit-3:	Advanced programming techniques Control constructs - Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules - Local & global variables, scope rules of functions, Functions -parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of Hanoi	8 Hours
Unit-4:	Dynamic data structures in C: Pointers - The & and * operator, pointer expression, assignments, arithmetic, comparison, mallocvscalloc, 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, Unions – Declaration, uses, enumerated data-types,	8 Hours



	typedef.	
Unit-5:	Additional features: File Handling – The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf, C Preprocessor- #define, #include, #undef, Conditional compilation directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions	8 Hours
<u>Text Books:</u>	1. Let us C by YashwantKanetkar, 6 th Edition, PBP Publication	
<u>Reference Books:</u>	1. Programming in ANSI C by Balaguruswamy, 3 rd Edition, 2005, Tata McGraw Hill * Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1- https://www.programiz.com/c-programming#introduction 2- https://www.tutorialspoint.com/cprogramming/index.htm	

Course Code: IMW108	<div>BCA-Semester I</div> <div>Operating System</div>	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basic concepts and functions of operating systems	
CO2.	Understanding about process concept and its states.	
CO3.	Understanding the fragmentation and paging concepts in storage management.	
CO4.	Understanding the deadlock detection and prevention methods in operating system.	
CO5.	Understanding different access method used in Information management.	
Course Content:		
Unit-1:	Introduction to Operating System Introduction to the Operating System (OS), Types of Operating System: Batch System, Time Sharing System, Real Time System. Multi Programming, Distributed System, Functions and Services of OS.	8 Hours
Unit-2:	Process Management Process Management: Process Concept, Process State, Process Control Block, Process Scheduling, CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Preemptive & Non Preemptive Scheduling.	8 Hours
Unit-3:	Deadlock Deadlocks-System model, Characterization, Deadlock Prevention, Deadlock Avoidance and Detection, Recovery from deadlock.	8 Hours
Unit-4:	Storage Management Logical Address, Physical Address, External and Internal Fragmentation. Concept of paging, Page table structure - Hierarchical Paging, Hashed Page Tables, Inverted Page Table.	8 Hours
Unit-5:	Information Management File Concept, Access Methods, Directory Structure. Device Management: Disk Structure, Disk Scheduling Algorithms.	8 Hours
Text Books:	1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.	
Reference Books:	1. William Stallings, Operating System, 4th Edition, Pearson Education. 2. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education	
Additional electronic reference material	1- https://www.javatpoint.com/os-tutorial 2- https://www.studytonight.com/operating-system/introduction-operating-systems	

Course Code: TMU101	<div>BCA-Semester I</div> <div>Environmental Studies</div>	L-2 T-1 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding environmental problems arising due to constructional and developmental activities.	
CO2.	Understanding the natural resources and suitable methods for conservation of resources for sustainable development.	
CO3.	Understanding the importance of ecosystem and biodiversity and conserving it for maintaining ecological balance.	
CO4.	Understanding the types and adverse effects of various environmental pollutants and their abatement devices.	
CO5.	Understanding Greenhouse effect, various Environmental laws, movements, different disasters and their management.	
Course Content:		
Unit-1:	Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, concept of sustainability & sustainable development. Ecology and Environment: Concept of an Ecosystem- its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.	8 Hours
Unit-2:	Natural Resources: Renewable & Non-Renewable resources; Land resources and land use change; Land degradation, Soil erosion & desertification. Deforestation: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. Energy Resources: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies. Biodiversity: Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Biogeographical Classification of India	8 Hours
Unit-3:	Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies.	8 Hours
Unit-4:	Environmental policies & practices: Climate change & Global Warming (Greenhouse Effect), Ozone Layer - Its Depletion and Control Measures, Photochemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context	8 Hours
Unit-5:	Human Communities & Environment: Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation,	8 Hours



	Environmental communication & public awareness; Case study	
<u>Text Books:</u>	1. “Environmental Chemistry”, De, A. K., New Age Publishers Pvt. Ltd.	
<u>Reference Books:</u>	Reference Books: 1. “Biodiversity and Conservation”, Bryant, P. J., Hypertext Book 2. “Textbook of Environment Studies”, Tewari, Khulbe&Tewari, I.K. Publication *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://envs.uoregon.edu/undergrads/tutorials/ 2. https://alison.com/courses/environmental-studies	

Course Code: IMW151	<div>BCA-Semester I</div> <div>Programming in C Lab</div>	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying basic concepts involved in Computer Programming.	
CO2.	Applying programming skills to design, implement, test, debug and document programs in C.	
CO3.	Applying the use of functions and functions with parameters passing option.	
CO4.	Applying the pointers and array in programming.	
CO5.	Applying the algorithm using program involved in advance topics in C like file handling functions and the concept of Standard C library.	
Course Content:		
	Part A <ol style="list-style-type: none"> 1 Printing the reverse of an integer. 2 Printing the odd and even series of N numbers. 3 Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar(). 4 Input a string and find the number of each of the vowels appear in the string. 5 Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end. 6 Printing the reverse of a string. 	
	Part B <ol style="list-style-type: none"> 1 Searching an element in an array using pointers. 2 Checking whether the given matrix is an identity matrix or not. 3 Finding the first N terms of Fibonacci series. 4 Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable. 5 Define a structure with three members and display the same. 6 Declare a union with three members of type integer, char, string and illustrate the use of union. 7 Recursive program to find the factorial of an integer. 8 Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers. 	

	<p>9 Arranging N numbers in ascending and in descending order using bubble sort.</p> <p>10 Addition and subtraction of two matrices.</p> <p>11 Multiplication of two matrices.</p> <p>12 Converting a hexadecimal number into its binary equivalent.</p> <p>13 Check whether the given string is a palindrome or not.</p> <p>14 Demonstration of bitwise operations.</p> <p>15 Applying binary search to a set of N numbers by using a function.</p> <p>16 Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.</p>	
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Course Code: TMUGA101	Specialization- MAWT BCA- Semester-I Foundation in Quantitative Aptitude (Value Added Course)	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Solving complex problems using Criss cross method, base method and square techniques.	
CO2.	Applying the arithmetical concepts of Average, Mixture and Allegation.	
CO3.	Evaluating the different possibilities of various reasoning based problems in series, Blood relation, Ranking and Direction.	
CO4.	Operationalizing the inter-related concept of Percentage in Profit Loss and Discount, Si/CI and Mixture/Allegation.	
Course Content:		
Unit-1:	Speed calculations Squares till 1000, square root, multiplications: base 100, 200 300 etc., 11-19, crisscross method for 2X2, 3X3, 4X4, 2X3, 2X4 etc., cubes, cube root	3 Hours
Unit-2:	Percentages Basic calculation, ratio equivalent, base, change of base, multiplying factor, percentage change, increment, decrement, successive percentages, word problems	5 Hours
Unit-3:	Profit Loss Discount Basic definition, formula, concept of mark up, discount, relation with successive change, faulty weights	5 Hours
Unit-4:	SI and CI Simple Interest, finding time and rate, Compound Interest, difference between SI and CI, Installments	4 Hours
Unit-5:	Averages Basic Averages, Concept of Distribution, Weighted Average, equations	3 Hours
Unit-6:	Mixtures and allegations Mixtures of 2 components, mixtures of 3 components, Replacements	5 Hours
Unit-7:	Blood relations Indicating type, operator type, family tree type	3 Hours
Unit-8:	Direction sense Simple statements, shadow type	2 Hours
Reference Books:	0. R1:-ArunShrama:- How to Prepare for Quantitative Aptitude 1. R2:-Quantitative Aptitude by R.S. Agrawal 2. R3:-M Tyra: Quicker Maths 3. R4:-Nishith K Sinha:- Quantitative Aptitude for CAT 4. R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com 5. R6:-Logical Reasoning by Nishith K Sinha 6. R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended.	
Additional electronic	7. https://www.indiabix.com/aptitude/questions-and-answers/	

**reference
material:**

Evaluation Scheme for Quantitative Aptitude Skill Enhancement:-

The students will be evaluated on the score of 100 for every semester. Detailed scheme for the course is as follows.

- a. 20 marks best 2 out of CT1 + CT2 + CT3
- b. 10 marks will be for Assignments.
- c. 10 marks for attendance and practice sheets, at the end of semester, will be provided in the following manner.
- d. 60 marks for final external exams.

S No	% Attendance <	Marks
1.	0-10	1
2.	10 -20	2
3.	20- 30	3
4.	30-40	4
5.	40-50	5
6.	50-60	6
7.	60 – 70	7
8.	70 – 80	8
9.	80 – 90	9
10.	90-100	10

From{CT 1, CT2 and CT3} Best 2 CT's Score (20) + Final External exam (60) + Attendance (10)+ Assignment(10) = 100 marks

Course Code: IMW206	<div>BCA-Semester II</div> <div>English Communication-II</div>	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the principle of effective communication	
CO2.	Understanding and Write various kinds of applications .	
CO3.	Understanding importance of e mail and memo	
CO4.	Understanding various types of official reports.	
CO5.	Understanding components of resume	
Course Content:		
Unit-1:	Principles of Effective written communication 7 C's of Business communication: Clarity, Completeness, Conciseness, Consideration, Courtesy, Correctness, and Concreteness. Practice sessions for business writing.	6 Hours
Unit-2:	Letter writing Structure & Planning, Types of Letter: Leave letter, Cover Letter, Application Letter. Persuasive Writing: AIDA; practice sessions on letter writing.	6 Hours
Unit-3:	Email & Memo writing Importance of Email & Memo writing in the business world, Format of Email & Memo, Structure of Email & Memo, practice sessions on email and memo writing	6 Hours
Unit-4:	Precise Writing & Report Writing Techniques of Precise writing, qualities of a good precise. Different types of Report – sales report, Annual report, Technical report, Components of a good report focusing on how to write short reports, practice sessions on report writing	6 Hours
Unit-5:	Resume writing Components of a good resume, different formats of resume, resume writing practice Conducting Effective Meetings Different Types of meetings: Business meetings, Review meetings, Preparation for the meeting – Writing Agenda, MOM. Presentation Skills Planning & developing effective Presentation, Do's & don'ts of a good presentation, use of Effective visual aids in a presentation	6 Hours
Text Books:	1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.	
Reference Books:	1. Shirley Taylor, Communication for Business, Pearson Education. 2. Lesiicar and Flatley, Basic Business Communication, Tata	



	McGraw-Hill. *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://www.tudelft.nl/en/student/counselling/managing-your-career/career-toolkit/job-searching-strategies/motivation-letters/	

<u>Course Code:</u> IMW207		L-3 T-1
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	<p style="text-align: center;">BCA-Semester II</p> <p style="text-align: center;">Computer Networks</p>	P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding basic concepts of Computer Networking.	
CO2.	Understanding the concept of Computer Networking devices.	
CO3.	Understanding the various protocols used for networking .	
CO4.	Understanding the concept of WAN Technology in networking.	
CO5.	Applying various troubleshooting methods used in networking.	
Course Content:		
Unit-1:	<p>Networking Fundamentals</p> <p>Basics of Network & Networking, Advantages of Networking, Types of Networks, Network Terms- Host, Workstations, Server, Client, Node, Types of Network Architecture- Peer-to-Peer & Client/Server, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes. Introduction of OSI model, Seven layers of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, Comparison between OSI model & TCP/IP model. Overview of Ethernet Addresses</p>	8 Hours
Unit-2:	<p>Basics of Network Devices</p> <p>Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, Data Link Layer: Ethernet, Ethernet standards, Ethernet Components, Point-to-Point Protocol(PPP),PPP standards, Address Resolution Protocol, Message format, transactions, Wireless Networking: Wireless Technology, Benefits of Wireless Technology, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, Wireless network Components: Wireless Access Points, Wireless NICs, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless LAN modulation techniques, wireless security Protocols: WEP,WPA, 802.1X, Installing a wireless LAN</p>	8 Hours
Unit-3:	<p>Basics of Network, Transport and Application Layers</p> <p>Network Layer: Internet Protocol (IP), IP standards, versions, functions, IPv4 addressing, IPv4 address Classes, IPv4 address types, Subnet Mask, Default Gateway, Public & Private IP Address, methods of assigning IP address, IPv6 address, types, assignment, Data encapsulation, The IPv4 Datagram Format, The IPv6 Datagram Format, Internet Control Message Protocol (ICMP), ICMPv4, ICMPv6, Internet Group Management Protocol (IGMP),Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP</p>	8 Hours

Unit-4:	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 Fiber, Cellular Technologies, Connecting LANs : Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual Private Networking, SSL VPN, Remote Terminal Emulation, Network security: Authentication and Authorization, Tunneling and Encryption Protocols, IPSec, SSL and TLS, Firewall, Other Security Appliances, Security Threats	8 Hours
Unit-5:	Network Operating Systems and Troubleshooting Network Network Operating Systems: Microsoft Operating Systems, Novell NetWare, UNIX and Linux Operating Systems, Macintosh Networking, Trouble Shooting Networks: Command-Line interface Tools, Network and Internet Troubleshooting, Basic Network Troubleshooting : Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools.	8 Hours
<u>Text Books:</u>	1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011	
<u>Reference Books:</u>	1. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008 2. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010 *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1- https://www.geeksforgeeks.org/computer-network-tutorials/ 2- https://www.javatpoint.com/computer-network-tutorial 3- https://www.softwaretestinghelp.com/computer-networking-basics/	

<u>Course Code:</u> IMW208		L-3 T-0 P-0
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	BCA-Semester II	C-3
	OOPS with Java	
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basic concepts of OOPS and Java Environment.	
CO2.	Understanding the use of class and object in Java Environment.	
CO3.	Understanding the concept of Packages in Object Oriented Programming.	
CO4.	Understanding the role of thread in Java programming.	
CO5.	Applying the concept of JDBC for application development.	
Course Content:		
Unit-1:	Introduction: History, Overview of Java, Object Oriented Programming, A simple Programme, Two control statements - if statement, for loop, using Blocks of codes, Lexical issues – White space, identifiers, Literals, comments, separators, Java Key words. Data types: Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting, Automatic type promotion in Expressions Arrays. Operators: Arithmetic operators, The Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. Control Statements: Selection Statements - if, Switch: Iteration Statements - While, Do-while, for Nested loops, Jump statements.	8 Hours
Unit-2:	Classes: Class Fundamentals, Declaring objects, Assigning object reference variables, 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, Using command line arguments. Inheritance: Inheritance basics, Using super, method overriding, Dynamic method Dispatch, using abstract classes, using final with Inheritance	8 Hours
Unit-3:	Packages: Definition, Access protection importing packages, Interfaces: Definition implementing interfaces. Exception Handling: Fundamental, Exception types, Using try and catch, Multiple catch clauses, Nested try Statements, throw, throws, finally, Java’s Built - in exception, using Exceptions	8 Hours
Unit-4:	Multithreaded Programming The Java thread model, The main thread, Creating a thread, Creating multiple thread, Creating a thread, Creating multiple threads, Using is alive() and Join(), Thread - Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi-threading. I/O basics, Reading control input, writing control output, Reading and Writing files, Applet Fundamentals, the AWT package,AWT Event handling concepts The transient and volatile modifiers, using instance of using assert	8 Hours
Unit-5:	JAVA Database Connectivity (JDBC): Database connectivity: JDBC architecture, JDBC Drivers, the JDBC API: loading a driver, connecting to a database, Creating and executing JDBC statements, Handling SQL exceptions, Accessing result sets: Types of result sets, Methods of result set interface. An example JDBC application to query a database	8 Hours
Text Books:	1. The complete reference Java –2: V Edition By Herbert Schildt Pub. TMH.	



<u>Reference Books:</u>	1. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and LeuraLemayPub. Pearson Education. *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1- https://www.w3schools.com/java/default.asp 2- https://www.tutorialspoint.com/java/index.htm 3- https://beginnersbook.com/java-tutorial-for-beginners-with-examples/	

<u>Course Code:</u> IMW204	<div></div> <div>BCA-Semester II</div> <div>Data Structure & Algorithms</div>	L-3 T-0 P-2 C-4
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Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the need and various types of Data Structures	
CO2.	Understanding the conceptual knowledge of various searching and sorting techniques.	
CO3.	Understanding the importance of stack and queue in data structures.	
CO4.	Applying the use of various types of sorting methods on data.	
CO5.	Applying various algorithms of tree and graph data structures.	
Course Content:		
Unit-1:	Introduction to Data structures Definition, Classification of data structures: primitive and non primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: 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, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.	8 Hours
Unit-2:	Searching and Sorting Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort	8 Hours
Unit-3:	Stack and Queue 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. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, Operations on all types of Queues	8 Hours
Unit-4:	Linked List Definition, 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.	8 Hours
Unit-5:	Tree Graphs and their Applications: 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 and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search.	8 Hours
Text Books:	1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001	
Reference Books:	1. Trembley and Sorenson Data Structures 2. E. Balaguruswamy Programming in ANSI C. 3. Bandyopadhyay, Data Structures Using C Pearson Education, 1999	



	*Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm	

<u>Course Code:</u> IMW209	<div></div> <div>BCA-Semester II</div> <div>Database Management System</div>	L-3 T-1 P-0 C-4
<u>Course Outcomes:</u>	On completion of the course, the students will be :	

CO1.	Understanding the use of basic concepts involved in Database management system.	
CO2.	Understanding the concepts of ER models, keys and modelling in DBMS	
CO3.	Applying SQL queries and DDL/DML commands in DBMS.	
CO4.	Analyzing the use of normalization, deadlock handling, serializable and recovery techniques in Database transactions.	
CO5.	Analyzing the concurrency control techniques involved in DBMS like validation based protocol and granularity.	
Course Content:		
Unit-1:	Introduction An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and their interfaces, Data definition language, DML, Overall Database Structure.	8 Hours
Unit-2:	Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagram to tables, extended ER model. Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra.	8 Hours
Unit-3:	SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Insert, update and delete operations, sub queries, Aggregate functions, Joins, Unions, Intersection, Minus operations. Roles and Privileges	8 Hours
Unit-4:	Data Normalization: Functional dependencies, Normal form up to 3rd normal form & BCNF Transaction Processing Concepts: Transaction system, testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures.	8 Hours
Unit-5:	Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity. Overview of recovery techniques and Database Security.	8 Hours
<u>Text Books:</u>	1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006	
<u>Reference Books:</u>	1. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003. *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://beginnersbook.com/2015/04/dbms-tutorial/	



<p>Course Code: IMW255</p>	<p style="text-align: center;">BCA-Semester II</p> <p style="text-align: center;">OOPS with Java Lab</p>	<p>L-0 T-0 P-2 C-1</p>
<p>Course Outcomes:</p>	<p>On completion of the course, the students will be :</p>	
<p>CO1.</p>	<p>Understanding the Java Programming environment</p>	



CO2.	Applying objects in Object Oriented Programming	
CO3.	Applying various mathematical operations in Java.	
CO4.	Applying the concept of packages in Java.	
CO5.	Applying the database connections in Java using JDBC.	
Course Content:		
	Part A 1. Write a program to check whether two strings are equal or not. 2. Write a program to display reverse string. 3. Write a program to find the sum of digits of a given number. 4. Write a program to display a multiplication table. 5. Write a program to display all prime numbers between 1 to 1000. 6. Write a program to insert element in existing array. 7. Write a program to sort existing array. 8. Write a program to create object for Tree Set and Stack and use all methods. 9. Write a program to check all math class functions. 10. Write a program to execute any Windows 95 application (Like notepad, calculator etc) 11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).	
	Part B 12. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions. 13. Write a program to get file name at runtime and display number of lines and words in that file. 14. Write a program to list files in the current working directory depending upon a given pattern. 15. Create a textfield that allows only numeric value and in specified length. 16. Create a Frame with 2 labels, at runtime display x and y coordinate of mouse pointer in the labels.	

Course Code: IMW256	<div>BCA-Semester II</div> <div>Database Management System Lab</div>	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying the DDL and DML commands to manage Database.	

CO2.	Applying the use of cursors, PL/SQL queries and exception handling in DBMS.	
CO3.	Applying the JOIN, UNION and GROUPBY techniques in DBMS operations.	
CO4.	Applying the concept of conditional retrieval and query sorting in DBMS	
CO5.	Analyzing the use of SELECT, WHERE and ORDER BY clauses in DBMS	
Course Content:		
	<ol style="list-style-type: none"> 1. Create User in Oracle Database and grant and revoke the privileges and use of commit save point role back command. 2. Create the following: <ul style="list-style-type: none"> • Synonym sequences and Index • Create alter and update views. 3. Create PL/SQL program using cursors, control structure, exception handling 4. Create following: <ul style="list-style-type: none"> • Simple Triggers • Package using procedures and functions. 5. Create the table for <ul style="list-style-type: none"> • COMPANY database • STUDENT database and Insert five records for each attribute. 6. Illustrate the use of SELECT statement 7. Conditional retrieval - WHERE clause 8. Query sorted - ORDER BY clause 9. Perform following: <ul style="list-style-type: none"> • UNION, INTERSECTION and MINUS operations on tables. • UPDATE, ALTER, DELETE, DROP operations on tables 10. Query multiple tables using JOIN operation. 11. Grouping the result of query - GROUP BY clause and HAVING clause 12. Query multiple tables using NATURAL and OUTER JOIN operation 	



Course Code: TMUGA-201	Specialization- MAWT BCA- Semester-II Analytical Reasoning (Value Added Course)	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying the arithmetical concepts in Ratio Proportion Variation.	
CO2.	Employing the techniques of Percentage; Ratios and Average in inter related concepts of Time and Work, Time Speed and Distance.	

CO3.	Identifying different possibilities of reasoning based problems of Syllogisms and Venn diagram.	
CO4.	Examining the optimized approach to solve logs and Surds.	
Course Content:		
Unit-1:	Ratio, proportions and variations Concept of ratios, proportions, variations, properties and their applications	5 Hours
Unit-2:	Time and Work Same efficiency, different efficiency, alternate work, application in Pipes and Cisterns	6 Hours
Unit-3:	Time Speed Distance Average speed, proportionalities in Time, Distance, trains, boats, races, circular tracks	6 Hours
Unit-4:	Logs and Surds Concept and properties of logs, surds and indices	4 Hours
Unit-5:	Coding and decoding Sequential coding, reverse coding, abstract coding	3 Hours
Unit-6:	Syllogisms Two statements, three statements	4 Hours
Unit-7:	Venn diagram Basic concept and applications	2 Hours
<u>Reference Books:</u>	8. R1:-ArunShrama:- How to Prepare for Quantitative Aptitude 9. R2:-Quantitative Aptitude by R.S. Agrawal 10. R3:-M Tyra: Quicker Maths 11. R4:-Nishith K Sinha:- Quantitative Aptitude for CAT 12. R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com 13. R6:-Logical Reasoning by Nishith K Sinha 14. R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended.	
<u>Additional Electronic Reference Material:</u>	15. https://www.tutorialspoint.com/reasoning/reasoning_analytical.htm 16. https://www.wiziq.com/tutorials/analytical-reasoning	

Evaluation Scheme for Quantitative Aptitude Skill Enhancement:-

The students will be evaluated on the score of 100 for every semester. Detailed scheme for the course is as follows.

- 20 marks best 2 out of CT1 + CT2 + CT3
- 10 marks will be for Assignments.
- 10 marks for attendance and practice sheets, at the end of semester, will be provided in the following manner.
- 60 marks for final external exams.



From{CT 1, CT2 and
Final External exam
Assignment(10) = 100

S No	% Attendance <	Marks
1.	0-10	1
2.	10 -20	2
3.	20- 30	3
4.	30-40	4
5.	40-50	5
6.	50-60	6
7.	60 – 70	7
8.	70 – 80	8
9.	80 – 90	9
10.	90-100	10

CT3} Best 2 CT's Score (20) +
(60) + Attendance (10)+
marks

<u>Course Code:</u> IMW307		L-2 T-1 P-0 C-3
	BCA-Semester III	
	Human Values & Professional Ethics	
Course	On completion of the course, the students will be :	

Outcomes:		
CO1.	Understanding the importance of value education in life and method of self-exploration.	
CO2.	Understanding ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration.	
CO3.	Applying right understanding about relationship and physical facilities.	
CO4.	Analyzing harmony in myself, harmony in the family and society, harmony in the nature and existence.	
CO5.	Evaluating human conduct on ethical basis.	
Course Content:		
Unit-1:	Understanding of Morals, Values and Ethics; Introduction to Value Education- need for Value Education. Self- Exploration–content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration. Continuous Happiness and Prosperity- basic Human Aspirations. Gender Issues: Gender Discrimination and Gender Bias (home & office), Gender issues in human values, morality and ethics.	6 Hours
Unit-2:	Conflicts of Interest: Conflicts between Business Demands and Professional Ethics. Social and Ethical Responsibilities of Technologists. Ethical Issues at Workplace: Discrimination, Cybercrime, Plagiarism, Sexual Misconduct, Fraudulent Use of Institutional Resources. Intellectual Property Rights and its uses. Whistle blowing and beyond, Case study.	6 Hours
Unit-3:	Harmony in the Family and Society- Harmony in Human-Human Relationship, Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman and other salient values in relationship.	6 Hours
Unit-4:	Understanding Harmony in the Nature and Existence – Whole existence as Co-existence. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Coexistence (Sah-astitva) of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence.	6 Hours
Unit-5:	Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems c) Ability to identify and develop appropriate technologies and management patterns for above production systems.	6 Hours
Text Books:	1-Human Values - Prof. A.N.Tripathi New Age International, 2009	
Reference Books:	1. Human Values and Professional Ethics - Jayshree, Suresh and B.S.	



	<p>Raghuwan , S. Chand Publication, 2011-12</p> <p>2. Just Business: Business Ethics in Action- Elaine Sternberg, Oxford University Press, 2000.</p> <p>*Latest editions of all the suggested books are recommended</p>	
<u>Additional electronic reference material</u>	<p>1.http://hvpe1.blogspot.com/2016/06/notes-human-values-and-professional.html</p>	

<u>Course Code:</u> IMW305	<div>BCA-Semester III</div> <div>Software Engineering</div>	L-3 T-0 P-0 C-3
Course	On completion of the course, the students will be :	

Outcomes:		
CO1.	Understanding various accepted methodologies to design software	
CO2.	Understanding various Analysis, Design Concepts and Principles	
CO3.	Understanding the Taxonomy Of Software Testing	
CO4.	Understanding the basics of Software Project Management	
CO5.	Understanding various Function Point Models, COCOMO Model, Delphi Method, Scheduling	
Course Content:		
Unit-1:	Software Product and Process: Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering, Overview – Product Engineering Overview.	8 Hours
Unit-2:	Software Requirements: Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioural Models – Structured Analysis and Data Dictionary.	8 Hours
Unit-3:	Analysis, Design Concepts and Principles -Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.	8 Hours
Unit-4:	Testing -Taxonomy Of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques	8Hours
Unit-5:	Software Project Management -Measures And Measurements – ZIPF's Law – Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling– Risk Management – CASE Tools.	8 Hours
<u>Text Books:</u>	1. Ian Sommerville, “Software engineering”, Seventh Edition, Pearson Education Asia, 2007	
<u>Reference Books:</u>	1. Roger S. Pressman, “Software Engineering – A practitioner's Approach”, Sixth Edition, McGraw-Hill International Edition, 2005 *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference</u>	1. https://www.vssut.ac.in/lecture_notes/lecture1428551142.pdf	



<u>material</u>		
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<u>Course Code:</u> IMW309		L-3 T-0 P-0 C-3
	<div>BCA-Semester III</div> <div>Introduction to Web Technology</div>	
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding the concepts of internet and internet protocols such as FTP, SMTP, TCP/IP etc. and the architecture of Web System.	

CO2.	Understanding about HTML and different attributes of HTML. Designing simple HTML page	
CO3.	Understanding XML concepts , the differentiation between HTML and XML and the different attributes of XML.	
CO4.	Understanding PHP and its basic syntax, variables, Loops, Arrays and Strings.	
CO5.	Understanding about HTTP requests, Files and Cookies.	
Course Content:		
Unit-1:	Introduction to Internet: Introduction, History of internet, Internet Design Principles, Internet Protocols- FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture	8 Hours
Unit-2:	Introduction to World Wide Web: Evolution of Web, Static and Dynamic Web Sites, Web Applications, Web Development Technologies - HTML, CSS, JS, XML; Protocols - HTTP, secure HTTP, etc; URL, Web Browser, Web Server, Web Services	8 Hours
Unit-3:	HTML: 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	8 Hours
Unit-4:	CSS: Introduction to CSS, Syntax, Selectors ,Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing	8 Hours
Unit-5:	XML: Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes,XML DTD, XML Schema, XML Parser, Document Object Model (DOM).	8 Hours
<u>Text Books:</u>	1. Web Technologies - HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax, Black Book, by Dreamtech Press	
<u>Reference Books:</u>	1.HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow- Wiley Publishing Inc, 2010 *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://www.w3schools.com/html/	



<p><u>Course Code:</u> IMW310</p>	<p style="text-align: center;">BCA-Semester III</p> <p style="text-align: center;">Programming in Python</p>	<p>L-3 T-0 P-0 C-3</p>
<p><u>Course Outcomes:</u></p>	<p>On completion of the course, the students will be :</p>	
<p>CO1.</p>	<p>Understanding the use of data types and conditional statements.</p>	
<p>CO2.</p>	<p>Understanding the use of dictionaries.</p>	
<p>CO3.</p>	<p>Designing a code and then test small python programs that meet the</p>	

	requirements.	
CO4.	Understanding the concept of object-oriented programming as used in Python: classes, subclasses, properties, inheritance, and overriding.	
CO5.	Understanding various concept of microservices.	
Course Content:		
Unit-1:	<p>Introduction: Introduction to Python, Setting up the environment, Installing Python, Running python program, Python's execution model, Guidelines on how to write good, The Python culture, A note on the IDEs.</p> <p>Built-in Data Types: Numbers, Immutable sequences, Mutable sequences, Set types, Mapping types – dictionaries, The collections module, Final considerations</p> <p>Iterating and Making Decisions: Conditional programming, Looping, Putting this all together.</p>	8 Hours
Unit-2:	<p>Advanced Concepts Functions, the Building Blocks of Code: Use of functions, Scopes and name resolution, Input parameters, Return values, Recursive functions, Anonymous functions, Function attributes, Built-in functions, importing objects.</p> <p>Lists and Nested List: Introduction, Accessing list, Operations, Working with lists, Library Function and Methods with Lists.: Introduction, Accessing tuples.</p> <p>Dictionaries : Introduction, Accessing values in dictionaries, Working with dictionaries,</p> <p>OOP, Decorators, and Iterators: Decorators, Class and object namespaces, Attribute shadowing, Initializing an instance, Accessing a base class, Multiple inheritance, Static and class methods, Private methods and name mangling, The property decorator, Operator overloading, Polymorphism</p>	8 Hours
Unit-3:	<p>Exception Handling Definition Exception, Exception handling Except clause, Try? finally clause. User Defined Exceptions Static and Final Keyword, Access Modifiers and specifiers, scope of a class.</p> <p>Modules: Importing module, Math module, Random module.</p>	8 Hours
Unit-4:	<p>Web Development The Edges – GUIs and Scripts: Scripting-The imports, Parsing Arguments, The business logic, GUI application- The import, The layout logic, The business logic, The tkinter.tix module, The turtle module, wxPython, PyQt, and PyGTK, The principle of least astonishment, Threading considerations.</p> <p>Web Development Done Right: Django design philosophy, The Django URL dispatcher, Setting up Django, Adding the Entry model.</p>	8 Hours
Unit-5:	<p>Cloud Native Python Building Microservices in Python: Modeling microservices, Building microservices, Testing the RESTful API.</p> <p>Building a Web Application in Python: Getting started with applications, Working with Observables and AJAX, Binding data for the adduser template.</p>	8 Hours
Text Books:	1. "Python in a Nutshell" by Alex Martelli, Oreilly Publication.	



<u>Reference Books:</u>	1. CC Python Programming by Wesley J. Chun, Pearson Education 2. An Introduction to Python by Guido Van Russom, Fred L. Drake, Network Theory Limited. 3. Beginning Python: From Novice To Professional By Magnus Lie Hetland, Second Edition Apress *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://docs.python.org/3/tutorial/	

<u>Course Code:</u> IMW306	<div>BCA-Semester III</div> <div>Information Security Fundamentals</div>	L-3 T-0 P-0 C-3
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding the basic concepts and importance of information security.	
CO2.	Understanding the role and concept of user identity and access management.	

CO3.	Understanding the system and server security concepts.	
CO4.	Analyzing threats to information security, analyse their impact and propose suitable countermeasures.	
CO5.	Analyzing various aspects of securing systems, servers, Internet, user identity and management.	
Course Content:		
Unit-1:	Introduction Security Definition, Why Security, Security and its need, Current Trends and Statistics, Basic Terminology, The C I A of Security the Relation: Security functionality and Ease of Use Triangle	8 Hours
Unit-2:	User Identity and Access Management: User identity and Access Management: Authentication, Account Authorization, Validation, Access Control and Privilege management. Hashing and Cryptography- Encryption and Decryption	8 Hours
Unit-3:	System and Server Security: System Security, Desktop & Server Security	8 Hours
Unit-4:	Internet Security Internet Security: LAN Security, Email Security, Hacking attacks, preventive measures.	8 Hours
Unit-5:	Risk Assessment and Cyber Law Vulnerability Assessment, Penetration Testing, Risk Assessment, Threat, Vulnerability, Cyber Laws – Indian Context	8 Hours
<u>Text Books:</u>	1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012	
<u>Reference Books:</u>	1. Information security: Principles and Practice - Mark Stamp, 2 nd Edition, Pub: John Wiley & Sons, Inc., 2011 *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1. https://www.omniseu.com/security/index.php	

<u>Course Code:</u> IMW312	<div>BCA-Semester III</div> <div>English Communication –III</div>	L-2 T-1 P-0 C-3
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding knowledge of grammar to address competitive exams.	
CO2.	Understanding the Use advance English language by using variety of words i.e. idioms and phrase in variety of sentences in functional context	
CO3.	Understanding the proper usage of English grammar	
CO4.	Understanding the strategies of comprehension	
CO5.	Applying professional writing methodologies.	

Course Content:		
Unit-1:	English Grammar & Vocabulary <ul style="list-style-type: none"> • Correction of Common Errors (with recap of English Grammar with its usage in practical context.) • Synthesis : Simple , complex and compound sentence • Commonly used Idioms & phrases (Progressive learning whole semester) 	8 Hours
Unit-2:	Speaking Skills <ul style="list-style-type: none"> • Art of public speaking • Common conversation • Extempore • Power Point Presentation (Ppt) Skills: Nuances of presenting PPTs 	8 Hours
Unit-3:	Comprehension Skills <ul style="list-style-type: none"> • Strategies of Reading comprehension: Four S's • How to solve a Comprehension (Short unseen passage: 150-200 words) 	8 Hours
Unit-4:	Professional Writing <ul style="list-style-type: none"> a) Preparing Notice, Agenda & Minutes of the Meeting 	8 Hours
Unit-5:	Value based text reading: Short story <ul style="list-style-type: none"> a) The Barber's Trade Union – Mulk Raj Anand 	8 Hours
<u>Text Books:</u>	1. Singh R.P., An Anthology of Short stories, O.U.P. New Delhi.	
<u>Reference Books:</u>	1. Allen, W. " <i>Living English Structure</i> " Pearson Education, New Delhi. 2. Joseph, Dr C.J. & Myall E.G. " <i>A Comprehensive Grammar of Current English</i> " Inter University Press, Delhi 3. Wren & Martin " <i>High School English Grammar and Composition</i> " S.Chand & Co.Ltd., New Delhi. 4. Norman Lewis " <i>Word Power Made Easy</i> " Goyal Publications & Distributors, New Delhi. Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1. https://www.englishgrammar101.com/module-1/nouns/lesson-1/what-is-a-noun	



Course Code: IMW353	<div>BCA-Semester III</div> <div>Introduction to Web Technology Lab</div>	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying web designing rules .	
CO2.	Applying HTML and different attributes of HTML for Designing simple HTML page.	
CO3.	Applying CSS and different attributes of CSS Designing simple CSS page.	
CO4.	Creating a dynamic website using HTML.	
CO5.	Creating a dynamic website using HTML with CSS	
Course Content:		

	<p>1.Design a simple web page with head, body and footer, with heading tags, image tag</p> <p>2. Design a web site for book information, home page should contain books list, when particular book is clicked, information of the books should display in the next page.</p> <p>3. Design a page to display the product information such as name, brand, price and etc with table tag</p> <p>4. Design a web site for book information using frames, home page should contain two parts, left part should contain books list, and right part should contain book information.</p> <p>5. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements.</p> <p>6. Design a web page with nice formatting like background image, text colors and border for text using external CSS.</p> <p>7. Design a web page to perform mathematical calculations such as addition, subtraction, multiplication, and division</p> <p>8. Design a web page to read data from an XML file and display the data in tabular format, take the data as employee information.</p> <p>9. Design a web site for online purchase using CSS, JS and XML, web site should contain the following web pages.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Home pge <input type="checkbox"/> Login page <input type="checkbox"/> Signup page <input type="checkbox"/> Product details page 	

Course Code: IMW354	<div>BCA-Semester III</div> <div>Python Programming Lab</div>	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the use of data types and conditional statements.	
CO2.	Understanding the use of dictionaries.	
CO3.	Applying a code and then test small python programs that meet the requirements.	
CO4.	Applying object-oriented programming as used in Python: classes, subclasses, properties, inheritance, and overriding.	
CO5.	Applying various concept of microservices.	

Course Content:		
	<ol style="list-style-type: none"> 1. Write a python code to find given number is prime or not 2. Write a python code to find LCM and GCM of a given list 3. Write a python code to find mean and standard deviation of a given list of numbers 4. Write a python code to add and delete element from a dictionary using functions 5. Write a python code to print 10 student details using class and lists 6. Write a python code to find student from a given list using class 7. Write a python code to inherit employee class to student class 8. Write a python code to build simple GUI calculator 9. Write a python code to build web page with student registration form 10. Write a python code to build web pages with sign-in and sing-up forms 11. Write a python code to build Rest api for product 12. Write a python code to build Ajax enabled web application for product 	

Course Code: TMUGS-301	<p>Value Added Course</p> <p>BCA-Semester III</p> <p>Managing Self</p>	L-2 T-0 P-0 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Utilizing effective verbal and non-verbal communication techniques in formal and informal settings	
CO2.	Understanding and analyzing self and devising a strategy for self growth and development.	
CO3.	Adapting a positive mindset conducive for growth through optimism and constructive thinking.	
CO4.	Utilizing time in the most effective manner and avoiding procrastination.	
CO5.	Making appropriate and responsible decisions through various	

	techniques like SWOT, Simulation and Decision Tree.	
Course Content:	Formulating strategies of avoiding time wasters and preparing to-do list to manage priorities and achieve SMART goals.	
Unit-1:	I Personal Development Personal growth and improvement in personality Perception Positive attitude Values and Morals High self motivation and confidence Grooming	8 Hours
Unit-2:	Professional Development Goal setting and action planning Effective and assertive communication Decision making Time management Presentation Skills Happiness, risk taking and facing unknown	8 Hours
Unit-3:	Career Development Resume Building Occupational Research Group discussion (GD) and Personal Interviews	8 Hours
Text Book	1. Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18 th ed., Pearson Education Tracy, Brian, Time Management (2018), Manjul Publishing	
Reference Books:	1. Hill, Napoleon, Think and grow rich (2014), Amazing Reads 2. Scott, S.J., SMART goals made simple (2014), Createspace Independent Pub	
Additional electronic reference material	1. https://www.hloom.com/resumes/creative-templates/	

Evaluation Scheme: Faculty led Continuous Evaluation

- Evaluation of “Managing Self” and “Managing Work and Others” will follow the continuous evaluation method.
- Students will be evaluated on the score of 100 on the pattern prescribed by the University for Conduction of Practical Courses.
 - a) **Internal:** 50 marks for Internal evaluation following the continuous evaluation method, which includes:
 - a. 40 marks for Class Performance (Every class activity will carry 8 marks; each students can participate in maximum of 5 activities)
 - b. 10 marks for Attendance and involvement in the activities
 - b) **External:** 50 marks for External evaluation at the time of external exams (Based on Observations, GDs and PIs and other assessment tools).



Course Code: TMUGA-302	Specialization- MAWT BCA- Semester-III Modern Algebra and Data Management (Value Added Course)	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying the concepts of modern mathematics Divisibility rule, Remainder Theorem, HCF /LCM in Number System.	
CO2.	Relating the rules of permutation and combination, Fundamental Principle of Counting to find the probability.	
CO3.	Applying calculative and arithmetical concepts of ratio, Average and Percentage to analyze and interpret data.	
CO4.	Correlating the various arithmetic concepts to check sufficiency of data	
Course Content:		
Unit-1:	Number theory Classification of Numbers, Divisibility Rules, HCF and LCM, Factors, Cyclicity(Unit Digit and Last Two digit), Remainder Theorem, Highest Power	8 Hours

	of a Number in a Factorial, Number of trailing zeroes	
Unit-2:	Data interpretation Data Interpretation Basics, Bar Chart, Line Chart, Tabular Chart, Pie Chart, DI tables with missing values	7 Hours
Unit-3:	Data Sufficiency Introduction of Data Sufficiency, different topics based DS	5 Hours
Unit-4:	Permutations and combinations Fundamental counting, and or, arrangements of digits, letters, people in row, identical objects, rank, geometrical arrangements, combination: - basic, handshakes, committee, selection of any number of objects, identical and distinct, grouping and distribution, de-arrangements	6 Hours

S No	% Attendance <	Marks
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Unit-5:	Probability Introduction, Probability based on Dice and Coins, Conditional Probability, Bayes Theorem	4 Hours
<u>Reference Books:</u>	17. R1:-ArunShrama:- How to Prepare for Quantitative Aptitude 18. R2:-Quantitative Aptitude by R.S. Agrawal 19. R3:-M Tyra: Quicker Maths 20. R4:-Nishith K Sinha:- Quantitative Aptitude for CAT 21. R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com 22. R6:-Logical Reasoning by Nishith K Sinha 23. R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended.	
<u>Additional Electronic Reference Material</u>	24. https://mathcs.clarku.edu/~djoyce/ma225/algebra.pdf 25. http://www.ddegiust.ac.in/studymaterial/mca-3/ms-11.pdf	

Evaluation Scheme for Quantitative Aptitude Skill Enhancement:-

The students will be evaluated on the score of 100 for every semester. Detailed scheme for the course is as follows.

- e. 20 marks best 2 out of CT1 + CT2 + CT3
- f. 10 marks will be for Assignments.
- g. 10 marks for attendance and practice sheets, at the end of semester, will be provided in the following manner.
- h. 60 marks for final external exams.

11.	0-10	1
12.	10 -20	2
13.	20- 30	3
14.	30-40	4
15.	40-50	5
16.	50-60	6
17.	60 – 70	7
18.	70 – 80	8
19.	80 – 90	9
20.	90-100	10

From{CT 1, CT2 and CT3} Best 2 CT's Score (20) + Final External exam (60) + Attendance (10)+ Assignment(10) = 100 marks

<u>Course Code:</u> IMW401	<div style="background-color: #cccccc; text-align: center; padding: 5px;"> BCA-Semester IV </div> <div style="background-color: #cccccc; text-align: center; padding: 5px;"> NoSQL Databases </div>	L-3 T-0 P-0 C-3
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding the value of Relational Databases	
CO2.	Understanding the features of NoSQL	

CO3.	Understanding various data models of NoSQL.	
CO4.	Understanding the concept of read and update consistency	
CO5.	Understanding the concept of Big Data and Hadoop.	
Course Content:		
Unit-1:	Introducing NoSQL: The value of Relational Databases, Disadvantages of Relational Databases, A Brief History of NoSQL, Features of NoSQL: Features of NoSQL, ACID vs. BASE, Managing Different Data Types	8 Hours
Unit-2:	Data models Aggregates, key-value and document data models, Column-Family Stores, relationships, graph databases, schema-less databases, materialized views.	8 Hours
Unit-3:	Distribution Models Distribution models:Single Server, sharding, master-slave replication, peer-peer replication, sharding and replication.	8 Hours
Unit-4:	Update and Read Consistency Update Consistency, Read Consistency. Relaxing Consistency:Relaxing Consistency, Relaxing Durability, NoSQL Databases: Key-Value Databases, Document Databases, Column-Family Stores.GraphDatabases:Graph Databases, Beyond NoSQL	8 Hours
Unit-5:	Big Data andHadoop Introduction to Big Data, Big Data Characteristics, Big Data solutions, introduction to Hadoop, Hadoop Architecture, Hadoop eco System, MapReduce, HDFS, HDFS architecture, benefits of HDFS, HDFS commands.	8 Hours
<u>Text Books:</u>	1. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Copyright © 2013 Pearson Education, Inc. 2012.	
<u>Reference Books:</u>	1. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012. 2. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011. *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://www.guru99.com/nosql-tutorial.html	



<p><u>Course Code:</u> IMW406</p>	<p style="text-align: center;">BCA-Semester IV</p> <p style="text-align: center;">Android Application Development</p>	<p>L-3 T-0 P-0 C-3</p>
<p><u>Course Outcomes:</u></p>	<p>On completion of the course, the students will be :</p>	
<p>CO1.</p>	<p>Understanding Android programming including design, development and testing skills</p>	
<p>CO2.</p>	<p>Understanding the Android platform, Programming paradigms and Application Components</p>	

CO3.	Understanding the user interface design principles and testing of the user interface	
CO4.	Applying the Background processing	
CO5.	Analyzing the Data Access and Storage	
Course Content:		
Unit-1:	Introduction to Android Introduction to the Android platform, Programming paradigms and Application Components - Part 1: Manifest File, Activities, Intents. Introduction to the Android Development environment. Getting started building and testing a simple app – Resources, Layouts, Text & Scroll Views	8 Hours
Unit-2:	User Experience 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, Notifications : Status, Toasts and Dialogs, Styles and Themes, Focus, Touch Mode, Gestures.	8 Hours
Unit-3:	Background Processing -Creating background tasks :AsyncTask, AsyncTaskLoader; Network Connections. Programming paradigms and 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	8 Hours
Unit-4:	Data Management Data Access and Storage: Shared Preferences, App settings, Files & the Android File system, SQLite Database, Loaders, Firebase. Programming paradigms and Application Components Part 3: Content Providers and Content Resolvers.	8 Hours
Unit-5:	Testing 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.	8 Hours
<u>Text Books:</u>	1. Google Android Developer Fundamentals Course – Concepts, Dec 2016	
<u>Reference Books:</u>	1. Hello, Android Introducing Google's Mobile Development Platform, Ed Burnette. The Pragmatic Bookshelf, 4 th Editions,	



	<p>2015.</p> <p>2. Sams Teach Yourself Android Application Development in 24 Hours, Carmen Dellesio, Lauren Darcey, Shane Conder, SAMS, 4th Edition, 2016.</p> <p>3. Android Programming for Beginners , John Horton,, Packt Publishing, Dec 2015</p> <p>*Latest editions of all the suggested books are recommended</p>	
<u>Additional electronic reference material</u>	<p>1- https://developers.google.com/training/courses/android-fundament</p>	

<u>Course Code:</u> IMW403	<p>BCA-Semester IV</p> <p>Server Side Scripting Languages</p>	L-3 T-0 P-0 C-3
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding basic Server web architecture	
CO2.	Understanding the working of web protocols like Python, Ruby Rails as well as IP and web address	
CO3.	Understanding the CGI and GUI Programming.	
CO4.	Understanding the use of advance rails application	

CO5.	Applying the code using various languages .	
Course Content:		
Unit-1:	Introduction to Server-side Scripting Languages Server-side Scripting, Different Scripting Languages, Web services, Web application frameworks – MVC, General purpose frameworks – e.g., Django, RoR; Discussion forums, Wikis, Weblogs, Content management system (CMS).	8 Hours
Unit-2:	Introduction to Python How to set up the environment, Lexical conventions and Syntax, Variables, Data Types, Operators, Statements and Expressions, Decision making, Loops, Strings, Tuples, Lists, Dictionary, Recursion, Date and Time, Functions, Modules – math, random; Files I/O, Exceptions	8 Hours
Unit-3:	CGI and GUI Programming in Python Classes and Objects, Regular Expressions, CGI Programming, Database Access Networking, Sending Email, Multithreading, XML Processing, GUI Programming, Extending and Embedding Python.	8 Hours
Unit-4:	Introduction to Ruby on Rails MVC Architecture, How to install, Framework, Directory structure, Features, Basic Rails Application	8 Hours
Unit-5:	Advanced Rails Applications Setting up the database, Active records, Migrations, Controllers, Routes, Views, Layouts, Scaffolding, AJAX, Uploading files, sending Email	8 Hours
<u>Text Books:</u>	1. Python: Essential Reference, by David M. Beazley	
<u>Reference Books:</u>	1. Professional Ruby on Rails by Noel Rappin, Wiley India Pvt Ltd 2. Learn Ruby on Rails: Book one, by Daniel Kehoe *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://www.tutorialspoint.com/ruby-on-rails/index.htm	



Course Code: IMW408	<div></div> <div>BCA-Semester IV</div> <div>Entrepreneurship</div>	L-2 T-1 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the role of Entrepreneurs	
CO2.	Understanding the importance of Entrepreneurship in Economic Growth	
CO3.	Understanding Thematic Apperception Test.	
CO4.	Understanding Small Enterprises	
CO5.	Understanding various Sources of Finance	
Course Content:		

Unit-1:	Entrepreneurship: Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth	8 Hours
Unit-2:	Motivation: Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.	8 Hours
Unit-3:	Business: Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.	8 Hours
Unit-4:	Financing and Accounting: Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.	8 Hours
Unit-5:	Support to Entrepreneurs: Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.	8 Hours
<u>Text Books:</u>	1. Khanka. S.S., “Entrepreneurial Development” S. Chand & Co. Ltd., Ram Nagar, New Delhi.	
<u>Reference Books:</u>	1. Hisrich R D, Peters M P, “Entrepreneurship” 8th Edition, Tata McGraw-Hill. 2. Mathew J Manimala, “Entrepreneurship theory at cross roads: paradigms and praxis” 2nd Edition Dream tech. 3. Rajeev Roy, ‘Entrepreneurship’, Oxford University Press. *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://www.edx.org/learn/entrepreneurship	



<p><u>Course Code:</u> IMW409</p>	<p style="text-align: center;">BCA-Semester IV</p> <p style="text-align: center;">English Communication-IV</p>	<p>L-3 T-0 P-0 C-3</p>
<p><u>Course Outcomes:</u></p>	<p>On completion of the course, the students will be :</p>	
<p>CO1.</p>	<p>Understanding the usage of English grammar in day to day context.</p>	
<p>CO2.</p>	<p>Acquiring adequate knowledge of grammar and vocabulary to address competitive exams</p>	
<p>CO3.</p>	<p>Applying their listening to understand the basic content.</p>	

CO4.	Understanding how to write and comprehensive skills in English.	
CO5.	Analyzing activities in situational context (like Impromptu).	
Course Content:		
Unit-1:	Vocabulary & Grammar <ul style="list-style-type: none"> • Homophones and Homonyms • Correction of Common Errors (with recap of English Grammar with its usage in practical context.) • Transformation of sentences 	8 Hours
Unit-2:	Essence of Effective listening & speaking <ul style="list-style-type: none"> • Listening short conversation/ recording (TED talks / Speeches by eminent personalities) <i>Critical Review of these abovementioned ,Impromptu</i>	8 Hours
Unit-3:	Professional Writing <ol style="list-style-type: none"> a) Proposal: Significance, Types, Structure & AIDA b) Report Writing: Significance ,Types, Structure& Steps towards Report writing 	8 Hours
Unit-4:	Job Oriented Skills <ol style="list-style-type: none"> a) Cover Letter b) Preparing Rèsumè and Curriculum-Vitae c) Interview: Types of Interview, Tips for preparing for Interview and Mock Interview d) Corporate Expectation & Professional ethics: Skills expected in corporate world 	8 Hours
Unit-5:	Value based text reading: Short story <ol style="list-style-type: none"> a) A Bookish Topic – R.K. Narayan 	8 Hours
<u>Text Books:</u>	1. Singh R.P., An Anthology of Short stories, O.U.P. New Delhi.	
<u>Reference Books:</u>	<ol style="list-style-type: none"> 1. Raman Meenakshi& Sharma Sangeeta, “<i>Technical Communication-Principles & Practice</i>” Oxford University Press, New Delhi. 2. Mohan K. & Sharma R.C., “<i>Business Correspondence of Report Writing</i>”,TMH, New Delhi. 3. Chaudhary, Sarla “Basic Concept of Professional Communication” DhanpatRai Publication, New Delhi. *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://learnenglish.britishcouncil.org/vocabulary	

<u>Course Code:</u> IMW402	Generic Elective-I BCA-Semester IV Interactive Web Application Development	L-3 T-0 P-0 C-3
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding the foundation in web technologies	
CO2.	Understanding popular web scripting languages	

CO3.	Understanding the JavaScript data types, variables, operators, expressions, statements, functions	
CO4.	Applying code for designing web pages using HTML.	
CO5.	Applying various concepts of AJAX and JSON	
Course Content:		
Unit-1:	Introduction to Scripting Languages & JavaScript- Introduction to Scripting Languages, Advantages and disadvantages of scripting languages. Server side and client side scripting, Glue Languages. Overview of popular web scripting languages. Introduction to Javascript. Client side and Server side usage of JavaScript.	8 Hours
Unit-2:	Learning Javascript Javascript data types, variables, operators, expressions, statements, functions. Objects, arrays, date, math, error handling, flow control, loops. Document Object Model - creating nodes, namespace, DOM and HTML, DOM and CSS. Event handling, Event types. Lexical evaluation, this scope, hoisting, FIF. Introduction to Functional programming.	8 Hours
Unit-3:	jQuery JS Library Introduction to jQuery, accessing the jQuery library, Selecting Page elements, Adding content to a page, Setting and reading tag attributes, Reading, Setting and Removing HTML Attributes, Acting on selected elements, adding pull quotes, responding to events.	8 Hours
Unit-4:	Windows, Frames and Overlay in JavaScript- Window object, dialogs, Controlling windows. Form handling, form fields, form validation. UI elements, Browser management, Media management. User defined HTML attributes.	8 Hours
	AJAX & JSON Introduction to AJAX: XMLHttpRequest, AJAX request and response, Events, Database; Introduction to JSON: Syntax, Http, Files; Sessions, templates. Relational databases, Object Relational Mapping. Deferred Objects, Promise Objects, Asynchronous programming. How to debug Asynchronous running code. Cover topics like Timeouts, try catch and finally, Web sockets.	8 Hours
<u>Text Books:</u>	1. JavaScript and JQuery Interactive Front-End Web Development, Jon Duckett. Wiley 2014.	
<u>Reference Books:</u>	1. Learning Web App Development, Semmy Purewal. O'Reilly	



	<p>2014.</p> <p>2. JavaScript & JQuery The Missing Manual, David Sawyer McFarland. O'Reilly 2014.</p> <p>3. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, Kogent Solutions. Dreamtech Press, 2011</p> <p>*Latest editions of all the suggested books are recommended</p>	
<u>Additional electronic reference material</u>	1. https://www.w3schools.com/js/	

<u>Course Code:</u> IMW405	<p>Generic Elective-I</p> <p>BCA-Semester IV</p> <p>User Interface Design</p>	<p>L-3</p> <p>T-0</p> <p>P-0</p> <p>C-3</p>
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding the fundamentals of Human Factors and Principles of Design	

CO2.	Understanding User Centred Design	
CO3.	Understanding the Wireframes and Wire Framing tools	
CO4.	Understand Material Design principles	
CO5.	Understanding quantitative and qualitative methods.	
Course Content:		
Unit-1:	Design Principles Fundamentals of Human Factors and Principles of Design; UX and UI, User Centred Design : studying a Domain, Identifying Themes and Market Gaps, Understanding the Use case, creating requirements and a solution to the problem.	8 Hours
Unit-2:	Mobile Design From Use Cases to Screens, Paper and Interactive Prototyping, Wireframes and Wireframing tools, Usability Testing; Avoiding and Removing Features.	8 Hours
Unit-3:	Android Design Designing for Android : understanding Material Design principles, UI elements and their effective use, Mobile Location and Networking, Instrumentation and Logging	8 Hours
Unit-4:	Web Design -Designing for the Web : Responsive web design, Evolutionary design, reusability, accessibility, performance, creating a style guide, grids and type, web design patterns, testing.	8 Hours
Unit-5:	UI Case Studies -Quantitative Methods: Logging, A/B Testing, Qualitative Methods: Field and Diary Studies, Analyzing Data: Case Study, Analysis of 2 deployed applications – success and failures.	8 Hours
<u>Text Books:</u>	1. Android UI Design, Jessica Thornsby. Packt Publishing 2016.	
<u>Reference Books:</u>	1. Mobile App UX Principles, Stephen Griffiths. Google, Apr 2015 2. Essential Mobile Interaction Design, Cameron Banga, Josh Weinhold. Addison Wesley 2014. 3. Moving to Responsive Web Design, Inayaili de Leon. Apress 2016. *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1. https://careerfoundry.com/en/courses/become-a-ui-designer/	



<p><u>Course Code:</u> IMW452</p>	<p style="text-align: center;">BCA-Semester IV</p> <p style="text-align: center;">Android Application Development Lab</p>	<p>L-0 T-0 P-4 C-2</p>
<p><u>Course Outcomes:</u></p>	<p>On completion of the course, the students will be :</p>	
<p>CO1.</p>	<p>Creating Hello World Android Application</p>	
<p>CO2.</p>	<p>Creating an Android project from a basic app template.</p>	
<p>CO3.</p>	<p>Creating virtual devices and run their application on both emulator and</p>	

	device	
CO4.	Creating interactive user interfaces in the Layout Editor, in XML and programmatically.	
CO5.	Implementing TextView, EditText, Button, ScrollView, RecyclerView, ImageView, LinearLayout, popup menus, toasts	
Course Content:		
	<p>1. Hello World Android Application</p> <p>Students will learn to:</p> <ul style="list-style-type: none"> • Install and use the Android IDE. • Understand the development process for building Android apps. • Create an Android project from a basic app template. • Create virtual devices and run their application on both emulator and device • Add log statements to their app • Make changes to manifest file as required <p>2. Hello Toast application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • create interactive user interfaces in the Layout Editor, in XML and programmatically. • Implement TextView, EditText, Button, ScrollView, RecyclerView, ImageView, LinearLayout, popup menus, toasts • Add onClick functionality to a button. • implement the MVP design pattern <p>3. Product Review application</p> <p>Students will learn to</p> <ul style="list-style-type: none"> • Use XML code to add multiple TextView elements. • Use XML code to define a scrolling view. • Display free-form text with some HTML formatting tags. • Style the TextView background color and text color. • Include a web link in the text. <p>4. Using resources, templates, creating an app icon</p> <p>Students will learn to</p> <ul style="list-style-type: none"> • Explore and use Android developer resources 	

- Use different application templates
- Use Android code samples
- Create an app icon

5. TwoActivities application

Students will learn to

- Create an app with 2 activities in Android Studio.
- Define parent and child activities for "Up" navigation.
- Start activities with `explIMWt` intents.
- Pass data between activities with intent extras

6. Extended TwoActivities application

Students will learn

- About the activity lifecycle, and when activities are created, pause, stop and destroyed.
- To use callback methods associated with activity changes.
- About the effect of actions like configuration changes that can result in activity lifecycle events.
- How to retain activity state across lifecycle events.

7. ImplIMWt events

Students will learn to

- Create `implIMWt` intents and use their actions and categories.
- Use the `ShareCompat.IntentBuilder` helper class to easily create `implIMWt` intents for sharing data.
- Advertise that an app accepts `implIMWt` intents by declaring intent filters in the Android manifest file

8. Calculator application

Students will learn to

- Put into use all skills learned so far.

9. Using the Debugger

Students will learn to

- Run an app in debug mode in an emulator or on a device.
- Step through the execution of the app.
- Set and organize breakpoints.

10. Testing your application

Students will learn



- To organize and run tests in Android Studio
- What a unit test is, and how to write unit tests for their code.
- How to create and run local unit tests in Android Studio.

11. Using Android Support Library

Students will learn how to

- verify that the Android support libraries are available in Android Studio and find more information on Android support libraries.
- indicate support library classes in an app.
- Understand compileSdkVersion, targetSdkVersion, and minSdkVersion.
- recognize deprecated or unavailable APIs in your code.

12. Enhanced UI elements I

Students will learn how to

- Change the input methods to enable spelling suggestions, auto-capitalization, and password obfuscation.
- Change the generic on-screen keyboard to a phone keypad or other specialized keyboards.
- Add a spinner input control to show a dropdown menu with values, from which the user can select one.
- Add an alert with OK and Cancel for a user decision.
- Create an application using all of the above

13. Enhanced UI Elements II

Students will learn how to

- Use date and time pickers and recording the selections.
- Use images as buttons to launch an activity.
- Add radio buttons for the user to select one item from a set of items.
- Create an application using all of the above

14. Android Service

Students will learn how to

- Create, start and stop a service
- Demonstrate startService(), stopService() and onBindService()



	<ul style="list-style-type: none"> • Use the service to download a file from the Internet • Trigger a service from an activity <p>15. Content Provider</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • create and populate an SQLite database • create a content provider interface for this database • use the content provider interface to access data from another application <p>16. Note application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • create and use the app bar, and options menu • Add menu items to the options menu. • Add icons for items in the options menu. • Set menu items to show in the action bar. • Add event handlers for menu item clicks. • Use actionbar, dialogs and notifications 	
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<u>Course Code:</u> IMW451	<div>BCA-Semester IV</div> <div>Server Side Scripting Language Lab</div>	L-0 T-0 P-4 C-2
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Applying a python program to find the resolution of an image	
CO2.	Creating a simple rail application	
CO3.	Creating controllers and views – ruby on rails	
CO4.	Creating applications using rails scaffolding	

CO5.	Creating a python program to find the hash of file	
Course Content:		
	<p>Write a python program to perform the following:</p> <ul style="list-style-type: none"> • Add two numbers • Calculate the area of a cube • Check is the number is even, odd, prime • Print Fibonacci series <ol style="list-style-type: none"> 1. Write a python program to perform following: <ul style="list-style-type: none"> • Display Calendar • Shuffle a deck of cards. • Sort different words in alphabetic order. • Count the occurrences of a letter, vowels, etc in a given sentence 2. Write a python program to merge mails 3. Write a python program to find the resolution of an image 4. Write a python program to find the hash of file 5. Write a python game – where 2 dice has to be rolled. When doubles are rolled, then display how many times it took to roll the double. 6. Write a python game to guess colors. Player can guess a color, and if the random color picked is same, then the player gets 5 points. 7. Create a simple rail application 8. Manage data using a database in a rail application 9. Create controllers and views – ruby on rails 10. Develop applications using rails scaffolding 11. Send and receive mails using ruby on rails 	

Course Code: TMUGS-401	<div>BCA-Semester IV</div> <div>Managing Work with others</div>	L-2 T-1 P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Communicating effectively in a variety of public and interpersonal settings.	
CO2.	Applying concepts of change management for growth and development by understanding inertia of change and mastering the Laws of Change.	
CO3.	Analysing scenarios, synthesizing alternatives and thinking critically to negotiate, resolve conflicts and develop cordial interpersonal relationships.	
CO4.	Functioning in a team and enabling other people to act while encouraging growth and creating mutual respect and trust.	
CO5.	Handling difficult situations with grace, style, and professionalism.	
Course Content:		
Unit-1:	Intrapersonal Skills Creativity and Innovation Understanding self and others (Johari window) Stress Management Managing Change for competitive success Handling feedback and criticism	8 Hours
Unit-2:	Interpersonal Skills Conflict management Development of cordial interpersonal relations at all levels Negotiation Importance of working in teams in modern organisations Manners, etiquette and net etiquette	8 Hours
Unit-3:	Interview Techniques Job Seeking Group discussion (GD) Personal Interview	8 Hours
Text Book	1. Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18 th ed., Pearson Education	
Reference Books:	1. Burne, Eric, Games People Play (2010), Penguin UK 2. Carnegie, Dale, How to win friends and influence people (2004), RHUK	
Additional electronic reference material	1. https://www.hloom.com/resumes/creative-templates/	

Evaluation Scheme: Faculty led Continuous Evaluation

- Evaluation of “**Managing Self**” and “**Managing Work and Others**” will follow the continuous evaluation method.
 - Students will be evaluated on the score of 100 on the pattern prescribed by the University for Conduction of Practical Courses.
- c) **Internal:** 50 marks for Internal evaluation following the continuous evaluation method, which includes:
- a. 40 marks for Class Performance (Every class activity will carry 8 marks; each students can participate in maximum of 5 activities)
 - b. 10 marks for Attendance and involvement in the activities
- d) **External:** 50 marks for External evaluation at the time of external exams (Based on Observations, GDs and PIs and other assessment tools).

Course Code: TMUGA-402	Specialization- MAWT	L-2 T-1
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	BCA- Semester-IV Advance Algebra and Geometry (Value Added Course)	P-0 C-0
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Recognizing the rules of Crypt-arithmetic and relate them to find out the solutions.	
CO2.	Illustrating the different concepts of Height and Distance and Functions.	
CO3.	Employing the concept of higher level reasoning in Clocks, Calendars and Puzzle Problems.	
CO4.	Correlating the various arithmetic and reasoning concepts in checking sufficiency of data.	
Course Content:		
Unit-1:	Clocks and calendars Introduction , Angle based , faulty Clock, Interchange of hands, Introduction of Calendars, Leap Year , Ordinary Year	5 Hours
Unit-2:	Set theory Introduction , Venn Diagrams basics, Venn Diagram – 3 sets, 4-Group Venn Diagrams	4 Hours
Unit-3:	Heights and Distance Basic concept, Word problems	3 Hours
Unit-4:	Functions Introduction to Functions, Even and Odd Functions, Recursive	3 Hours
Unit-5:	Problem Solving Introduction, Puzzle based on 3 variable, Puzzle based on 4 variable	6 Hours
Unit-6:	Data Sufficiency Introduction, Blood relation based, direction based, ranking based	5 Hours
Unit-7:	Crypt Arithmetic Introduction of Crypt Arithmetic, Mathematical operations using Crypt Arithmetic, Company Specific Pattern	4 Hours
Reference Books:	26. R1:-ArunShrama:- How to Prepare for Quantitative Aptitude 27. R2:-Quantitative Aptitude by R.S. Agrawal 28. R3:-M Tyra: Quicker Maths 29. R4:-Nishith K Sinha:- Quantitative Aptitude for CAT 30. R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com 31. R6:-Logical Reasoning by Nishith K Sinha 32. R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal * Latest editions of all the suggested books are recommended.	
Additional Electronic Reference Material	33. https://www.math.stonybrook.edu/~aknapp/download/a2-alg-inside.pdf 34. https://www.jmilne.org/math/CourseNotes/AG.pdf	

Evaluation Scheme for Quantitative Aptitude Skill Enhancement:-

The students will be evaluated on the score of 100 for every semester. Detailed scheme for the course is as follows.

- 20 marks best 2 out of CT1 + CT2 + CT3
- 10 marks will be for Assignments.
- 10 marks for attendance and practice sheets, at the end of semester, will be provided in the following manner.
- 60 marks for final external exams.

S No	% Attendance <	Marks
1.	0-10	1
2.	10 -20	2
3.	20- 30	3
4.	30-40	4
5.	40-50	5
6.	50-60	6
7.	60 – 70	7
8.	70 – 80	8
9.	80 – 90	9
10.	90-100	10

From{CT 1, CT2 and CT3} Best 2 CT's Score (20) + Final External exam (60) + Attendance (10)+ Assignment(10) = 100 marks

Course Code: IMW508	<div>BCA-Semester V</div> <div>Cross Platform Application Development</div>	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding Mobile web applications	
CO2.	Understanding SPA mobile web applications using AngularJS	
CO3.	Understanding the Hybrid Apps using Phonegap	
CO4.	Applying code to design UI Hybrid App using ionic	
CO5.	Analysing cordova environment.	
Course Content:		
Unit-1:	Introduction to Cross-platform application -Introduction to Mobile Apps, Types of Mobile Apps, Native Apps, Mobile Web Apps, Hybrid Apps, Architecture of all kinds of Apps, Introduction to cross platform, benefits of cross platforms, technology used in cross platforms.	8 Hours
Unit-2:	Cross Platform Technologies -HTML5, New Features in HTML5,	8 Hours

	HTML5 forms, CSS3, New Rules in CSS3, Introduction to JS, JS expressions, JS control statements, JS functions, JS Objects, JS form validations.	
Unit-3:	AngularJS Introduction to AngularJS, Features of AngularJS, Setting up AngularJS, AngularJS MVC, directives, scope, view, controllers, services.	8 Hours
Unit-4:	Phonegap -Introduction to Phonegap, Setting up Phonegap, UI with Phonegap, Phone Gap Events, PhoneGap APIs - Accelerometer, Camera, File, Geolocation, Media, Notification, Storage	8 Hours
Unit-5:	Ionic & Cordova -Ionic Overview, Ionic benefits, Setting up Ionic, Ionic CSS, Ionic JS, Ionic native API-Camera, Media, Geolocation, Cordova Overview, Environment Setup, Basic app Creation, Config.xml, Storage, Events.	8 Hours
<u>Text Books:</u>	1. PhoneGap and AngularJS for Cross-platform Development by Eugene Liang Yuxian	
<u>Reference Books:</u>	1. Learning Ionic by Arvind Ravulavaru 2. Yonathan Aklilu Redda, "Cross Platform Mobile Applications Development", June 2012 3. HTML5 Covers CSS3, Javascript, XML, XHTML, AJAX, PHP & JQuery, Black Book, Kogent Learning Solutions Inc, DreamTech Press, 2001. *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://docs.angularjs.org/tutorial	

Course Code: IMW505	<div></div> <div>BCA-Semester V</div> <div>Professional Android Application Development</div>	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the UI (User Interface) for Android Platform.	
CO2.	Understanding how to design web application for effective communication and Data Exchange.	
CO3.	Understanding network related application and their working in context of Android environment.	
CO4.	Understanding the features of Android platform.	
CO5.	Understanding how to commercialize Android application	
Course Content:		
Unit-1:	User Interface -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.	8 Hours
Unit-2:	Web Applications -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	8 Hours

	Web Services.	
Unit-3:	Networking -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.	8 Hours
Unit-4:	Native Capabilities -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	8 Hours
Unit-5:	Commercializing applications -APKs, Registering and publishing on the Play StorePermissions, Performance, Security - Kernel, Application level Security, Using permissions, designing for Performance & UsabilityHow to monetize your application	8 Hours
<u>Text Books:</u>	1. Google Android Developer Fundamentals Course – Concepts, Dec 2016	
<u>Reference Books:</u>	1. Hello, Android Introducing Google's Mobile Development Platform, Ed Burnette. The Pragmatic Bookshelf, 4 th Editions, 2015. 2. Sams Teach Yourself Android Application Development in 24 Hours, Carmen Dellesio, Lauren Darcey, Shane Conder, SAMS, 4 th Edition, 2016. 3. Android Programming for Beginners , John Horton,, Packt Publishing, Dec 2015 *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1- https://developers.google.com/training/courses/android-fundamentals	

Course Code: IMW503	<div>BCA-Semester V</div> <div>Web Analytics</div>	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concept of web analytics, why web analytics	
CO2.	Understanding an account creation in Google Analytics	
CO3.	Understanding the concept of R & Rstudio	
CO4.	Applying Google Analytics with R programming.	
CO5.	Analyzing CRO services.	
Course Content:		
Unit-1:	Introduction Introduction to web analytics, why web analytics, terminology, web analytical methods, web analytical tools, web analytics metrics, site data, frameworks, KPI, Web Analytics Service Providers, Social media, mobile data, web video data	8 Hours
Unit-2:	Google Analytics Introduction to Google Analytics, Why Google Analytics, Creating Google Analytics account, view filters, metrics and dimensions, google analytics interfaces, profiles, tracking, reports	8 Hours
Unit-3:	Introduction to R & Rstudio Introduction to R, installing R & Rstudio, data types, variables, loops, functions, vectors, lists, arrays, factors, data frames, charts & graphs	8 Hours
Unit-4:	Web Analytics Using R	8 Hours

	Integrating Google Analytics with R, RGoogleAnalytics package, google API authentication, extracting data, dimensions and metrics, users, visitors, page views, data from mobile browsers, page performance, site search, types of visitors to a site, data visualization, benefits of data visualization, generating different graphs from web data	
Unit-5:	Usability and Conversion User Experience (UX), Usability, differences between UX and usability, principles of website usability and UX, testing UX, tools for usability testing, introduction to conversion, conversion optimization, SEO, CRO, conversion trends, web & customer exit survey, CRO services	8 Hours
<u>Text Books:</u>	1. Web Analytics For Dummies By Pedro Sostre, Jennifer LeClaire, John Wiley & Sons, 2007	
<u>Reference Books:</u>	1. A First Course in Statistical Programming with R by W. John Braun, Duncan J. Murdoch, Cambridge University Press, 2016 2. The Art of R Programming: A Tour of Statistical Software Design By Norman Matloff, No Starch Press, 2011 *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://analytics.google.com/analytics/academy/course/6	

Course Code: IMW502	Generic Elective-II	L-3 T-0 P-0 C-3
	BCA-Semester V	
	PHP & Perl Programming	
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding PHP Development Environment and code syntax.	
CO2.	Understanding different web related features.	
CO3.	Understanding advance concept OOPS, Database Handling and Ajax programming.	
CO4.	Applying Perl code including Control Statements, Arrays, Strings and I/O.	
CO5.	Applying advance programming concepts like Socket programming and CGI	
Course Content:		
Unit-1:	PHP Basics Introduction to PHP, Setting up PHP Development Environment, PHP Code Syntax, Variables & Constants, Operators, Control Statements, Arrays, Strings, Functions	8 Hours
Unit-2:	PHP Web Get & Post, Cookies, Sessions, Sending email	8 Hours

Unit-3:	PHP Advanced-Object Oriented Programming, Database Handling, Ajax programming	8 Hours
Unit-4:	Perl Basics-Introduction to Perl, Setting up Perl Development Environment, Perl Code Syntax, Variables & Scalars, Operators, Control Statements, Arrays, Strings, Subroutines, IO	8 Hours
Unit-5:	Perl Advanced-Object Oriented Programming, Socket Programming, Database Access, Perl CGI Programming	8 Hours
<u>Text Books:</u>	1. PHP and MYSQL: Create - Modify - Reuse by Timothy Boronczyk, Martin E. Psinas	
<u>Reference Books:</u>	1. Perl Black Book by Steven Holzner 2. Learning Perl by Randal L. Schwartz *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1. https://www.tutorialspoint.com/php/php_for_perl_developers.htm	

Course Code: IMW509	Generic Elective-II	L-3 T-0 P-0 C-3
	BCA-Semester V	
	Enterprise Application Development	
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding enterprise software architecture on the web.	
CO2.	Understanding enterprise applications using the Java programming language	
CO3.	Understanding various advanced Java technologies used to build web applications for the enterprise and construct enterprise applications using advanced Java technologies	
CO4.	Applying the use of advanced Java libraries and frameworks in building a medium-size web application for the enterprise	
CO5.	Analyzing Enterprise mobility.	
Course Content:		
Unit-1:	Introduction to Enterprise Application: Enterprise Architecture – life cycle, development framework, architectural model, conceptual layers, enterprise IT architecture domain. Enterprise Server – introduction, different types of enterprise servers, set up clusters. Enterprise Resource Planning (ERP) - Customer Relationship Management (CRM) - SCM – HRM. Enterprise Java – Introduction to web application and its lifecycle; Different container	8 Hours
Unit-2:	Web Tier:XML and Java API for XML processing – Introduction to JAXP; DOM, SAX and StAX interface; XSLT Servlets – Introduction; servlet life cycle; sessions; session tracking using hidden fields, user authentication, URL rewriting and Cookies; Inter-servlet communication, Java Server Pages (JSP) – introduction to JSP tags; JSP Life Cycle;	8 Hours

	Directives; Custom JSP tags. Java Server Faces Technology – Introduction; Page Navigation; Tags; Life Cycle and Architecture	
Unit-3:	Enterprise Information Systems Tier Java Database Connectivity – Introduction; Different types of drivers; Steps to establish a connection and query it, Java Persistence API – JPA Architecture; Entities; Entity Relationship; Managing Entities, Java Transaction API (JTA) – Transactions in J2EE; Serializability; Concurrent transactions; Distributed transaction and transaction manager, Mobile Database – Need for mobile database; Architecture; different products; Mobile transactions	8 Hours
Unit-4:	Business Tier Enterprise JavaBeans (EJB) – EJB container; enterprise beans; Session beans; Message-driven beans, JAX-WS Web service endpoints – introduction to creating web services and client, Business Intelligence and Data warehousing – Data model, Data integrity, OLAP, Application in an enterprise, Model-View-Controller (MVC) Architecture – Introduction, Model1 and Model 2 architecture	8 Hours
Unit-5:	Enterprise Mobility Introduction to Enterprise Mobility: Trends and benefits; Drivers; Risks and analysis, Enterprise Mobility Architecture – High level architecture; Building Modules; Capability Model; Meta Model – Mobile Device Security; Enterprise Mobility infrastructure: Secure VOIP, Enterprise Mobility Middleware and Solutions- MEAPs, Native Apps, HTML5.,	8 Hours
<u>Text Books:</u>	1. Head First Servlets and JSP by Bryan Basham, Kathy Sierra, and Bert Bates from O'Reilly Media, INC, 2008	
<u>Reference Books:</u>	1. Java Server Faces: The Complete Reference by Chris Schalk, Ed Burns and James Holmes, 2006 2. A Practical Guide to Enterprise Architecture by James McGovern, 2003 3. Java EE 6 Development using GlassFish Application Server by David R. Heffelfinger, Packt Publishing, 2009 *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1. https://www.progress.com/tutorials/jdbc/understanding-jta	

Course Code: IMW552	<div>BCA-Semester V</div> <div>Professional Android Development Lab</div>	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Creating a Notification using the Notification Builder.	
CO2.	Creating an HTTP connection to server & get the connection status	
CO3.	Creating a multithreaded application.	
CO4.	Creating a view with different moving shapes	
CO5.	Designing animated picture application.	
Course Content:		
	<ol style="list-style-type: none"> Course List Application Students will learn how to <ul style="list-style-type: none"> Use the RecyclerView class to display items in a scrollable list. Dynamically add items to the RecyclerView 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. Background Download application Students will learn how to 	

	<ul style="list-style-type: none"> • Use AsyncTask to run a background task • Add an AsyncTask to an app in order to run a task in the background, separate from the UI thread • Identify and understand the benefits and drawbacks of using AsyncTask for background tasks. <p>3. Notifications app</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Create a Notification using the Notification Builder. • Use Pending Intents to respond to Notification actions. • Update or cancel existing Notifications • Change <p>4. Finger Track application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Use multi-touch in their application to track several fingers <p>5. Network application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Use AIDL and networking APIs • How to check network connection status. • How to perform network operations. <p>6. Weather application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Create an HTTP connection to server & get the connection status • Fetch information from a web service <p>7. Multithreaded weather application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Create a multithreaded application • Assign a thread for a specific task <p>8. Simple Game application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • 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 	
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	<ul style="list-style-type: none"> • Keep track of user sCC <p>9. Ball Bounce Animation application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Create a view with different moving shapes • Make the shapes rotate or bounce based on user input <p>10. Animated Picture app</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • 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 <p>11. TrackMe App</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • 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 <p>12. MyMedia Player app</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Record audio and save the same • Access and play locally stored Media files <p>13. Personalized Speed Dialer App</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Access Contacts • Replace native dialer • Place outgoing calls • Receive notifications for incoming calls <p>14. Permissions</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Check whether required permissions are granted • Request for run-time permission <p>15. SSO Application</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> • Create user login and registration forms. • Store user registration details in the local database. 	
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	<ul style="list-style-type: none"> Authenticate users on login <p>16. Preferences app</p> <p>Students will learn how to</p> <ul style="list-style-type: none"> 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. 	
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Course Code: IMW554	<div>BCA-Semester V</div> <div>Industrial Training Seminar</div>	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Gaining industrial experience of developing	
CO2.	Understanding software or web based applications to solve real time problems of customers.	
CO3.	Understanding the program relevance in the industry.	
CO4.	Applying program skills in real projects.	
CO5.	Applying various problem solving methods .	
Course Content:	<p>Students will have to undergo industrial training of six weeks in any industry or reputed organization after the IV semester examination in summer. The evaluation of this training shall be included in the V semester evaluation. The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the IV semester and shall be the nodal officer for coordination of the training. Students will prepare an exhaustive technical report of the training during the V semester which will be duly signed by the officer under whom training was undertaken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Principal of the college. The student at the end of the V semester will present his report about the training before a committee constituted by the Director of the College which would comprise of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director. The marks by the external</p>	

	<p>examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned. Not more than three students would form a group for such industrial training/ project submission.</p> <p>The marking shall be as follows.</p> <p>Internal: 50 Marks</p> <p>By the faculty guide - 25 marks</p> <p>By committee appointed by the director – 25 marks</p> <p>External: 50 Marks</p> <p>By officer-in-charge trainee in industry – 25 marks</p> <p>By external examiner appointed by the university – 25 marks</p>	
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Course Code: IMW553	<div>BCA-Semester V</div> <div>Mini Project</div>	L-0 T-0 P-8 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying practical knowledge within the chosen area of technology for project development	
CO2.	Identifying , analyse, formulate and handle programming projects with a comprehensive and systematic approach	
CO3.	Contributing as an individual or in a team in development of technical projects	
CO4.	Developing effective communication skills for presentation of project related activities	
CO5.	Identifying programming projects with a comprehensive and systematic approach	
Course Content:		
	<p>The students will undertake a mini project as part of their Vth semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.</p> <p>Bridge Course:The bridge course ensures that all the students</p>	

	<p>have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through a week mandatory classroom participation where faculty and other experts will give adequate inputs in application based courses, IT and soft skills.</p> <p>The Project:</p> <p>Each student will be allotted a Faculty Guide and an Industry Guide during the internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project.</p> <p>Each student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.</p> <p>Project Evaluation Guidelines:</p> <p>The Project evaluator(s) verify and validate the information presented in the project report.</p> <p>The break-up of marks would be as follows:</p> <ol style="list-style-type: none"> 1. Internal Evaluation 2. External Assessment 3. Viva Voce <p>Internal Evaluation:</p> <p>Internal Evaluator of project needs to evaluate Internal Project work based on the following criteria:</p> <ul style="list-style-type: none"> • Project Scope , Objectives and Deliverables • Research Work, Understanding of concepts 	
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	<ul style="list-style-type: none">• Output of Results and Proper Documentation• Interim Reports and Presentations– Twice during the course of the project <p>External Evaluation:</p> <p>The Project evaluator(s) perform the External Assessment based on the following criteria.</p> <ul style="list-style-type: none">• Understanding of the Project Concept• Delivery Skill• The Final Project Report• Originality and Novelty	
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Course Code: IMW554	<div></div> <div>BCA-Semester V</div> <div>Cross Platform Application Development Lab</div>	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Creating dynamic web application for Product management using Javascript	
CO2.	Creating SPA web application for the lab exercise 1 using AngularJS	
CO3.	Creating AngularJS App for capturing location with image and store locally in the phone using PhoneGap	
CO4.	Creating AngularJS App for moving object(ball) using Accelerometer and PhoneGap	
CO5.	Creating Ionic App for Playing Audio and Video based on file type(Music Player)	
Course Content:		
	<ol style="list-style-type: none"> Design web site with following pages using HTML5, which adopts to all screens <ol style="list-style-type: none"> Home page Login page Sign-up page Develop dynamic web application for Product management using Javascript Develop SPA web application for the lab exercise 1 using AngularJS Develop Contact App with following using AngularJS <ol style="list-style-type: none"> Add Contact Delete Contact Edit Contact Develop AngularJS App for capturing location with image and store locally in the phone using PhoneGap Develop AngularJS App for moving object(ball) using Accelerometer and PhoneGap Develop Ionic App for Playing Audio and Video based on file type(Music Player) Develop Ionic App for displaying current location using Geolocation based on user movement 	

	9. Develop Cordova App and demonstrate basic events handling	
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Course Code: IMW603	<div>BCA-Semester VI</div> <div>Basic iOS Application Development</div>	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding iOS, iOS Versions, iOS Layers	
CO2.	Understanding Swift, data types	
CO3.	Understanding the concepts of Cocoa Touch, MVC model, Advantages of MVC model	
CO4.	Understanding the concepts of image View and Page Controls	
CO5.	Understanding the SQL Lite concepts.	
Course Content:		
Unit-1:	Introduction & Objective- Introduction to iOS, iOS Versions, iOS Layers, iOS Features. Xcode and interface builder - introduction to IDEs, Xcode IDE, Introduction to IB (Interface Builder), Working with Xcode and IB, Story boards. Introduction to Objective-C, Features of Objective-C, Objective-C programming Syntax, Objective-C constructs, Objects & Classes-Protocols, Categories & extensions.	8 Hours
Unit-2:	Swift & iPhone SDK - Introduction to Swift, data types, variables, constants, control statements, arrays, dictionary, strings, functions, classes & objects, initialization, inheritance, extensions, protocols, generics. iOS App Lifecycle, Views, View Controllers, Events, NSObject, NSString, NSArray, NSDictionary	8 Hours
Unit-3:	User Interface I Introduction to Cocoa Touch, What is MVC model?, Advantages of MVC model View based applications: Delegates, Controllers, IBOutlet. Frames, Labels, Text Fields and Buttons, Alert View, Date Pickers, Sliders, Steppers, Switches.	8 Hours
Unit-4:	User Interface II Image View, Page Controls, Table View, Scroll View, Web View, Collection view, Toolbar, navigation bar, tab bar.	8 Hours

Unit-5:	Managing Data & Testing Property Lists, File storage. Introduction to SQLite, SQLite DML statements, Built in functions to work with SQLite, Introduction to CC Data, CC Data objects – ManagedObjectContext, ManagedObject - Working with CC Data, Introduction to Testing, Types of Testing, Testing Application on Real Device, Application Distribution	8 Hours
<u>Text Books:</u>	1. IOS 9 Programming Fundamentals with Swift: Swift, Xcode, and Cocoa Basics By Matt Neuburg (O'Reilly Media, Inc., 28-Sep-2015)	
<u>Reference Books:</u>	1. Programming iOS 5: By Matt Neuburg (O'Reilly Media, Inc., 15-Mar-2012) *Latest editions of all the suggested books are recommended.	
<u>Additional electronic reference material</u>	1. https://www.tutorialspoint.com/ios/index.htm	

<u>Course Code:</u> IMW601	Generic Elective-III BCA-Semester VI Responsive Website Design	L-3 T-0 P-0 C-3
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding fundamental skills to maintain web server services required to host a website.	
CO2.	Applying markup languages for processing, identifying, and presenting of information in web pages.	
CO3.	Applying scripting languages and web services to transfer data and add interactive components to web pages.	
CO4.	Analyzing web media objects using editing software.	
CO5.	Analyzing formal concepts of layout and organization to design websites that effectively communicate using visual elements.	
<u>Course Content:</u>		
Unit-1:	Introduction to Responsive Web Design -Introduction, Basics of Responsive design – fluid grid, flexible images, and media queries, Responsive design workflow, Targeted devices and device compatibility, remote debugging and emulation in browser, HTML5	8 Hours
Unit-2:	Basics of CSS3 CSS3 – rules, transition, animation, user interface; CSS Responsive – Viewport, grid view, media queries, images, videos and frameworks	8 Hours
Unit-3:	JQuery and JQuery Mobile -jQuery – syntax, selectors, events, JQuery effects, control, functions, structures, JQuery HTML and JQuery traversing, create HTML5 apps using JQuery; jQuery	8 Hours

	Mobile – lists, forms, themes and events.	
Unit-4:	Creating Responsive design -Sizing contents to Viewport, touch targets, Using CSS media queries – create responsive menus, Breakpoint, Using CSS Flexbox, Custom web fonts, Collapsible content for mobile, Responsive forms, Add widgets with Bootstrap framework	8 Hours
Unit-5:	Responsive Patterns and Optimizations - Responsive patterns: Fluid pattern, Column drop pattern, Layout shifter pattern, Off canvas pattern; Optimizations: minor breakpoints, optimizing text layouts, responsive tables.	8 Hours
<u>Text Books:</u>	1. Responsive Web Design with HTML5 and CSS3, 2012, by Frain, Ben	
<u>Reference Books:</u>	1. Step By Step Bootstrap 3: A Quick Guide To Responsive Web Development Using Bootstrap 3, by RiwantoMegosinarso 2. jQuery Mobile: Up and Running, 2012, by Firtman 3. jQuery Mobile Web Development Essentials, 2013, by Raymond Camden *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1. https://www.w3schools.com/css/	

Course Code: IMW602	<div>Generic Elective-III</div> <div>BCA-Semester VI</div> <div>Mobile Testing</div>	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding test mobile applications to address specified business problems using high-level languages, technologies and appropriate methodologies.	
CO2.	Understanding mobile application for publishing for a given framework(s) following legal and ethical guidelines demonstrating an understanding of the publishing process.	
CO3.	Analyzing mobile application issues to determine the best solution.	
CO4.	Analyzing mobile testing procedure that is properly documented and tests the current prototype outside of the development environment.	
CO5.	Analyzing various android testing tools .	
Course Content:		
Unit-1:	Testing Fundamentals -Need of Testing, Levels & Types of Testing : Functional, Black Box, White Box, Regression, Stress, etc., Basic concepts of Software Testing, SDLC, SDLC Phases, STLC : Alpha, Beta, User Acceptance, etc. Test Cases, Test Case Design, Execution of Test Cases, Test suites, Test Plan, Test Strategy. Test Reporting, Defect Management and Release cycles, Test.Automation. Testing lifecycle of mobile applications, mobile application test environments, difference between desktop and mobile application testing as well as testing on emulators and devices.	8 Hours

Unit-2:	Mobile apps testing Mobile application testing landscape, UI and functional mobile application testing strategies, compatibility testing need and methods, non-functional mobile application testing - Performance, security, operations testing - Installation, un-installation, upgrade, testing integration with device features, challenges in testing, difference between testing mobile web and testing native applications.	8 Hours
Unit-3:	Mobile Test tool- Types of tools available, popular test tools for native and web applications, tools for unit testing, functional and non-functional testing. Overview of Mobile Build and Test tools :Junit, Monkeytalk, Appium, Selendroid, Robotium, Ant, Maven, Gradle.	8 Hours
Unit-4:	Introduction to Android testing framework: Junit: Junit Test Framework, Features of Junit Test Framework, Testing Fundamentals-TestCase, TestSuite,TestRunners, JUnit classes, Junit in Android, Android Testing Framework, Test Projects-Directory Structure, Android Testing API, Mock Objects, Activity Testing, what to Test, ContentProvider Testing, service Testing, choosing devices to test, Testing tools	8 Hours
Unit-5:	Using Tools for testing- Introduction to monkeytalk, key features of monkeytalk tool, installation and use of monkeytalk tool for mobile application testing on emulator, PC connected device, mobile web, or cloud device. Using monkey talk : creation of test project, test suite and test script, record and playback feature, different verification techniques, data driven testing methods, synchronization, script parameterization, reporting features. Using Robotium : creation of test project, test suite, Robotium Framework, data driven testing methods	8 Hours
<u>Text Books:</u>	1. Testing and Securing Android Studio Applications, Belen Cruz Zapata. Packt Publishing, 2014.	
<u>Reference Books:</u>	1. Learning Android Application Testing, Paul Blundell, Diego Torres Milano. O'Reilly 2015. 2. The Way of the Web Tester, Jonathan Rasmusson. The Practical Programmer 2016. 3. Testing Applications on the Web: Test Planning for Mobile	

	and Internet-Based Systems Hung Q. Nguyen, Bob Johnson, Michael Hackett, 2012 *Latest editions of all the suggested books are recommended	
<u>Additional electronic reference material</u>	1. https://www.guru99.com/mobile-testing-tools.html	

<u>Course Code:</u> IMW607	Generic Elective-IV BCA-Semester VI Mobile Security	L-3 T-0 P-0 C-3
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Understanding the fundamental design paradigms and technologies to mobile computing applications.	
CO2.	Understanding consumer and enterprise mobile applications using representative mobile devices and platforms using modern development methodologies.	
CO3.	Understanding effective mobile interfaces using human computer interaction principles.	
CO4.	Understanding the role of mobile applications in software intensive systems.	
CO5.	Understanding the usability of representative mobile devices such as smartphones and tablets.	
<u>Course Content:</u>		
Unit-1:	Introduction to Mobile Risks & Security Mobile Risk Model, Primary Risks, Threats and Vulnerabilities, Identity Management, Device Security, Privacy, App Stores, Risk Mitigation Strategies and Controls, Forensics.	8 Hours
Unit-2:	Android 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.	8 Hours
Unit-3:	Web and iOS Introduction to Web Attacks & Trends, Common Threats :URL	8 Hours

	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.	
Unit-4:	Mobile Malware and Secure Mobile Development Mobile malware : Trojans, worms, ransomware, phishing, pharming, protecting against malware and other security risks – 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.	8 Hours
Unit-5:	Mobile Device Management 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.	8 Hours
<u>Text Books:</u>	1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole. Wiley 2008.	
<u>Reference Books:</u>	1. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, Dafydd Stuttard, Marcus Pinto. Wiley 2011. 2. Bulletproof Android: Practical Advice for Building Secure Apps, Godfrey Nolan. Pearson Education 2015. 3. Android Security: Attacks and Defenses, AbhishekDubey, Anmol Mishra. CRC Press 2013. *Latest editions of all the suggested books are recommend	
<u>Additional electronic reference material</u>	1. https://medium.com/@shahbaz.qaiser.cs/mobile-security-framework-guide-f4ad515665a2	

Course Code: IMW605	Generic Elective-IV BCA-Semester VI Building Websites Using HTML5	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding how to use HTML5 to create website and also its scope and Limitations	
CO2.	Understanding how to use CSS to improve the look of a website.	
CO3.	Understanding the use different HTML5 features.	
CO4.	Understanding how to handle Multimedia using HTML5 and API provided.	
CO5.	Understanding the use of Canvas for graphics in HTML5.	
Course Content:		
Unit-1:	Introduction to HTML5: Why HTML5? HTML, XHTML, Styling HTML5 with CSS, When can you use HTML5?	8 Hours
Unit-2:	Features of HTML5: Introduction to canvas, multimedia, storage, working offline, geolocation, input types, placeholder text, micro data.	8 Hours
Unit-3:	Multimedia: Video containers, video codec, audio codec, Multimedia accessibility, MIME. Communication API	8 Hours
Unit-4:	Canvas and Storage: Basics of Canvas, Using transforms, capturing images, drawing on the animating the canvas, Web storage, Web SQL database	8 Hours
Unit-5:	Geolocation: API methods, Messages, workers and sockets. Limitation in current browsers.	8 Hours
Text Books:	1.HTML5: Up and Running by Mark Pilgrim, O'Reilly, August 2010	
Reference Books:	1. Pro Html5 Programming: Powerful App Is For Richer Internet Application Development by Peter Lubbers, Brian Albers, Frank Salim, Ric Smith, Apress, 2010 *Latest editions of all the suggested books are recommended	

<u>Additional electronic reference material</u>	1. https://www.tutorialspoint.com/html5/index.htm	

<u>Course Code:</u> IMW652	<div>BCA-Semester VI</div> <div>Basic iOS Application Development Lab</div>	L-0 T-0 P-2 C-1
<u>Course Outcomes:</u>	On completion of the course, the students will be :	
CO1.	Creating a program to print student details using class & objects	
CO2.	Creating a program to instantiate Circle object using protocols	
CO3.	Creating a program to add a method for existing class using categories	
CO4.	Creating a program to display digital clock using threads	
CO5.	Creating a program to collect n names and print them using arrays	
<u>Course Content:</u>		
	<ol style="list-style-type: none"> 1. Write a program to print student details using class & objects 2. Write a program to instantiate Circle object using protocols 3. Write a program to add a method for existing class using categories 4. Write a program to display digital clock using threads 5. Write a program to collect n names and print them using arrays 6. Write a program to traverse array using fast enumerations 7. Develop an app to perform simple arithmetic operation using basic controls 8. Develop an app to display list of items using table view 9. Develop an app to display list of images using image view and navigate them 	

	10. Develop an app to manipulate file like create and delete 11. Develop an app to manipulate data using SQLite 12. Develop an app to manipulate data using CC Data	
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Course Code: IMW651	<div>BCA-Semester VI</div> <div>Major Project</div>	L-0 T-0 P-20 C-10
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying practical knowledge within the chosen area of technology for project development	
CO2.	Identifying , analyse, formulate and handle programming projects with a comprehensive and systematic approach	
CO3.	Contributing as an individual or in a team in development of technical projects	
CO4.	Developing effective communication skills for presentation of project related activities	
CO5.	Identifying programming projects with a comprehensive and systematic approach	
Course Content:		
	<p>The students will undertake a project as part of their final semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.</p>	

If the student chooses to undertake an industry project, then the topic should be informed to the mentor, and the student should appear for intermediate valuations. Prior to undertaking this project the students undergo a bridge course.

Bridge Course:

The bridge course ensures that all the students have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through a week mandatory classroom participation where faculty and other experts will give adequate inputs in application based courses, IT and soft skills.

The Project:

Each student will be allotted a Faculty Guide and an Industry Guide during the internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project.

Each student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.

Project Evaluation Guidelines:

The Project evaluator(s) verify and validate the information presented in the project report.

The break-up of marks would be as follows:

4. Internal Evaluation
5. External Assessment

6. Viva Voce

Internal Evaluation:

Internal Evaluator of project needs to evaluate Internal Project work based on the following criteria:

- Project Scope , Objectives and Deliverables
- Research Work, Understanding of concepts
- Output of Results and Proper Documentation
- Interim Reports and Presentations– Twice during the course of the project

External Evaluation:

The Project evaluator(s) perform the External Assessment based on the following criteria.

- Understanding of the Project Concept
- Delivery Skill
- The Final Project Report
- Originality and Novelty

The Final Project Report Details:

- The report should have an excel sheet that documents the work of every project member

Viva Voce

- Handling questions
- Clarity and Communication Skill

Marking Scheme:

1. **Internal Evaluation:** 35% of Total Marks
2. **External Evaluation:** 50% of Total Marks
3. **Viva Voce:** 15 % of Total Marks

For e.g., If the total mark for the project is 100, then

❖ Internal Evaluation = 35 marks

The break-up of marks is shown below:-

- Interim Evaluation 1: 10 marks
- Interim Evaluation 2: 10 marks
- Understanding of concepts: 5 marks

	<ul style="list-style-type: none"> • Programming technique: 5 marks • Execution of code : 5 marks <p>❖ External Evaluation = 50 marks</p> <p>The break-up of marks is shown below:-</p> <ul style="list-style-type: none"> • Project Report: 15 marks • Explanation of project working: 10 marks • Execution of code: 10 marks – (if done in industry, a stand-alone module can be reprogrammed and submitted. Error rectification etc. can be included by the evaluator) • Participation in coding: 15 marks <p>❖ Viva Voce = 15 marks</p> <p>The break-up of marks is shown below: -</p> <ul style="list-style-type: none"> • Questions related to project: 10 marks • Questions related to technology: 5 marks <p>The Project evaluator(s) verifies and validates the information presented in the project report.</p>	
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