



HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)
CHENNAI

DEPARTMENT OF COMPUTER APPLICATIONS

B.C.A-Bachelor of Computer Applications
Specialization in
General/Database Systems/Multimedia and Animations
(3 YEARS)

CURRICULUM and SYLLABUS

Regulation 2018

(Applicable for Students admitted from Academic Year 2018-2019)

DEPARTMENT OF COMPUTER APPLICATIONS

SCHOOL OF COMPUTING SCIENCES

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE VISION AND MISSION

Motto:

To Make Every Man a Success and No Man a Failure

Vision:

To be an International Institute of Excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society.

Mission:

- To create an ecosystem that promotes learning and world class research.
- To nurture creativity and innovation.
- To install highest ethical standards and values.
- To pursue activities for the development of the Society.
- To develop national and international collaborations with institutes and industries of eminence.
- To enable graduates to become future leaders and innovators.

Value Statement:

Integrity, Innovation, Internationalization.

DEPARTMENT OF COMPUTER APPLICATIONS

VISION AND MISSION

VISION

The department of Computer Applications aims to transform graduates into software experts with high degree of technical skill and to encourage students towards research.

MISSION

- To establish a strong foundation of industrial, R&D and academic collaborations for training and research.
- To provide strong theoretical foundation complemented with extensive practical training.
- To design and deliver curriculum to meet the changing the needs of industry.
- To promote all round personality development of the students through interaction with alumni, academia and industry.

B.C.A(Bachelor of Computer Applications)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The Program Educational Objectives (PEOs) are defined and developed for each program with the consultation and involvement of various stakeholders such as management, students, industry, regulating authorities, alumni, faculty and parents. Their interests, social relevance and contributions are taken into account in defining and developing the PEOs.

The Program Educational Objectives (PEOs) of the **Computer Applications** are listed below:

- PEO I** To provide students with a strong foundation in the Mathematical, Scientific and Engineering fundamentals necessary to formulate, solve and analyse engineering problems and to prepare them for graduate studies, R&D.
- PEO II** To provide exposure to cutting edge technologies with adequate training and opportunities to work as teams on multidisciplinary projects with effective communication skills, ethics and leadership qualities.
- PEO III** To prepare the students for a successful career in IT and ITES industries with effective Institute-Industry Interaction.
- PEO IV** To inculcate the desire for lifelong learning and contribute to the society and introduce them the best practices.

PROGRAM OUTCOMES (ALIGNED WITH GRADUATE ATTRIBUTES) (PO)

At the end of this program, graduates will be able to

- PO1 Computer knowledge:** Apply the knowledge of mathematics, computer Fundamentals to IT applications.
- PO2 Design/Development of solutions:** Design solutions for IT applications using latest technologies and develop and implement the solutions using various latest languages.
- PO3 Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex IT applications with an understanding of the limitations.
- PO4 Environment and sustainability:** Understand the impact of the IT analyst solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
- PO5 Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO6 Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PROGRAM SPECIFIC OUTCOMES (PSO)**B.C.A- Bachelor of Computer Applications (General)**

At the end of this program, graduates will be able to execute the outcomes defined by Professional body.

- PSO1:** Impart the basic knowledge and conceptual understanding of Computing Systems through mathematical and analytical skills.
- PSO2:** Analyze a problem, identify the computing requirements and using procedures find a solution
- PSO3:** Improve the analytical knowledge of the through innovative system design using modern tools and techniques as a team.

PROGRAM SPECIFIC OUTCOMES (PSO)**B.C.A- Bachelor of Computer Applications
Specialization in Database Systems**

At the end of this program, graduates will be able to execute the outcomes defined by Professional body.

- PSO1:** Impart the basic knowledge and conceptual understanding of Computing Systems through mathematical and analytical skills.
- PSO2:** Associate the learning from the courses related to Databases, Operating Systems, Data Structures, Programming Languages to arrive at solutions to real world problems
- PSO3:** Design and develop database systems used for storing digital data in real world applications

PROGRAM SPECIFIC OUTCOMES (PSO)**B.C.A- Bachelor of Computer Applications
Specialization in Multimedia and Animations**

At the end of this program, graduates will be able to execute the outcomes defined by Professional body.

- PSO1:** Acquire multiple skills that will enhance their employability in different segments of Animation, Gaming and Entertainment industry.
- PSO2:** Develop competence in the fields of Computer Graphics assets creation, Visual Effects, Gaming and Graphic designing
- PSO3:** Apply acquired knowledge in the field of multimedia in practice and independently continue to expand knowledge in this field.

B.C.A- Bachelor of Computer Applications -Curriculum and Syllabus									
(110 CREDIT STRUCTURE)									
SEMESTER - I									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	BS	ELA4104	English -1	3	0	0	3	0	3
2	BS	MAA1101	Applied Mathematics	3	0	0	3	0	3
3	BS	BCB2101	Computer Concepts & Problem Solving	3	1	0	4	0	4
4	BS	BCB2102	Introduction to Digital Logic Fundamentals	3	1	0	4	0	4
5	PC	BCB2103	Programming in C	3	0	0	3	0	3
PRACTICAL									
6	PC	BCB2131	Computer Concepts and Problem Solving Laboratory	0	0	2	1	0	2
7	PC	BCB2132	C Programming Laboratory	0	0	2	1	0	2
Total				15	2	4	19	0	21
L – Lecture; T – Tutorial; P – Practical; S- Self Study; C – Credit; TCH -Total Contact Hour									

SEMESTER - II									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	BS	ELA4116	English –II	3	0	0	3	0	3
2	BS	GEA1116	Business Statistics	3	1	0	4	0	4
3	PC	BCB2116	Data Structures	3	1	0	4	0	4
4	PC	BCB2117	Microprocessors	3	0	0	3	0	3
5	BS	GEA2117	Introduction to Accounting	3	0	0	3	0	3
PRACTICAL									
6	PC	BCB2141	Data Structures Lab	0	0	2	1	0	2
7	BS	GEA1146	Accounting Laboratory	0	0	2	1	0	2
Total				15	2	4	19	0	21
L – Lecture; T – Tutorial; P – Practical; S- Self Study; C – Credit; TCH -Total Contact Hour									

SEMESTER - III									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	PC	BCB2201	Web Designing	3	0	0	3	0	3
2	PC	BCB2202	PC Hardware & Networking	3	0	0	3	0	3
3	PC	BCB2203	Software Engineering	3	0	2	4	0	5
4	PC	BCB2204	Object Oriented Programming	3	0	0	3	0	3
5	PC	BCB2205	Computer Organization	3	0	0	3	0	3
PRACTICAL									
6	PC	BCB2231	Object Oriented Programming Laboratory	0	0	2	1	0	2
7	PC	BCB2232	Web Designing Laboratory	0	0	2	1	0	2
Total				15	0	6	18	0	21
L – Lecture ; T – Tutorial ; P – Practical ; S- Self Study; C – Credit; TCH -Total Contact Hour									

SEMESTER - IV									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	PC	BCB2216	Web Programming using PHP	3	0	2	4	0	5
2	PC	BCB2217	Operating Systems	3	0	0	3	0	3
3	PC	BCB2218	Computer Networks	3	0	0	3	0	3
4	PC	BCB2219	Database Management Systems	3	0	0	3	0	3
5	PC	BCB2220	Enterprise Resource Planning	3	0	0	3	0	3
PRACTICAL									
6	PC	BCB2241	Relational Database Management Systems Laboratory	0	0	2	1	0	2
7	PC	BCB2242	Operating Systems Laboratory	0	0	2	1	0	2
Total				15	0	6	18	0	21
L – Lecture ; T – Tutorial ; P – Practical ; S- Self Study; C – Credit; TCH -Total Contact Hour									

SEMESTER - V									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	PC	BCB2301	Multimedia Systems	3	0	0	3	0	3
2	PC	BCB2302	Introduction to java programming	3	0	0	3	0	3
3	PC	BCB2303	Introduction to python programming	3	0	0	3	0	3
4	DE	*****	E1 Elective – I	3	0	0	3	0	3
5	DE	*****	E2 Elective – II	3	0	0	3	0	3
PRACTICAL									
6	PC	BCB2331	Multimedia Systems Laboratory	0	0	2	1	0	2
7	PC	BCB2332	Java Programming laboratory	0	0	2	1	0	2
Total				15	0	4	17	0	19
L – Lecture ; T – Tutorial ; P – Practical ; S- Self Study; C – Credit; TCH -Total Contact Hour									

SEMESTER - VI									
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	PC	BCB2316	Computer Graphics	3	0	0	3	0	3
2	PC	BCB2317	Data Warehousing and Data Mining	3	0	0	3	0	3
3	DE	*****	E3 Elective – III	3	0	0	3	0	3
4	DE	*****	E4 Elective – IV	3	0	0	3	0	3
5	DE	*****	E5 Elective – V	3	0	0	3	0	3
PRACTICAL									
6	PC	BCB2346	Project Work	0	0	8	4	0	8
Total				15	0	8	19	0	23
L – Lecture ; T – Tutorial ; P – Practical ; S- Self Study; C – Credit; TCH -Total Contact Hour									

LIST OF DEPARTMENTAL ELECTIVES WITH GROUPING - SEMESTER WISE									
SEM	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
ELECTIVE – I									
5	DE	BCC2351	Mobile application development	3	0	0	3	0	3
5	DE	BCC2352	Digital marketing	3	0	0	3	0	3
5	DE	BCC2353	Information Security	3	0	0	3	0	3
5	DE	BCC2354	Sketching & drawing	3	0	0	3	0	3
5	DE	BCC2355	Principles of computer security	3	0	0	3	0	3
ELECTIVE – II									
5	DE	BCC2361	Scripting languages	3	0	0	3	0	3
5	DE	BCC2362	Cyber forensics	3	0	0	3	0	3
5	DE	BCC2363	Data visualization & visualization frameworks	3	0	0	3	0	3
5	DE	BCC2364	Graphic design & visual arts	3	0	0	3	0	3
5	DE	BCC2365	Ethical Hacking and Systems Defence	3	0	0	3	0	3
ELECTIVE – III									
6	DE	BCC2371	Online ads designs and management	3	0	0	3	0	3
6	DE	BCC2372	Machine learning – R programming	3	0	0	3	0	3
6	DE	BCC2373	Hadoop administration	3	0	0	3	0	3
6	DE	BCC2374	2-D Animation	3	0	0	3	0	3
6	DE	BCC2375	Network Security	3	0	0	3	0	3
ELECTIVE – IV									
6	DE	BCC2381	Artificial intelligence	3	0	0	3	0	3
6	DE	BCC2382	E-commerce	3	0	0	3	0	3
6	DE	BCC2383	Soft computing	3	0	0	3	0	3
6	DE	BCC2384	3D Animation	3	0	0	3	0	3
6	DE	BCC2385	Cyber Security Techniques and Tools	3	0	0	3	0	3
ELECTIVE – V									
6	DE	BCC2391	Software testing	3	0	0	3	0	3
6	DE	BCC2392	Business intelligence	3	0	0	3	0	3
6	DE	BCC2393	Software quality management	3	0	0	3	0	3
6	DE	BCC2394	Secure Coding Practices	3	0	0	3	0	3
L – Lecture; T – Tutorial; P – Practical; S- Self Study; C – Credit; TCH -Total Contact Hour									

Specialization in Database Systems

LIST OF ELECTIVES									
SEM	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
5	DE	BCC2351	Mobile application development	3	0	0	3	0	3
5	DE	BCC2363	Data visualization & visualization frameworks	3	0	0	3	0	3
6	DE	BCC2372	Machine learning – R programming	3	0	0	3	0	3
6	DE	BCC2373	Hadoop administration	3	0	0	3	0	3
6	DE	BCC2392	Business intelligence	3	0	0	3	0	3
<i>L – Lecture; T – Tutorial; P – Practical; S- Self Study; C – Credit; TCH -Total Contact Hour</i>									

Specialization in Multimedia and Animations

LIST OF ELECTIVES									
SEM	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
5	DE	BCC2354	Sketching & drawing	3	0	0	3	0	3
5	DE	BCC2364	Graphic design & visual arts	3	0	0	3	0	3
6	DE	BCC2371	Online ads designs and management	3	0	0	3	0	3
6	DE	BCC2374	2-D Animation	3	0	0	3	0	3
6	DE	BCC2384	3D Animation	3	0	0	3	0	3
<i>L – Lecture; T – Tutorial; P – Practical; S- Self Study; C – Credit; TCH -Total Contact Hour</i>									

SEMESTER – I

COURSE TITLE		ENGLISH-I			CREDITS	3
COURSE CODE		ELA4104	COURSE CATEGORY	BS	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-4
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		This course has been designed to develop students’ language skills and communication needs. It attempts to develop their proficiency through oral communication skills with an application knowledge of grammar and vocabulary. This course teaches students how to communicate accurately, appropriately and fluently in professional and social situations.				
Course Objective		<ol style="list-style-type: none">1. To acquire self-confidence by which the learner can improve upon their informative listening skills by an enhanced acquisition of the English language2. To provide an environment to Speak in English at the formal and informal levels and use it for daily conversation, presentation, group discussion and debate3. To equip the students to read intensively and extensively, short meaningful extracts from literary and non-literary texts and identify various types of connections among statements4. To enhance the oral communication skills of the students via functions in clusters and respond to daily conversations naturally5. To equip the learners in develop critical thinking skills and participate in Group activities, task-based activities and respond to hypothetical situations				
Course Outcome		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Identify relationships between topic sentences and subordinate sentences2. Develop the skill to listen to speeches, lectures, telephone conversations, recorded versions of all the above, and responding non-verbally as well as verbally3. Develop a conscious awareness about the processes of metacognitive skills by considering societal and environmental contexts4. Apply and analyse the contextual knowledge through reading the passages and participate in group activities and task-based activities5. Identify his/her choicest field or specialized area through wide reading such as science fiction, crime thriller and so on by applying ethical principles and contributing to society				
Prerequisites: Plus Two English-Intermediate Level						

CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	-	1	-	-	3	-	2	-
CO-2	-	1	-	1	1	-	1	1	2
CO-3	1	-	1	-	-	2	-	2	-
CO-4	-	-	-	1	-	1	1	1	-
CO-5	1	1	-	-	1	3	1	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: EXTENSIVE READING									(9L)
<p>Reading short meaningful extracts from literary and non-literary texts and identifying various types of connections among statements such as reason-result, statement-illustration, cause-effect, result-reason, addition, contradiction/opposite, introduction, furthering, adding, summing up, conclusion - Tracing the texture of texts — Referencing -- Anaphoric and cataphoric references — Identifying relationships between topic sentences and subordinate sentences</p> <p>Suggested Activities: Reading leading to making notes—Random note making—Systematizing conventions</p> <p>Suggested Reading: 1. Cambridge Academic English, An integrated skills course for EAP by Martin Hewings and Craig Thaine, by Cambridge University Press, 2014 2. Professional Speaking Skills by Aruna Koneru, Oxford Press, 2015 3. Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016. 4. English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 edition</p>									CO-1 BTL-2
MODULE 2: INTENSIVE READING									(9L)
<p>Matching discourse functions with corresponding linguistic structures — one function carried out through several structures — one structure fulfilling several functions - Cohesion and cohesive markers — Coherence and grammatical linkers -Reading newspapers at breakfast table — Reading publicity materials – Skimming – Reading quickly for grasping the main idea or point — Scanning — Reading carefully, looking for specific information — Railway timetable — medical prescription — textbooks — cover letters accompanying important documents - Reading and Note making — Purposes of note making -- Various formats of making notes — Short forms and abbreviations — commonly used and personal conventions</p> <p>Suggested activities: Non-literary texts for comparison and contrast -- Identifying words, phrases, idioms, phatic communion phrases, formulaic expressions etc. (which suits day to day communication) from reading materials and using them appropriately in one's own use</p>									CO-2 BTL-3

<p>Suggested sources:</p> <ol style="list-style-type: none"> 1. (Listening and Speaking Modules) – Language Lab 2. Professional Speaking Skills by Aruna Koneru, Oxford Press 3. English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 edition 4. Cambridge Academic English, An integrated skills course for EAP by Martin Hewings and Craig Thaine, by Cambridge University Press, 2014 	
MODULE 3 : CRITICAL THINKING (9L)	
<p>Identifying differences and similarities between pairs of pictures, illustrations, diagrams etc. and talking about them by working in pairs and small groups - Defining 'argument' — Components of an argument: reason and conclusion — illustrating arguments — Identifying arguments from a set of statements and identifying their components</p> <p>Suggested Activities:</p> <p>Developing critical thinking skills through visuals (print and electronic), Choose the best responses from the statements, Group activities, task based activities, responses to hypothetical situations</p> <p>Suggested sources:</p> <ol style="list-style-type: none"> 1. Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition 2. Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016. 	<p>CO-3 BTL-4</p>
MODULE 4 : ORAL COMMUNICATION SKILLS (9L)	
<p>Functions in clusters: Cluster 1. Inviting, responding with thanks, accepting invitation/declining - invitation with a valid reason, promising to meet on a later occasion, taking leave & bidding farewell 2. Apologizing, explaining reason, promising not to repeat the mistake, reassuring, taking leave - 3. Correcting someone, defending the right point or stance, convincing the other etc - 4. Greeting, appreciating something good, illustrating the point further, Complimenting - 5. Complaining, defending logically, demanding things to be set right, and producing proof or evidence - Examples in the form of short recorded extracts of direct interactions as well as telephone conversations from various walks of life such as office work, business, advertisement, law court, police, various service providers such as gas agency, door delivery agency and so on</p> <p>Suggested activities:</p> <p>Listening to small meaningful chunks of day-to-day communication and responding to them naturally -- Greetings, formulaic expressions etc. Identifying and listing natural ways of functioning in contexts, based on short extracts taken from plays, or dialogues from fiction.</p> <p>Suggested sources:</p> <ol style="list-style-type: none"> 1. Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016. 	<p>CO-4 BTL-3</p>

MODULE 5 – FUNCTIONAL GRAMMAR		(9L)
Sentence – Parts of Speech – Comparative Adjectives - Pronouns – prepositions – conjunctions – Articles – Non-finite Verbs - tenses – conditionals – question tags – modal verbs – common errors – concord – Reported speech – Active & Passive voice Suggested Activities: Exercises related to grammatical aspects and its function in functional English (day to day conversations) Suggested Sources: 1. Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition		CO-5 BTL-1
TEXT BOOKS		
1.	Steve Hart et al (2016), <i>Embark, English for Undergraduates</i> , Cambridge University Press	
2	Dolly John(2014), <i>English for Life and the Workplace through LSRW&T skills</i> , Pearson Publications.	
REFERENCE BOOKS		
1	Sabina Pillai and Agna Fernandez (2018), <i>Soft Skills & Employability Skills</i> , Cambridge University Press .	
2	Collins(2012), <i>Skills for the TOEFL IBT Test</i>	
3	Aruna Konreu(2015), <i>Professional Speaking Skills</i> , Oxford Publications.	
E BOOKS		
1	https://www.britishcouncil.in/english/courses-business	
2	http://www.bbc.co.uk/learningenglish/english/features/pronunciation	
3	http://www.cambridgeenglish.org/learning-english/free-resources/write-and-improve/	
MOOC		
1	https://www.mooc-list.com/tags/english	
2	https://www.mooc-list.com/course/adventures-writing-stanford-online	
3	http://www.cambridgeenglish.org/learning-english/free-resources/mooc/	

COURSE TITLE		APPLIED MATHEMATICS				CREDITS		3	
COURSE CODE		MAA1101	COURSE CATEGORY		BS	L-T-P-S	3-0-0-0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL		BTL-3	
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz		Attendance		ESE
15%		15%		10%	5%		5%		50%
Course Description		The course develops the basic Mathematical skills of students in analytical and problem-solving skills for computer applications. The topics introduced will serve as basic tools for specialized studies in many fields of which includes sequence and series, Application of summation of series. Problems in probability and geometric properties of plane helps them to understand various application in mathematics							
Course Objective		1. To obtain the knowledge of equations 2. To understand the application of Arithmetic and Geometric Progression 3. To able to reflect on geometric properties of plane and linear systems 4. To understand the expansion of trigonometric ratios 5. To able to reflect the chance that an event will happen using Baye’s theorem.							
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the relation between roots and coefficients. 2. Apply mathematical Thinking through the application of summation of series 3. Interpret the mathematical results using geometric properties of plane and get solution to linear system through cramer’s rule. 4. Apply the knowledge of trigonometric expansion to solve the problems 5. Solve and analyze Baye’s theorem, binomial and normal distribution.							
Prerequisites: Basic Mathematics									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	-	-	-	-	2	3	-	-
CO-2	1	1	1	-	2	-	3	2	-
CO-3	3	-	-	-	-	-	1	-	-
CO-4	2	2	-	2	-	1	3	-	1
CO-5	3	-	-	2	-	-	3	-	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: THEORY OF EQUATIONS (9L)									

Theory of equations - solutions of a quadratic equations-polynomials-algebraic equations –transcendental equations-irrational roots and imaginary roots- relation between roots and coefficient-reciprocal equations. Suggested Readings: Algebraic equation.		CO-1 BTL-3
MODULE 2: SEQUENCES AND SERIES (9L)		
Binomial, Exponential and logarithmic series (without proof)-Arithmetic progression- Geometric progression- Applications to summation of series Suggested Readings: Problems dealings with AP and GP		CO-2 BTL-2
MODULE 3: LINEAR ALGEBRA (9L)		
Linear Algebra: Types of matrices - Matrix operations - canonical forms - Inverse of a matrix - Geometric properties of plane linear transformaticm - Rotation - Reflection - Expansion and compressions - Shears - translation - successive transformation - Inverse transformation - Rank and nullity - Linear systems and matrices - Methods of solution to Linear systems (Cramer’s Rule). Suggested Readings: Solving simultaneous equations		CO-3 BTL-3
MODULE 4: TRIGONOMETRY (9L)		
Trigonometry-Expansions of $\sin \sin n\theta$, $\cos \cos n\theta$ and $\tan \tan n\theta$ – Conversion of $\sin \sin n\theta$, $\cos \cos n\theta$ and $\tan \tan n\theta$ in terms of sines / cosines of multiples of θ - Expansions of $\sin^n\theta$, $\cos^n\theta$ - Expansion of $\sin^n\theta \cos^m\theta$ Suggested Readings: Circular functions, D’Moivre’s Theorem.		CO-4 BTL-2
MODULE 5: PROBABILITY (9L)		
Probability – definition of probability – mutually exclusive events - mutually independent events - sample space & events - conditional probability - Baye’s theorem - mean – standard deviation – Binomial and Normal distributions Suggested Readings: Various distribution and applications of probability		CO-5 BTL-3
TEXT BOOKS		
1.	Narayanan, S. and Manickavachagam Pillai(2009), <i>Calculus</i> , Vol. I & Vol. II, S. Viswanathan Printers & Publishers	
REFERENCE BOOKS		
1.	Shanthi Narayanan(2005), <i>Differential Calculus</i> , S Chand & Co Ltd	
E BOOKS		
1.	https://www.e-booksdirectory.com/details.php?ebook=10512	
MOOC		
1.	https://www.coursera.org/learn/trigonometry	

COURSE TITLE		COMPUTER CONCEPTS & PROBLEM SOLVING				CREDITS		4		
COURSE CODE		BCB2101	COURSE CATEGORY		BS		L-T-P-S		3-1-0-0	
Version	1.0	Approval Details			26th ACM 23-03-2019		LEARNING LEVEL		BTL-3	
ASSESSMENT SCHEME										
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance		ESE
15%		15%		10%		5%		5%		50%
Course Description		Solving problems is the core of computer science. Programmers must first understand how a human solves a problem, then understand how to translate this "algorithm" into something a computer can do, and finally how to "write" the specific syntax (required by a computer) to get the job done.								
Course Objective		1. To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, 2. To identify, formulate, and solve complex engineering problems by applying principles 3. To apply engineering design to produce solutions that meet specified needs 4. To develop and conduct appropriate experimentation, analyze and interpret data. 5. To acquire and apply new knowledge using appropriate learning strategies.								
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the basics of computer 2. Apply word processing techniques 3. Implement word processing using spreadsheets 4. Analyze the problem-solving techniques 5. Apply factoring and array techniques in real time								
Prerequisites: Computer Basics										
CO, PO AND PSO MAPPING										
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3	
CO-1	3	3	2	-	-	1	2	-	2	
CO-2	3	3	2	2-	-	-	-	-	1	
CO-3	3	3	2	-	1	-	2	-	-	
CO-4	2	3	3	-	-	-	-	-	1	
CO-5	3	3	3	-	-	2	3	2	3	
1: Weakly related, 2: Moderately related and 3: Strongly related										
MODULE 1: FUNDAMENTALS OF COMPUTERS									(9L+3T)	
Evolution of Computers – Inputs/Outputs – Alternative Methods of Input – Organization of Modern Digital Computers – Operating System – Multitasking OS – Graphical User Interface.									CO-1 BTL-2	

Practical component: System, MS-OFFICE Suggested Readings: Evaluation computers and multitasking operation.		
MODULE 2: WORD PROCESSING		(9L+3T)
Word Processing Programs and Their Uses – Word Processor’s Interface – Editing Text – Formatting Text –Macro- Special Features of Word – Desktop Publishing Service – Converting doc into www pages Practical component: MS - Word Suggested Readings: DTP and Special feature of Word		CO-2 BTL-2
MODULE 3: SPREADSHEET SOFTWARE		(9L+3T)
Spreadsheet Programs – applications – Spreadsheet package features, attributes - structure, label, data, importing data, formula, functions – data handling – Managing workbooks. Practical component: MS- Excel Suggested Readings: Formula, Functions and Managing workbooks		CO-3 BTL-3
MODULE 4: INTRODUCTION TO COMPUTER PROBLEM SOLVING		(9L+3T)
Introduction – Problem Solving aspects-Top-Down Design-Implementation of Algorithms – Program Verification-Efficiency of Algorithms-Analysis of Algorithm-fundamental algorithm-factorial computation-generation of Fibonacci sequence. Practical component: Turbo C Suggested Readings: Analysis of Algorithm and Efficiency of algorithm		CO-4 BTL-2
MODULE 5 : FACTORING AND ARRAY TECHNIQUES		(9L+ 3T)
Factoring Methods-finding the square root of a number-generating prime numbers- Array Techniques array order reversal-Finding the maximum number in a set- Removal of duplicates from an ordered Array-finding the kth smallest element. Practical component : Turbo C Suggested Readings: Factoring and Array Techniques		CO-5 BTL-2
TEXT BOOKS		
1	Dorothy House(2015), “Microsoft Word, Excel, and PowerPoint: Just for Beginners. Outskirts Press	
2	Peter Norton(2017), “Introduction to Computers”,4th Edition, TMH Ltd, New Delhi.	
REFERENCE BOOKS		
1	R.G. Dromey(2015),”How to solve it by Computers”, Pearson Publishers, New Delhi.	
E BOOKS		
1	https://www.amazon.in/How-Solve-Computer-R-Geoff-Dromey/dp/0134339959	
MOOC		
1.	https://www.coursera.org/learn/creative-problem-solving	

COURSE TITLE		INTRODUCTION TO DIGITAL LOGIC FUNDAMENTALS				CREDITS	4		
COURSE CODE		BCB2102	COURSE CATEGORY		BS	L-T-P-S	3-1-0-0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-4		
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance	ESE
15%		15%		10%		5%		5%	50%
Course Description		The course covers the design and application of digital logic circuits, including combinational and sequential logic circuits.							
Course Objective		1. To understand number representation and conversion between different representation in digital electronic circuits. 2. To analyze logic processes and implement logical operations using combinational logic circuits. 3. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines. 4. To impart knowledge on the functioning of the peripheral devices for accessing memory 5. To familiarize the concepts of asynchronous sequential circuits and to analyze asynchronous sequential systems in terms of state machines.							
Course Outcome		Upon completion of this course, the students will be able to 1. Apply and represent the various data types in different logic gate design employing 1’S and 2’s complement nature. 2. Analyse, design and implement combinational logic circuit. Analyse, design and implement sequential logic circuits 3. Implement and interpret the peripheral devices direct access to primary memory. 4. Implement and interpret the analysis and design of circuit design 5. Describe factoring techniques							
Prerequisites: Digital Electronics									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	
CO-1	3	3	1	3	-	1	-	1	
CO-2	2	1	1	2	2	2	2	-	
CO-3	1	3	1	1	-	1	-	-	
CO-4	3	2	1	3	-	1	2	2	
CO-5	3	3	1	2	-	2	3	-	
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION TO DIGITAL DESIGN								(9L+3T)	
Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic Boolean Algebra and Logic Gates: Basic								CO-1 BTL-2	

Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates. Suggested Reading: CMOS Family of ICs		
MODULE 2: LOGIC GATES		(9L+3T)
Minimization: K-Map Method, POS - SOP, Don't Care Conditions, NAND, NOR Implementation, Combinational Logic: Combinational Circuits, Analysis and Design Procedure, Binary Adder, Subtractor, Magnitude Comparator, Decoders, Encoders, Multiplexers. Suggested Reading: Parity Generator and Checker		CO-2 BTL-4
MODULE 3: SEQUENTIAL CIRCUIT		(9L+3T)
Synchronous Sequential Logic: Sequential Circuits-Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment Design Procedure. Suggested Reading: Mealy and Moore Model		CO-3 BTL-4
MODULE 4: DIGITAL COMPONENTS		(9L+3T)
Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counters-Johnson Counter. Suggested Reading: BCD to seven segment Decoder		CO-4 BTL-4
MODULE 5: FACTORING AND ARRAY TECHNIQUE		(9L+3T)
Asynchronous Sequential Circuit: Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of State and Flow Tables, Race – Free State Assignment Hazards, Design Examples. Suggested Reading: Algorithmic state machine Chart		CO-5 BTL-4
TEXT BOOKS		
1	M.Morris Mano, “ <i>Digital Design</i> ”, 3rd edition, Pearson Education, Delhi.	
REFERENCE BOOKS		
1.	Ananthi Sheshasayee & J.G. Sheshasaayee(2016), <i>Digital Logic Fundamentals</i> , Margham Publications.	
E BOOKS		
1.	https://www.cs.indiana.edu/classes/b441-sjoh/notes/ADD/1.pdf	
2.	https://www.springer.com/gp/book/9783030361952	
MOOC		
1.	https://www.coursera.org/learn/digital-systems	
2.	https://nptel.ac.in/courses/117/106/117106114/	
3.	https://nptel.ac.in/courses/108/105/108105132/	

COURSE TITLE		PROGRAMMING IN C				CREDITS	3		
COURSE CODE		BCB2103	COURSE CATEGORY		PC	L-T-P-S	3- 0- 0 -0		
Version	1.0	Approval Details			26th ACM 23-03-2019	LEARNING LEVEL	BTL-3		
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz		Attendance	ESE		
15%		15%	10%	5%		5%	50%		
Course Description		The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also, by learning the basic programming constructs they can easily switch over to any other language in future.							
Course Objective		1. To impart adequate knowledge on the need of programming languages and problem solving techniques. 2. To develop an in-depth understanding of functional and logical concepts of C Programming. 3. To provide exposure to problem-solving through C programming. 4. To familiarize the basic syntax and semantics of C Language 5. To access files and to read and write content in files							
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the basic terminology used in computer programming and can able to use different data types in a computer program. 2. Implement and be able to develop logics using looping concepts which will help them to create programs, applications in C. 3. Design and implement programs involving functions and recursions in C language. 4. Write, compile and debug programs using various types of arrays and structures. 5. Apply the concepts of pointers and ability to handle possible errors during program execution.							
Prerequisites: Basic Computer Knowledge.									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	-	-	1	1	1	3	2	1
CO-2	2	1	1	1	-	1	-	-	1
CO-3	3	-	-	2	1	1	2	2	-
CO-4	1	2	1	-	-	1	-	2	1
CO-5	3	2	-	2	-	3	3	-	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 - INTRODUCTION								(9L)	
C fundamentals Character set - Identifier and keywords - data types - constants -								CO-1	

<p>Variables - Declarations - Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.</p> <p>Practical component:</p> <ol style="list-style-type: none"> 1. Average of numbers 2. Roots of a quadratic equation 3. calculate area and circumference of a circle. <p>Suggested Readings:</p> <p>Variables, Constants and Operators.</p>	BTL-2
MODULE 2 – OVERVIEW PROGRAMMING IN C	
<p>Data input output functions - Simple C programs - Flow of control - if, if-else, while, do-while, for loop, Nested control structures - Switch, break and continue, go to statements - Comma operator.</p> <p>Practical component:</p> <ol style="list-style-type: none"> 1. Sum of the Digits 2. Fibonacci Series- 3. check whether the entered year is leap year or not <p>Suggested Readings:</p> <p>Control flow statements and blocks, Looping statements.</p>	CO-2 BTL-2
MODULE – 3 : FUNCTIONS & RECURSIONS	
<p>Functions -Definition - proto-types - Passing arguments - Recursions. Storage Classes - Automatic, External, Static, Register Variables - Multi-file programs.</p> <p>Practical component:</p> <ol style="list-style-type: none"> 1. Factorial of a Number Using Recursion 2. Use of Static variables 3. Fibonacci Series using functions 4. swap two integers using call by value and call by reference <p>Suggested Readings:</p> <p>Function call, Storage Classes.</p>	CO-3 BTL-3
MODULE – 4 : ARRAYS	
<p>Arrays - Defining and Processing - Passing arrays to functions - Multi-dimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.</p> <p>Practical component:</p> <ol style="list-style-type: none"> 1. addition of two matrices of any order 2. multiply two 3 X 3 Matrices 3. add two distances in feet and inches using Unions 4. read and print an Employee's Details using Structure 5. String operations like substring, concatenation <p>Suggested Readings:</p> <p>Arrays. Strings. Multidimensional arrays and matrices</p>	CO-4 BTL-3

MODULE – 5 : POINTERS		(9L)
<p>Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays -</p> <p>Arrays of Pointers - Files: Creating, Processing, Opening and Closing a data file.</p> <p>Practical component:</p> <ol style="list-style-type: none">1. Find the sum of all the elements of an array using pointers.2. Swap value of two variables using pointer.3. Count the number of lines in a file4. Pay roll problems <p>Suggested Readings:</p> <p>Pointers, File input-output in C</p>		CO-5 BTL-3
TEXT BOOKS		
1	H. M. Deitel, P. J. Deitel(2016), <i>C: How to program</i> , 7th edition, Pearson Education.	
2	H. Schildt(2017), <i>C: The Complete Reference</i> , 4 th Edition, TMH Edition.	
REFERENCE BOOKS		
1	B.W. Kernighan and D.M.Ritchie(2015), <i>The C Programming Language</i> , 2 nd Edition, PHI.	
E BOOKS		
1.	http://www.cplusplus.com	
MOOC		
1.	https://www.coursera.org/specializations/c-programming	

COURSE TITLE		COMPUTER CONCEPTS AND PROBLEM-SOLVING LABORATORY				CREDITS	1
COURSE CODE		BCB2131	COURSE CATEGORY		PC	L-T-P-S	0-0-2-0
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME							
CIA							ESE
80%							20%
Course Description		This course covers the practical knowledge in Word Process, Spread Sheet techniques and writing C programming to solve problems and impart the concepts like looping, array, functions, pointers, file.					
Course Objective		<ol style="list-style-type: none">1. To identify, formulate, and solve complex engineering problems by applying principles2. To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment,3. To apply engineering design to produce solutions that meet specified needs4. To develop and conduct appropriate experimentation, analyze and interpret data.5. To acquire and apply new knowledge as needed, using appropriate learning strategies.					

Course Outcome	1. Implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.								
	2. Able to understand Word Processing Techniques and Calculation using spread sheets.								
	3. Demonstrate an understanding of computer programming language concepts.								
	4. Ability to design and develop Computer programs, analyze, and interpret the concept of pointers, declarations, initialization, operations on pointers and their usage.								
	5. Implement Real Time problems in C Programming								
	Prerequisites: Logical Skills								
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	1	-	3	1	-	-	2	2
CO-2	2	2	2	2	1	-	1	-	1
CO-3	1	3	-	1	2	1	2	1	2
CO-4	3	2	1	2	1	-	-	2	-
CO-5	-	3	-	2	1	-	1	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
LAB / MINI PROJECT/FIELD WORK									
1. Word Processing									
2. Spreadsheet									
3. Power point									
4. Factorial									
5. Fibonacci									
6. Prime Generation									
7. Removal of duplicates from an ordered Array									
8. Finding the kth smallest element.									
Suggested Readings:									
Word, Spreadsheet, Looping, array, functions, pointers, file,									
TEXT BOOKS									
1.	M.Morris Mano, “ <i>Digital Design</i> ”, 3rd edition, Pearson Education, Delhi								
REFERENCE BOOKS									
1	Ananthi Sheshasayee & J.G. Sheshasaayee(2016), <i>Digital Logic Fundamentals</i> , Margham Publications;								
E-BOOK									
1.	https://www.cs.indiana.edu/classes/b441-sjoh/notes/ADD/1.pdf								
MOOC									
1.	https://www.coursera.org/learn/digital-systems								

COURSE TITLE		C PROGRAMMING LABORATORY				CREDITS	1		
COURSE CODE		BCB2132	COURSE CATEGORY		PC	L-T-P-S	0-0-2-0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3		
ASSESSMENT SCHEME									
CIA							ESE		
80%							20%		
Course Description	The purpose of this course is to introduce to students to the field of programming using C language. The students will be able to enhance their analyzing and problem-solving skills and use the same for writing programs in C.								
Course Objective	1. To make the student learn a programming language. 2. To learn about problem solving techniques 3. To teach the students about file handling methods 4. To teach the students to write programs in C to solve problems.								
Course Outcome	Upon completion of this course, the students should be able to 1. Implement real time Problems 2. Apply control structures to solve problems. 3. create arrays and pointer 4. Implement real time problem 5. To implement structures and Files								
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	-	2	1	-	1	-	1	2
CO-2	2	1	2	2	1	2	3	2	-
CO-3	3	-	3	1	-	1	2	-	2
CO-4	1	-	2	2	1	2	-	2	1
CO-5	2	1	1	1	2	1	2	1	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
LAB / MINI PROJECT/FIELD WORK									
1 Input / output function 2 Control statements 3 Functions 4 Arrays 5 Pointers 6 Structures and Unions 7 Files									
Using case studies on: Roots of a quadratic equation, Measures of location – Matrix Operations –Evaluation of trigonometric functions – Pay roll problems. String operations like substring, concatenation, finding a string from a given paragraph, finding the number of words in a paragraph.									
TEXT BOOKS									

1.	E Balagurusamy(2017), <i>“Programming in Ansi C”</i> . McGraw Hill Education India Private Limited
2.	H. Schildt(2017), <i>C: The Complete Reference</i> , 4 th Edition, TMH Edition.
REFERENCE BOOKS	
1.	B.W. Kernighan and D.M.Ritche(2015), <i>The C Programming Language</i> , 2 nd Edition, PHI.
E BOOKS	
1.	http://www.cplusplus.com
MOOC	
1.	https://www.coursera.org/specializations/c-programming

SEMESTER- II

COURSE TITLE		ENGLISH II				CREDITS		3	
COURSE CODE		ELA4116	COURSE CATEGORY		BS	L-T-P-S		3-0-0-0	
Version	1.0	Approval Details			26th ACM 23-03-2019	LEARNING LEVEL		BTL-4	
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance	
15%		15%		10%		5%		5%	
Course Description		This course has been designed to develop students' language skills and communication needs. It attempts to develop their proficiency through oral communication skills with application knowledge of grammar and vocabulary. This course teaches students how to communicate accurately, appropriately and fluently in professional and social situations.							
Course Objective		1. To communicate effectively with grammatical accuracy and socio-cultural appropriacy with friends, classmates and other persons in the social circle 2. To design and formulate one’s own ideas, investigate and develop solutions for problems and make effective presentations 3. To create, select appropriate techniques and use modern tools for communication such as mails, advertising materials, brochures, bills, vouchers and other essential modes of writing discourse 4. To apply reasoning for contextual knowledge received from media discourse so as to gain the attention of the reader (print media) and viewer (visual media) 5. To use modern tools and learning materials such as MOOC, NPTEL and display a passion for extensive reading							
Course Outcome		Upon completion of this course, the students will be able to 1. Describe objects, places, landscapes, people, natural processes and upgrade from grammatical competence to communicative competence through problem solving tasks 2. Develop presentation skills and effective seminar participation 3. Develop business communication 4. Identify and list natural ways of functioning in contexts, based on short extracts taken from news reading, advertisements, plays, or dialogues from media 5. Perform self-check grammar tests to improve grammatical accuracy							
Prerequisites: Plus Two English-Intermediate Level									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	-	-	-	1	3	1	2	-
CO-2	1	1	-	1	-	-	1	1	1
CO-3	2	-	-	-	-	2	1	2	-

CO-4	-	-	1	-	-	-	1	1	1
CO-5	-	-	-	-	1	3	1	2	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: COMMUNICATIVE WRITING									(9L)
<p>Messages (informal, formal) - Memos - Formal letters of invitation - personal letters of invitation - Writing formal letters (a) business (b) official - Short paragraphs - Describing objects, places, landscapes, people, natural processes, describing processes (man-made) - Expanding short aphorisms, proverbs, quotes, idioms etc. into short paragraphs - Making posters for various occasions such as World Wildlife Day, AIDS Awareness, Anti-Ragging etc.</p> <p>Suggested Activities: Writing (a) Short publicity materials, (b) Brochures (c) user manuals, (d) warranty cards (e) captions</p> <p>Suggested Reading: 1. Cambridge Academic English, An integrated skills course for EAP by Martin Hewings and Craig Thaine, by Cambridge University Press, 2014 2. Professional Speaking Skills by Aruna Koneru, Oxford Press, 2015 3. Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016. 4. English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 edition</p>									CO-1 BTL-2
MODULE 2 –SKILLS FOR ACADEMIC PURPOSES									(9L)
<p>Enriching word power -- Language in use -- Listening comprehension -- Group discussion -- Note making -- Intensive reading -- Interpretation -- Interview skills -- E mail writing -- Synthesizing information from various sources --Expanding quotes - Job applications — Preparing CV – Preparing the profiles of organizations and institutions — Presentation skills – Effective seminar participation</p> <p>Suggested activities: Preparation and Writing of Slides, Embellishments - Oral presentation - Self Evaluation - Listening and note taking, identifying hard spots, framing questions & Raising doubts / Seeking clarifications (Seminar)</p> <p>Suggested sources: English for Life and the Workplace Through LSRW&T skills, by Dolly John, Pearson Publications, 2014 edition</p>									CO-2 BTL-3
MODULE – 3 : BUSINESS COMMUNICATION (WRITTEN)									(9L)
<p>Writing project proposals (pre-project stage) — writing project proceedings (while-project stage) — writing project reports (post-project stage) — writing project evaluation — Writing reviews of journal articles — Business correspondence for various purposes such as placing orders, reminding, complaining, notifying damage of consignment and demanding replacement, sales promotion</p> <p>Suggested Activities: writing gist of articles for putting them together in an edited form — Writing transcripts of lectures and speeches on academic interest</p>									CO-3 BTL-4

Suggested sources: Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition		
MODULE – 4 : WRITING FOR MEDIA (PRACTICE)		(9L)
From events to news story — the various stages of development of news reporting – Editing — Basics of editing; (i) At the level of contents & (ii) at the level of language – Advertisements - Electronic media and their advantages and limitations - Proof reading Suggested activities: Identifying and listing natural ways of functioning in contexts, based on short extracts taken from news reading, advertisements, plays, or dialogues from media Suggested sources: Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016.		CO-4 BTL-3
MODULE - 5 COMPREHENSION STRATEGIES		(9L)
Silent reading and testing comprehension skills — Reading aloud and accuracy in pronunciation — Making short speeches before small groups to check fluency — Writing small pieces of discourse meant for day-to-day communication — Writing short academic pieces for exam purposes — Doing self-check grammar tests to improve grammatical accuracy Suggested Activities: Reading primary sources—reading secondary sources and supporting the points already gathered from the primary sources Suggested Sources: Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition		CO-5 BTL-1
TEXT BOOKS		
1	Martin Hewings ,Craig Thaine(2014), <i>Cambridge Academic English -an integrated skills course for EAP</i> , Cambridge University Press.	
2	Raymond Murphy(2016), <i>Essential English Grammar</i> , Cambridge University Press.	
REFERENCE BOOKS		
1	Sabina Pillai and Agna Fernandez(2018), <i>Soft Skills & Employability Skills</i> , Cambridge University Press	
2	Aruna Koneru(2015), <i>Professional Speaking Skills</i> , Oxford Publications.	
E BOOKS		
1	https://www.britishcouncil.in/english/courses-business	
2	http://www.bbc.co.uk/learningenglish/english/features/pronunciation	
MOOC		
1	https://www.mooc-list.com/tags/english	
2	http://www.cambridgeenglish.org/learning-english/free-resources/mooc/	

COURSE TITLE		BUSINESS STATISTICS					CREDITS		4
COURSE CODE		GEA1116	COURSE CATEGORY			BS	L-T-P-S		3-1-0-0
Version	1.0	Approval Details				26th ACM 23-03-2019	LEARNING LEVEL		BTL-3
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance		ESE
15%		15%	10%		5%		5%		50%
Course Description		At the core, this course will teach you how to develop insights and make decisions from data sets. It will provide a foundation for an understanding of statistics and help you gain confidence leveraging statistics to create strong business cases and make intelligent business decisions. This course examines the use of descriptive statistics, time series, index numbers, probability, confidence intervals, hypothesis testing, regression and correlation analysis, t-tests, and applications of technology for statistical analysis, including the interpretation of the relevance of statistical findings for business problem solving and decision making.							
Course Objective		<div>1. To obtain the knowledge to represent statistical data in occurrence with time.</div> <div>2. To understand to variable measure changes over the time in magnitude</div> <div>3. To able to reflect the chance that an event will happen.</div> <div>4. To understand and implement the sampling techniques.</div> <div>5. To understand the statistical relationship between two variables.</div>							
Course Outcome		<div>Upon completion of this course, the students will be able to</div> <div>1. Describe the components of time series with examples.</div> <div>2. Compare and contrast the general level of magnitude of a group of related variables in two or more situation.</div> <div>3. Apply Baye’s theorem and can find the probability of the events.</div> <div>4. Formulate sampling techniques according to their sample size.</div> <div>5. Recognize the statistical relationship between two variables and perform rank correlation and regression.</div>							
Prerequisites: Statistics									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	-	2	2	-	2	2	-	-
CO-2	3	-	2	2	-	-	3	-	2
CO-3	3	-	-	2	1	1	-	2	1
CO-4	3	1	1	2	-	-	1	-	2
CO-5	3	-	-	2	2	1	3	-	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: TIME SERIES									(9L+3T)
Time Series – Component of Time Series – Graphical Method – Semi Average									CO-1

Method – Method of Least Square – Moving Average Method – Seasonal Variation Suggested Readings: Time series.	BTL-2
MODULE 2: INDEX NUMBERS	(9L+3T)
Index Numbers – Aggregative and Relative Index – Chain and Fixed Index – Wholesale Index – Cost of Living Index. Suggested Readings: Basic statistics	CO-2 BTL-2
MODULE 3: PROBABILITY	(9L+3T)
Probability – Addition and Multiplication Theorem – Conditional probability – Baye’s Theorem (without proof) – Simple problems. Suggested Readings: Problems based on events	CO-3 BTL-3
MODULE 4: TESTING OF HYPOTHESIS	(9L+3T)
Sampling Techniques – Types of Sample and Sampling procedures – Tests of Significance – Normal, t, F, Chi –square – Simple problems. Suggested Readings: Different types of samples	CO-4 BTL-2
MODULE 5: CORRELATION AND REGRESSION	(9L+3T)
Correlation: Rank correlation coefficient – Regression. Suggested Readings: Statistical relationship between variables.	CO-5 BTL-2
TEXT BOOKS	
1. S.P Gupta(2017) , <i>Statistical Methods</i> –Sultan Chand and sons	
REFERENCE BOOKS	
1. Dr. P.R. Vittal(2012) <i>Introduction to Operations Research</i> , Margham Publications.	
2. Snedecor G. W. & Cochran W. G (2014) , <i>Statistical Methods</i> , Oxford and IBH	
E BOOKS	
1. https://www.elsevier.com/books/statistical-methods/freund/978-0-08-049822-5	
MOOC	
1. https://www.mooc-list.com/tags/statistical-methods	

COURSE TITLE		DATA STRUCTURES			CREDITS	4
COURSE CODE		BCB2116	COURSE CATEGORY	PC	L-T-P-S	3- 1- 0 -0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-4
ASSESSMENT SCHEME						
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz		Attendance	ESE
15%	15%	10%	5%		5%	50%
Course Description	The course covers analysis and design of fundamental data structures and engages learners to use data structures as tools to algorithmically design efficient computer programs that will cope with the complexity of actual applications. The course focuses on basic and essential topics in data structures, including array-					

	based lists, linked lists, hash tables, recursion, binary trees, scapegoat trees, red-black trees, heaps, sorting algorithms, graphs, and binary tree.								
Course Objective	1. To learn the basic techniques of algorithm analysis. 2. To demonstrate several searching and sorting algorithms. 3. To implement linear and non-linear data structures. 4. To demonstrate various tree and graph traversal algorithms. 5. To analyse and choose appropriate data structure to solve problems in real world.								
Course Outcome	Upon completion of this course, the students will be able to 1. Select appropriate data structure as applied to specified problem 2. Describe linear and non-linear data structures like stacks, queues, linked list etc. 3. Describe the trees and the associated merits of executing different operations on it. 4. Apply the different sorting and searching techniques in real time. 5. Implement various graph techniques and witness its merits and applications								
Prerequisites: Programming in C									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	-	1	-	2	-	2
CO-2	1	2	1	-	-	-	2	-	
CO-3	3	1	2	1	-	-	1	1	2
CO-4	2	2	1	-	-	1	1	-	
CO-5	3	1	1	-	-	-	-	-	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – PROBLEM SOLVING									(9L+3T)
Problem solving – Top-down Design– Implementation– Verification – Efficiency– Analysis – Sample algorithms. Practical component Top Down Design Algorithm Implementation in C Suggested Readings: Problem Solving Techniques, Algorithmic Efficiency Analysis.									CO-1 BTL-2
MODULE 2 – LISTS, STACKS AND QUEUES									(9L+3T)
Abstract Data Type (ADT) – The List ADT – Definition, Representation of linked lists in Memory, Memory allocation - Linked list operations -Traversing, Searching, Insertion, and Deletion, Doubly Linked lists, Circular linked lists, and header linked lists -. Applications of Linked lists –The Stack ADT –The Queue ADT Practical component: Implementation of LISTS, STACKS AND QUEUES in C. Suggested Readings: Abstract Data types, Applications of Linear Data structure									CO-2 BTL-2
MODULE 3 – TREES									(9L+3T)
Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open addressing. Practical component: Implementation of Binary Tree structure in C Suggested Readings: Applications of Tress, Heaps									CO-3 BTL-3

MODULE 4 – SORTING		(9L+3T)
Preliminaries– Insertion Sort – Shells sort –Heap sort– Merge sort–Quick sort– External Sorting- Topological Sort. Practical component: Implementation of Sorting Techniques in C Programming. Suggested Readings: Applications of Tress, Heaps		CO-4 BTL-3
MODULE 5 – GRAPHS		(9L+3T)
Graph basics, Terminologies, Matrix and Adjacency List Representation of Graphs, Elementary Graph operations – Shortest-Path Algorithms–Un weighted Shortest Paths– Minimum Spanning Tree– Applications of Depth First Search, Breadth First Search. Practical component Graph implementation using C Programming. Suggested Readings: Applications of Graphs, Network problems		CO-5 BTL-3
TEXT BOOKS		
1	E.Balagurusamy(2013), <i>Data Structures Using C</i> , Tata McGraw Hill Education Private Limited	
REFERENCE BOOKS		
1	R. G. Dromey(2013) “ <i>How to Solve it by Computer</i> ” (Chaps 1-2), Prentice-Hall of India	
E BOOKS		
1.	https://apps2.mdp.ac.id/perpustakaan/ebook/Karya%20Umum/Dsa.pdf	
MOOC		
1.	https://www.coursera.org/learn/data-structures	
2.	https://www.coursera.org/specializations/data-structures-algorithms	

COURSE TITLE		MICROPROCESSORS			CREDITS	3
COURSE CODE		BCB2117	COURSE CATEGORY	PC	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		The course provides students with the basic 8-bit (8085) processor, 16-bit (8086) processor and 8-bit (8051) controllers, their architecture, internal organization and their functions, interfacing an external device with the processors/ controllers.				
Course Objective		1. To understand and describe about the concepts of microprocessors and 8085 internal architecture 2. To understand and describe about the 8085 interrupts and interrupts processing 3. To understand the 8085-microprocessor instruction set and addressing modes.				

	4. To write assembly language programming for 8085 arithmetic and logical operations. 5. To understand the 8085 applications, overview of 8086 microprocessor and 8051 microcontrollers.								
Course Outcome	Upon completion of this course, the students will be able to 1. Describe the functional block diagram and internal architecture of 8085 microprocessor. 2. Describe the 8085 interrupts and interrupts processing. 3. Describe the instruction set and addressing modes of 8085 microprocessor. 4. Apply programming skills and perform arithmetic and logical operations using assembly language in 8085 microprocessors. 5. Recognize the applications of 8085 microprocessor and basic concepts of 8086 microprocessor and 8051 microcontrollers.								
Prerequisites: Introduction to Digital Logic Fundamentals									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	3	3	-	1	1	-
CO-2	2	3	1	1	1	1	2	2	1-
CO-3	3	2	1	3	3	-	1	3	-
CO-4	3	3	1	2	3	-	1	3	1
CO-5	1	1	1	3	2	1	2	1	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: 8085 MICROPROCESSOR (9L)									
Introduction to Micro Computers, Microprocessors and Assembly Languages - 8085 MPU- signals- Internal architecture Suggested Reading: 8085 signals and Internal architecture									CO-1 BTL-3
MODULE 2: 8085 INTERRUPTS (9L)									
8085 Interrupts- maskable interrupts-non maskable interrupts-vectored interrupts- non vectored interrupts- Implementing interrupts - interrupt service routine- Multiple interrupts - trap Suggested Reading: 8085 Interrupts and Interrupt service routine									CO-2 BTL-3
MODULE 3: 8085 INSTRUCTION SET (9L)									
8085 Instruction set –data transfer instructions-stack instructions-I/O instructions arithmetic instructions-logical instructions-branch instructions-machine control instructions- Addressing modes Suggested Reading: 8085 Instruction set and Addressing modes									CO-3 BTL-3
MODULE4: 8085 ASSEMBLY PROGRAMMING (9L)									
8085 Assembly programming- arithmetic operations - 8 bit addition-8 bit subtraction - 8bit addition with carry-8 bit multiplication-8 bit division-16 bit addition-logical operations									CO-4 BTL-3

Suggested Reading: - 8085 assembly programming for arithmetic and logical operations		
MODULE 5:8085 APPLICATIONS AND OVERVIEW OF HIGHER PROCESSORS		(9L)
8085 applications-stepper motor speed control- keyboard and display interfacing-introduction to 8086 microprocessors- introduction to 8051 microcontrollers (qualitative analysis) Suggested Reading: - stepper motor speed control, keyboard and display interfacing and overview of 8086 microprocessors and 8051 microcontroller		CO-5 BTL-3
TEXT BOOKS		
1	Ramesh S. Gaonkar(2017), <i>“Microprocessor – Architecture, Programming and Applications with the 8085”</i> , Fifth Edition, Prentice Hall	
REFERENCE BOOKS		
1.	Lyla Das(2013), <i>Embedded Systems: An integrated approach</i> , Pearson publication.	
E BOOKS		
2.	https://www.jntubook.com/microprocessors-and-microcontrollers-textbook-free-download/	
MOOC		
1.	http://nptel.ac.in/courses/106108100/	
2.	http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/New_index1.html	

COURSE TITLE		INTRODUCTION TO ACCOUNTING			CREDITS	3
COURSE CODE		GEA2117	COURSE CATEGORY	BS	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		The course describes the basics of accounting, fundamentals of book keeping, accounting concepts and conventions. The course describes the process of accounting, from journal to preparation of trial balance and finally the Final Accounts. The course highlights the importance of balancing the cash balance between cash book and bank passbook. The course also highlights the importance of non-trading concerns, by preparing receipts and payments account and income and expenditure account.				

Course Objective	<ol style="list-style-type: none">1. To understand about the various forms of business and the features of each form of business and the differences among them2. To understand the concept of marketing, scope and importance and approaches of marketing, and traditional and modern concept of marketing3. To understand the fundamentals of book keeping, accounting concepts and conventions and the process of accounting and reconciling cash balance4. To understand the preparation of final accounts, the adjustments involved5. To understand the accounts of non-trading concerns, receipts and payments account and income and expenditure account								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Differentiate and appreciate the different forms of businesses2. Apply the concepts of marketing in real world, and the application of traditional and modern concept of marketing3. Design the process of accounting in real world.4. Prepare final accounts incorporating the adjustments.5. Formulate the accounts of non-trading concerns.								
Prerequisites: NIL									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	-	1	-	2	-	2
CO-2	1	2	1	-	-	-	2	-	
CO-3	3	1	2	1	-	-	1	1	2
CO-4	2	2	1	-	1	1	1	-	
CO-5	3	1	1	-	-	-		-	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION TO BUSINESS									(9L)
Commerce definition – Elements – Form of business – Sole Proprietor – Partnership – company – Private and Public – Public sector: Features and merits Suggested Readings: Differences between Private and Public Sector Enterprises									CO-1 BTL-2
MODULE 2: INTRODUCTION TO MARKETING									(9L)
Introduction to Marketing Definition, nature, scope and importance of marketing, Approaches to the study of marketing and economic development, traditional and modern concept of marketing, function of marketing Suggested Readings: Different Marketing approaches of different companies									CO-2 BTL-2
MODULE 3: ACCOUNTING PROCESS									(9L)
Fundamentals of Bookkeeping – Accounting Concepts and Conventions – Journal – Ledger – Subsidiary books – Trial balance – Preparation of bank reconciliation statement – Errors and their rectification. Practical component: Problems on Journal, Ledger and Trial Balance Suggested Readings: Accounting Concepts and Conventions									CO-3 BTL-3

MODULE 4: FINAL ACCOUNTS (9L)	
Final Accounts: Opening, Closing and Adjustment entries – Manufacturing, Trading and Profit and Loss Accounts – Balance Sheet. Practical component: Problems on Final accounts Suggested Readings: Importance of Balance Sheets	CO-4 BTL-3
MODULE 5: ACCOUNTS ON NON-TRADING CONCERNS (9L)	
Accounts of non-profit organizations- receipts and payments and income and expenditure accounts and balance sheet. Practical component: Problems on Receipts and Payments account and Income and Expenditure account Suggested Readings: Features of Non-Trading Concerns	CO-5 BTL-3
TEXT BOOKS	
1	Jain and Narang(2014),” <i>Advanced Accounting</i> ”, Kalyani Publishers
2	Gupta R L and Radhaswamy M(2014), “ <i>Advanced Accountancy</i> ”, Sultan Chand & Sons
REFERENCE BOOKS	
1	Tulsian P C(2002), ” <i>Financial Accounting</i> ”, Pearson Education
2.	Bhushan Y K(2000), “ <i>Fundamentals Of Business Organisation And Management</i> ”, Sultan Chand & Sons
E BOOKS	
1.	http://www.freebookcentre.net/Business/Accounting-Books.html
MOOC	
1.	https://www.coursera.org/learn/wharton-accounting

COURSE TITLE		DATA STRUCTURES LAB		CREDITS	1
COURSE CODE		BCB2141	COURSE CATEGORY	PC	L-T-P-S
Version	1.0	Approval Details	26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME					
CIA					ESE
80%					20%
Course Description	Data Structures laboratory provides a wide approach in C programming and enables to apply knowledge. This course				
Course Objective	1 To identify, formulate, and solve complex engineering problems by applying principles 2 To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, 3 To apply engineering design to produce solutions that meet specified needs 4 To develop and conduct appropriate experimentation, analyze and interpret data.				

	5 To acquire and apply new knowledge as needed, using appropriate learning strategies.								
Course Outcome	Upon completion of this course, the students will be able to 1. Implement sparse matrix, stack and queue using arrays and linked lists. 2. Implement the various operations on singly linked list, doubly linked list and circular linked list. 3. Apply different traversals on binary search tree. 4. Implement the sorting of numbers using heap and quick sort. 5. Implement search operations on graph using Dijkstra algorithm.								
Prerequisites: C programming									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	-	1	-	2	-	2
CO-2	1	2	1	-	-	-	2	-	1
CO-3	3	1	2	1	1	-	1	1	2
CO-4	2	1	1	-	-	1	1	-	
CO-5	2	1	1	-	-	-	1	-	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
LAB / MINI PROJECT/FIELD WORK									
1. Array implementation of List Abstract Data Type (ADT) 2. Linked list implementation of List ADT 3. Cursor implementation of List ADT 4. Array implementations of Stack ADT 5. Linked list implementations of Stack ADT 6. The following three exercises are to be done by implementing the following source files a. Program for 'Balanced Parenthesis' b. Array implementation of Stack ADT c. Linked list implementation of Stack ADT d. Program for 'Evaluating Postfix Expressions' An appropriate header file for the Stack ADT should be #included in (a) and (d) 7. Implement the application for checking 'Balanced Parenthesis' using array implementation of Stack ADT (by implementing files (a) and (b) given above) 8. Implement the application for checking 'Balanced Parenthesis' using linked list Implementation of Stack ADT (by using file (a) from experiment 6 and implementing file 9. Implement the application for 'Evaluating Postfix Expressions' using array and linked list Implementations of Stack ADT (by implementing file (d) and using file (b), and then by using files (d) and (c)) 10. Queues ADT 11. Search Tree ADT - Binary Search Tree									
Suggested Readings: Looping, array, stack, functions, pointers, file, queue, binary search tree and ADT									
TEXT BOOKS									

1.	E.Balagurusamy(2013), <i>Data Structures Using C</i> , Tata McGraw Hill Education Private Limited
REFERENCE BOOKS	
1	R. G. Dromey(2013), <i>“How to Solve it by Computer”</i> (Chaps 1-2), Prentice-Hall of India.
EBOOKS	
1.	https://www.quora.com/What-is-good-eBook-for-learning-data-structures
MOOC	
1.	https://www.coursera.org/learn/data-structures

COURSE TITLE		ACCOUNTING LABORATORY			CREDITS	1
COURSE CODE		GEA1146	COURSE CATEGORY	BS	L-T-P-S	0-0-2-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-2
ASSESSMENT SCHEME						
CIA						ESE
80%						20%
Course Description		The course describes the basics of accounting, fundamentals of book keeping, accounting concepts and conventions. The course describes the process of accounting, from journal to preparation of trial balance and finally the Final Accounts. The course highlights the importance of balancing the cash balance between cash book and bank passbook. The course also highlights the importance of non-trading concerns, by preparing receipts and payments account and income and expenditure account.				
Course Objective		<ol style="list-style-type: none">1. To understand about the various forms of business and the features of each form of business and the differences among them2. To understand the concept of marketing, scope and importance and approaches of marketing, and traditional and modern concept of marketing3. To understand the fundamentals of book keeping, accounting concepts and conventions and the process of accounting and reconciling cash balance4. To understand the preparation of final accounts, the adjustments involved5. To understand the accounts of non-trading concerns, receipts and payments account and income and expenditure account				
Course Outcome		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Differentiate the different forms of businesses2. Apply the concepts of marketing in real world, and the application of traditional and modern concept of marketing3. Design the process of accounting in real world.4. Prepare final accounts incorporating the adjustments.5. Formulate the accounts of non-trading concerns.				

Prerequisites: NIL									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	1	1	-	1	-	1	-	1
CO-2	1	-	1	-	-	-	1	-	
CO-3	2	1	2	1	-	-	1	1	1
CO-4	2	1	1	-	-	1	1	-	
CO-5	1	1	-	-	-	-		-	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
LAB / MINI PROJECT/FIELD WORK									
1. Company Creation, preparation of groups 2. Preparation of ledgers 3. Preparation of Voucher 4. Preparation of Profit and Loss Account 5. Preparations of Final Accounts with and without Adjustments 6. Cash Flow and Fund Flow Analysis 7. Preparation of Ratio Analysis 8. Stock Transactions 9. F11 – Features and F12 – Configurations Other Features and Report Generation									
TEXT BOOKS									
1	Jain and Narang(2014),” <i>Advanced Accounting</i> ”, Kalyani Publishers								
2	Gupta R L and Radhaswamy M(2014), “ <i>Advanced Accountancy</i> ”, Sultan Chand & Sons								
REFERENCE BOOKS									
1	Tulsian P C(2002), ” <i>Financial Accounting</i> ”, Pearson Education								
2.	Bhushan Y K(2000), “ <i>Fundamentals Of Business Organisation And Management</i> ”, Sultan Chand & Sons								
E BOOKS									
1.	http://www.freebookcentre.net/Business/Accounting-Books.html								
MOOC									
1.	https://www.coursera.org/learn/wharton-accounting								

SEMESTER III

COURSE TITLE		WEB DESIGNING					CREDITS		3		
COURSE CODE		BCB2201		COURSE CATEGORY		PC		L-T-P-S		3- 0- 0-0	
Version	1.0	Approval Details				26th ACM 23-03-2019		LEARNING LEVEL		BTL-3	
ASSESSMENT SCHEME											
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance		ESE	
15%		15%		10%		5%		5%		50%	
Course Description		Web design is the process of creating websites. It encompasses several different aspects, including webpage layout, content production, and graphic design. While the terms web design and web development are often used interchangeably, web design is technically a subset of the broader category of web development. Websites are created using a markup language called HTML. Web designers build webpages using HTML tags that define the content and metadata of each page. The layout and appearance of the elements within a webpage are typically defined using CSS, or cascading style sheets. Therefore, most websites include a combination of HTML and CSS that defines how each page will appear in a browser.									
Course Objective		<div>1. To understand the graphic design principles that relate to web design and learn how to implement theories into practice.</div> <div>2. To develop skills in analyzing the usability of a web site.</div> <div>3. To develop how to plan and conduct user research related to web usability.</div> <div>4. To learn the language of the web: HTML and CSS.</div> <div>5. To develop skills in DHTML</div>									
Course Outcome		<div>Upon completion of this course, the students will be able to</div> <div>1. Develop a web page using HTML simple tags.</div> <div>2. Implement the various use of cascading style sheet</div> <div>3. Analyze and write the functions using scripting language</div> <div>4. Evaluate the website using event handling mechanism</div> <div>5. Analyze the use of DHTML</div>									
Prerequisites: Basic Knowledge about HTML											
CO, PO AND PSO MAPPING											
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3		
CO-1	3	3	-	2	1	1	1	1	-		
CO-2	3	3	-	2	-	1	-	1	1		
CO-3	3	3	-	2	2	1	2	1	-		
CO-4	3	3	-	2	-	1	-	1	-		
CO-5	3	3	3	2	-	1	3	2	2		
1: Weakly related, 2: Moderately related and 3: Strongly related											

MODULE 1 – INTERNET BASICS		(9L)
Internet basics, introduction to HTML, list, creating tables, linking documents, frames, graphics to HTML documents, style sheet basics, adding styles to documents. Suggested Readings: Introduction to HTML		CO-1 BTL-3
MODULE 2 – CASECADING STYLE SHEET		(9L)
Creating style sheet tools, style sheet properties, font, text, list, color and background color, box, display properties. Suggested Readings: CSS Tools		CO-2 BTL-3
MODULE 3 – SCRIPTING LANGUAGES		(9L)
Introduction to JavaScript, Advantages of JavaScript, JavaScript Syntax, data types, variables, arrays. Operators and Expressions, Looping constructors, functions, dialog box, JavaScript, document object model. Suggested Readings: Introduction to JavaScript		CO-3 BTL-3
MODULE 4 – HTML		(9L)
Introduction – objects in HTML, event handling, window object, document object, browser object, object methods, built-in objects, user defined objects, cookies. Suggested Readings: Built-in objects		CO-4 BTL-3
MODULE 5 – DHTML		(9L)
DHTML, cascading style sheets, class, external style sheets, working with JavaScript style sheet. Suggested Readings: DHTML		CO-5 BTL-3
TEXT BOOKS		
1.	Thomas Powell(2017), <i>HTML & CSS: The complete Reference</i> , Fifth Edition McGraw Hill Education	
2.	Laura Lemay, Jennifer Kymin(2016) <i>Mastering HTML,CSS & JavaScript</i> , Web Publishing ,	
REFERENCE BOOKS		
1.	Joshua Johaman, Richard Zea, Talha Khan(2016), <i>Web Developers Reference Guide</i> , Packet Publishing.	
E BOOKS		
1.	https://www.creativebloq.com/web-design/free-ebooks-web-designers-5132836	
MOOC		
1.	https://www.coursera.org/specializations/web-design	

COURSE TITLE		PC HARDWARE & NETWORKING				CREDITS	3		
COURSE CODE		BCB2202	COURSE CATEGORY		PC	L-T-P-S	3-0-0-0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3		
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance	ESE
15%		15%		10%		5%		5%	50%
Course Description		To acquire basic knowledge in computer hardware and peripherals for installation, PC assembly, trouble shooting and maintenance including system management and its backup and to undertake disaster prevention, a basic knowledge of TCP/IP networks work group, internet and intranet.							
Course Objective		1. To understand basic concept & structure of Computer Hardware & Networking Components. 2. To identify the existing configuration of the computers & peripherals. 3. To apply their knowledge about computer peripherals to identify/rectify problems on board. 4. To integrate the PC's into Local Area Network & re-install OS & various shipboard applications. 5. To perform routine maintenance, upgrades of virus definitions, set schedules etc.							
Course Outcome		Upon completion of this course, the students will be able to 1. Identify the concepts in basics of computer. 2. Define the concepts of networking and topologies. 3. Identify the various networking devices. 4. Evaluate the process of network configuration. 5. Describe the network security ideas.							
Prerequisites: Basics of Hardware									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO -1	PSO-2	PSO-3
CO-1	3	2	-	2	1	-	1	1	-
CO-2	3	-	1	2	-	-	-	3	-
CO-3	3	-	-	2	-	2	-	2	1
CO-4	3	1-	-	2	1	-	-	3	-
CO-5	3	-	-	2	1	-	-	-	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION								(9L)	
Introduction about Computer-Basics of Computer-Organization of computer Software and hardware- Input/output devices. Inside the PC: Opening the PC and identification- Study of different blocks- Assembling and disassembling. Practical component: Assembling and disassembling.								CO-1 BTL-2	

Suggested Readings: Input/output devices		
MODULE 2: BASIC NETWORKING CONCEPTS		(9L)
Network Topologies: LAN, WAN , MAN, PAN, CAN.-Networking Model The OSI model-TCP/ IP Model Network adapters.-Introducing protocols.-Cabling and troubleshooting.		CO-2 BTL-2
Suggested Readings: Model The OSI model-TCP/ IP Model		
MODULE 3: ROUTERS AND SWITCHES		(9L)
Routers- Switches- Configuration-Modems-Hubsetc-Wired and Wireless technology.		CO-3 BTL-3
Suggested Readings: Wired and Wireless technology		
MODULE 4: NETWORK BASIC AND CONFIGURATION		(9L)
Network basic and configuration- Setting IP addresses- Sharing files and folders- Network troubleshooting. -PING test, ipconfig etc.		CO-4 BTL-2
Suggested Readings: Network basic and configuration		
MODULE 5: INTRODUCTION NETWORK SECURITY		(9L)
Introduction to servers and network security- Basics of Internet and Intranet- Types of Internet Connections- Dialup, Broadband, Leased Line, WWW, E-mails, Search Engines, Social Networking.		CO-5 BTL-2
Suggested Readings: servers and network security		
TEXT BOOKS		
1.	White, Ron, and Timothy Downs(2014). <i>How computers work</i> . Que Corp- 9th Edition	
REFERENCE BOOKS		
1.	Craig jacker(2017), <i>PC Hardware: The Complete Reference</i> , McGraw Hill Education	
E BOOKS		
1.	https://www.e-booksdirectory.com/listing.php?category=315	
MOOC		
1.	https://www.mooc-list.com/tags/hardware	

COURSE TITLE		SOFTWARE ENGINEERING			CREDITS	4	
COURSE CODE		BCB2203	COURSE CATEGORY		PC	L-T-P-S	3-0-2-0
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME							
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	ESE
15%		15%		10%	5%	5%	50%

Course Description	The purpose of this course is to present software engineering as a body of knowledge. The course is designed to present software engineering concepts and principles in parallel with the software development life cycle. The course will begin with an introduction to software engineering, giving you a definition of this body of knowledge, as well as a discussion of the main methodologies of software engineering.								
Course Objective	<ol style="list-style-type: none">1. To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment,2. To identify, formulate, and solve complex engineering problems by applying principles3. To apply engineering design to produce solutions that meet specified needs4. To develop and conduct appropriate experimentation, analyze and interpret data.5. To acquire and apply new knowledge as needed, using appropriate learning strategies.								
Course Outcome	Upon completion of this course, the students will be able to <ol style="list-style-type: none">1. Describe the basics Software Engineering2. Evaluate the Software Requirement Analysis3. Design about the Structured Analysis4. Identify the Software Design5. Perform Software Testing methods								
Prerequisites: Computer Concepts and Problem Solving									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	2	1	-	3	2	-
CO-2	-	-	1	-	-	-	-	-	1
CO-3	1	2	3	2	-	1	2	1	-
CO-4	3	-	2	2	-	1	3	3	-
CO-5	1	2	3	3	-	1	-	2	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION								(9L+3P)	
Introduction: Definition of software and software engineering – Software myths – Software Engineering paradigms: Linear Sequential Model & Prototyping Model Software Project Management – Software Metrics – Software Cost Estimation – Software Project Planning. Suggested Readings: Linear Sequential Model								CO-1 BTL-2	
MODULE 2: SOFTWARE REQUIREMENT ANALYSIS								(9L+3P)	
Software Requirement Analysis: Software Risks – Software Configuration Management System Analysis – Modelling the System Architecture – System Specification – Fundamentals of Requirement Analysis – Software Prototyping – Prototyping method sand tools specification – Software Requirements Specifications.								CO-2 BTL-2	

Suggested Readings: Software Risks, Software Requirements Specifications		
MODULE 3: STRUCTURED ANALYSIS		(9L+3P)
Structured Analysis: Introduction – the elements of the analysis model – data objects, attributes and relationships – Cardinality and Modality – ERD – DFD – Classical Analysis Methods: DSSD, JSD, SADT. Suggested Readings: DSSD, JSD, SADT		CO-3 BTL-3
MODULE 4: SOFTWARE DESIGN		(9L+3P)
Software Design: Software Design and Software Engineering – Design and Software Quality – Evolution of Software Design – Design Principles. Design Concepts, Abstraction, Refinement, Modularity – Effective Modular Design, Functional Independence, Cohesion, Coupling. Suggested Readings: Design Principles		CO-4 BTL-3
MODULE 5 : SOFTWARE TESTING METHODS		(9L+3P)
Software Testing Methods: Software Testing Fundamentals – White Box Testing – Black Box Testing – Debugging – Software Quality: McCall’s Quality Factors. Suggested Readings: Testing Strategies		CO-5 BTL-3
TEXT BOOKS		
1	Richard E Fairley(2016), <i>Principles of Software Engineering</i> , Wiley- Blackwell Publisher	
REFERENCE BOOKS		
1	Rajib Mall(2014), <i>Fundamentals of Software Engineering</i> , 4th Edition, Publisher- Prentice Hall India Learning Pvt Ltd.	
E BOOKS		
1	https://www.e-booksdirectory.com/listing.php?category=2	
MOOC		
1.	https://www.coursera.org/learn/systems-engineering	

COURSE TITLE		OBJECT ORIENTED PROGRAMMING			CREDITS	3
COURSE CODE		BCB2204	COURSE CATEGORY	PC	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance
ESE						
15%		15%		10%	5%	5%
50%						
Course Description		Object-oriented programming represents the integration of software components into a large-scale software architecture. The course focuses on the understanding of object-oriented concepts such as classes, objects, data abstraction, methods, method overloading, inheritance and polymorphism.				

Course Objective	1. To Understand the Object -Oriented Programming basic concepts and functions 2. To Analyze the overview of programming language 3. To apply the concept of inheritance 4. To analyze the structure of overloading and Polymorphism 5. To Understand File Concepts and Exception Handling								
Course Outcome	Upon completion of this course, the students will be able to 1. Describe the OOPS fundamentals 2. Identify the class, objects and constructor and destructor 3. Implement functions and its overloading 4. Identify and perform the various types of overloading and virtual functions 5. Apply the Functions of File handling								
Prerequisites: Programming in C									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	-	-	1	2	2	-
CO-2	2	2	2	1	-	-	1	-	1
CO-3	3	1	1	-	1	-	2	2	1
CO-4	1	2	1	2	-	1	1	-	1
CO-5	3	2	1	-	-	-	1	2	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION									(9L)
Object-oriented paradigm, elements of object-oriented programming – Merits and demerits of OO methodology – C++ fundamentals – data types, operators and expressions, control flow, arrays, strings, pointers and functions. Suggested Readings: Procedure Oriented Programming									CO-1 BTL - 3
MODULE 2: OVERVIEW PROGRAMMING IN C++									(9L)
Classes and objects – constructors and destructors, operator overloading – inheritance, virtual functions and polymorphism Suggested Readings: Constructors, Object oriented concepts									CO-2 BTL - 3
MODULE 3: ARRAYS AND POINTERS									(9L)
Arrays – Pointers – this pointer – functions Overloading – Default arguments – Overloading Constructors – Pointers to Functions – Ambiguity in function overloading. Suggested Readings: Inheritance, Function Overloading									CO-3 BTL - 3
MODULE 4: POLYMORPHISM									(9L)
Operator Overloading – Members Operator Function – Friend Operator Function – Overloading some special operators like [], () – Inheritance – Virtual base Class – Polymorphism – Virtual functions – Pure virtual function Suggested Readings: Polymorphism, Virtual Functions									CO-4 BTL - 3
MODULE 5: FILE HANDLING									(9L)

C++ streams – console streams –operations, manipulators - File streams - classes file modes file pointers and manipulations file I/O – Exception handling Suggested Readings: File handling in C++		CO-5 BTL - 3
TEXT BOOKS		
1.	Herbert Schildt(2017), " <i>C++ Complete Reference</i> ", Fourth edition, TMH,	
REFERENCE BOOKS		
1.	Bjarne Stroustrup, (2013)" <i>The C++ programming language</i> ", Addison Wesley,	
E BOOKS		
1.	https://docs.google.com/file/d/0BxY2b_iyHaj9b2FLNGIFQmc2SEU/edit	
MOOC		
1.	https://www.coursera.org/courses?query=object%20oriented%20programming	

COURSE TITLE		COMPUTER ORGANIZATION			CREDITS	3
COURSE CODE		BCB2205	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		This course introduces the principles of computer organization and the basic architecture concepts. The course emphasizes performance and cost analysis, instruction set design, pipelining, memory technology, memory hierarchy, virtual memory management, and I/O systems. Basic technical writing skills are also taught in this class.				
Course Objective		1. To understand the structure, function and characteristics of computer systems. 2. To understand the design of the various functional units and components of computers. 3. To identify the elements of modern instructions sets and their impact on processor design. 4. To explain the function of each element of a memory hierarchy, 5. To identify and compare different methods for computer I/O.				
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the basic fundamentals of computer organization such as data transfer logic and arithmetic operations 2. Describe the concept of Central Processing such as addressing modes, instruction formats and program control statements 3. Analyse cost performance and design trade-offs in designing and constructing a computer processor including memory.				

		4. Describe the internal organization of computers, CPU, memory unit and Input/Outputs and the relations between its main components. 5. Evaluate the concept of Input-Output Organization and able to differentiate microprocessor and microcontrollers.							
Prerequisites: Knowledge of logic circuits - combinational and sequential									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	2	3	2	1	-	3	1	-
CO-2	3	2	1	2	-	-	1	2	1
CO-3	2	2	3	2	2	1	3	3	-
CO-4	3	2	1	2	-	1	1	1	1
CO-5	1	2	3	3	-	1	3	1	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – BUILDING BLOCKS OF COMPUTER SYSTEM								(9L)	
Basic building blocks – I/O, Memory, ALU and its components, Control Unit and its functions, Instruction –word, Instruction and Execution cycle, branch, skip, jump and shift instruction, Operation of control registers; Controlling of arithmetic operations Suggested Readings: Transfer logic, Micro operations and Binary codes.								CO-1 BTL-3	
MODULE 2 – ADDRESSING TECHNIQUES AND REGISTERS								(9L)	
Addressing techniques – Direct, Indirect, Immediate, Relative, indexed addressing and paging. Registers – Indexed, General purpose, Special purpose, overflow, carry, shift, scratch, Memory Buffer register; accumulators; stack pointers; floating point; status information and buffer registers. Suggested Readings: Instruction execution stages, addressing modes.								CO-2 BTL-3	
MODULE 3 – MEMORY								(9L)	
Main memory, RAM, static and dynamic, ROM, EPROM, EEPROM, EAROM, Cache and Virtual memory. Suggested Readings: Memory hierarchy, Use of cache memory and virtual memory								CO-3 BTL-3	
MODULE 4 – INTERCONNECTING SYSTEM COMPONENTS								(9L)	
Buses, interfacing buses, Bus formats – address, data and control, Interfacing keyboard, display, auxiliary storage devices and printers. I/O cards in personal computers. Suggested Readings: Parallel processing, Pipelining and Peripheral devices								CO-4 BTL-3	
MODULE 5 – INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS								(9L)	
Introduction to 8085 microprocessors, examples of few instructions to understand addressing techniques. Difference between microprocessor and microcontrollers. Suggested Readings: Addressing techniques and Types of memory.								CO-5 BTL-3	
TEXT BOOKS									
1	David A. Patterson ,(2012)"Computer Architecture and logical Design", McGraw Hill								

2	John L. Hennessy(2011), <i>Computer Organization and Design: The Hardware/Software Interface</i> (4th ed.), Morgan Kaufmann Publishers Inc.
REFERENCE BOOKS	
1	J.P. Hayes(1988), <i>“Computer Architecture & Organization”</i> , Tata McGraw Hill
E BOOKS	
1	https://sites.google.com/site/uopcog/ebooks
MOOC	
1	https://www.coursera.org/learn/comparch

COURSE TITLE		OBJECT ORIENTED PROGRAMMING LABORATORY				CREDITS		1	
COURSE CODE		BCB2231	COURSE CATEGORY		PC	L-T-P-S		0-0-2-0	
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL		BTL-3	
ASSESSMENT SCHEME									
CIA								ESE	
80%								50%	
Course Description		Emphasis this course is on intensive study of object-oriented programming using C++. Execution of Programs based on Classes and objects polymorphism, overloaded operators, and file handling functions.							
Course Objective		1. To execute concept of functions based on call by value reference and address 2. To execute simple classes understanding objects 3. To Execute programs based on compile time polymorphism 4. To execute programs on run time polymorphism 5. To analyze file handling programs							
Course Outcome		Upon completion of this course, the students will be able to 1. Apply the concept of functions 2. Apply the constructor within program 3. Implement polymorphism using overloading 4. Design a program using run time polymorphism 5. Evaluate the program using file access							
Prerequisites: Programming in C									
CO, PO AND PSO MAPPING									
CO	PO 1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	3	1	2	2	2	-
CO-2	2	3	3	3	1	2	1	-	2
CO-3	2	3	3	3	1	2	-	2	3
CO-4	2	3	3	3	1	2	1	2	-
CO-5	2	3	3	3	1	2	-	1	2
1: Weakly related, 2: Moderately related and 3: Strongly related									

LAB / MINI PROJECT/FIELD WORK	
<ol style="list-style-type: none"> 1. Programs Using Functions <ul style="list-style-type: none"> - Functions with default arguments - Implementation of Call by Value, Call by Address and Call by Reference 2. Simple Classes for understanding objects, member functions and Constructors <ul style="list-style-type: none"> - Classes with primitive data members - Classes with arrays as data members - Classes with pointers as data members – String Class - Classes with constant data members - Classes with static member functions 3. Compile time Polymorphism <ul style="list-style-type: none"> - Operator Overloading including Unary and Binary Operators. - Function Overloading 4. Runtime Polymorphism <ul style="list-style-type: none"> - Inheritance - Virtual functions - Virtual Base Classes - Templates 5. File Handling <ul style="list-style-type: none"> - Sequential access - Random access 	
TEXT BOOKS	
1.	Herbert Schildt(2017), "C++ Complete Reference", Fourth edition, TMH
REFERENCE BOOKS	
1.	Bjarne Stroustrup, (2013) "The C++ programming language", Addison Wesley
E BOOKS	
1.	https://docs.google.com/file/d/0BxY2b_iyHaj9b2FLNGIFQmc2SEU/edit
MOOC	
1.	Introduction to object-oriented programming (Coursera)

COURSE TITLE		WEB DESIGNING LABORATORY		CREDITS	1
COURSE CODE		BCB2232	COURSE CATEGORY	PC	L-T-P-S
VERSION	1.0	APPROVAL DETAILS	26th ACM	23-03-2019	LEARNING LEVEL
					BTL-4
ASSESSMENT SCHEME					
CIA					ESE
80%					20%
Course Description	Web design is the process of planning, conceptualizing, and arranging content online. The goal of this course is to introduce designing a website with principles and techniques. Students will learn the website's overall functionality.				

Course Objective	1. To Design and create websites. 2. To conduct exploratory user interface design. 3. To understand the components involved in user interface design. 4. To understand the web apps, mobile apps.								
Course Outcome	Upon completion of this course, the students will be able to 1. Create web pages using HTML simple tags. 2. Create cascading style sheet 3. Write functions using scripting language 4. Create website using event handling 5. Develop a website for any real-world problem								
Prerequisites: E3 – Data Mining									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	1	1	1	3	2	1
CO-2	3	2	1	1	1	1	3	2	1
CO-3	3	2	1	1	1	1	3	2	1
CO-4	3	2	1	1	1	1	3	2	1
CO-5	3	1	-	1	-	1	2	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
LAB /MINI PROJECT/FIELD WORK									
1. Write a HTML program to illustrate body and pre tags 2. Write a HTML program to illustrate text font tags 3. Write a HTML program to illustrate comment, header and div tags 4. Write a HTML program to illustrate text formatting tags 5. Write a HTML program to illustrate List tags 6. Write a HTML program to illustrate nested and definition tags 7. Write a HTML program to illustrate image and table tags 8. Write a HTML program to illustrate hyper link and form tags 9. Write a java script program for addition of two numbers 10. Write a script to create an array of 10 elements and display its contents. 11. Create a resume page using html tags.									
TEXT BOOKS									
1.	Thomas Powell(2017), <i>HTML & CSS:The complete Reference</i> , Fifth Edition, McGraw Hill Education								
2.	Laura Lemay, Jennifer Kymin (2016), <i>"Mastering HTML,CSS & JavaScript, Web Publishing</i>								
REFERENCE BOOKS									
1.	Joshua Johaman, Richard Zea, Talha Khan(2016), <i>Web Developers Reference Guide</i> , Packet Publishing								
MOOC									
1.	https://www.creativebloq.com/web-design/free-ebooks-web-designers-5132836								
2.	https://www.coursera.org/specializations/web-design								

SEMESTER IV

COURSE TITLE		WEB PROGRAMMING USING PHP				CREDITS	4		
COURSE CODE		BCB2216	COURSE CATEGORY		PC	L-T-P-S	3- 0- 2 -0		
Version	1.0	Approval Details			26th ACM 23-03-2019	LEARNING LEVEL	BTL-3		
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE		
15%		15%		10%	5%	5%	50%		
Course Description		This course explains about introduction to php, SQL languages, MYSQL with PHP, built-in functions of PHP, cookies, session, implement all these concepts to create a web page design and client/server design. This paper starts with theoretical concepts of PHP and implement into real time applications							
Course Objective		1. To design web pages using PHP 2. To design SQL language within MySQL and PHP to access and manipulate databases 3. To create PHP code that utilizes the commonly used library functions 4. To demonstrate use of cookie, session, and authentication programming To design and create a complete web site							
Course Outcome		Upon completion of this course, the students will be able to 1. Develop web pages using PHP 2. Demonstrate to execute and connect MySQL and PHP to access and manipulate databases 3. Create PHP code that utilizes the commonly used library functions 4. Demonstrate use of cookie, session, and authentication programming in PHP 5. Design and create a complete web site that demonstrates good PHP/MySQL client/ server design							
Prerequisites: Programming skills									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	1	-	1	3	-	1
CO-2	2	-	1	1	2	1	2	3	1
CO-3	3	3	1	1	-	1	3	2	1
CO-4	1	3	2	1	-	1	1	3	1
CO-5	3	2	1	1	-	1	3	-	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION TO PHP								(9L+3P)	
Origin of PHP - PHP with web server - Benefits – Syntax – Delimiters- Variables – Datatypes – Operators – Dynamic variables – Strings - Flow Control – Arrays – Array operators								CO-1 BTL- 3	

Practical component: Basic tags –operators, variables, strings, flow controls. Suggested Readings: Benefits of Php		
MODULE 2: WRITING WEB PAGES WITH PHP		(9L+3P)
Web Protocols - HTML scripts and Forms element - Embedding PHP code into HTML - Retrieving and validating data - Redirecting web pages - Adding dynamic content - global Variable – String manipulation and regular expression - file handling. Practical component: PHP code into HTML - Retrieving and validating data - Redirecting web pages Suggested Readings: HTML scripts and Forms element		CO-2 BTL- 3
MODULE 3: FUNCTIONS, COOKIES & SESSIONS IN PHP		(9L+3P)
Functions - Using parameters and Returning Values - Call by value and call by reference - Using require() and include() - Session - Cookie - Using Cookies with Sessions - Deleting Cookies - Registering Session variables - Destroying the variables and Session Practical component: Call by value and call by reference - Using require() and include() - Session - Cookie. Suggested Readings: Functions		CO-3 BTL-3
MODULE 4: OOPS IN PHP		(9L+3P)
Object Oriented Programming in PHP - Object oriented concepts - Classes, objects and operations - Abstract class – Inheritance - Using Final keyword - Exception Handling - User defined exception Practical component: Classes, objects and operations, Inheritance Suggested Readings: Inheritance		CO-4 BTL-3
MODULE 5: MYSQL DATABASE		(9L+3P)
MySQL Architecture - Invoking MySQL through Command Line - MySQL Server Start and Stop - Defining a Database - Creating Tables and Fields in MySQL - Overview of Data Types in MySQL - Working with PHP-MySQL Environment - Using PhpMyAdmin (Web UI for DB access) Practical component: Defining a Database - Creating Tables and Fields in MySQL - Data Types in MySQL. Suggested Readings: MySQL Architecture		CO-5 BTLL-3
TEXT BOOKS		
1	Andrew B. Harris(2008) , “ <i>PHP 6/MySQL Programming for the Absolute Beginner</i> Cengage Learning PTR; 1st edition	
REFERENCE BOOKS		
1	Luke Welling, Laura Thomson(2004), “ <i>PHP and MySQL Web Development</i> ”, Third Edition Sam publishers	
E BOOKS		
1.	https://www.springer.com/in/book/9783319226583	
MOOC		
1.	https://www.coursera.org/learn/web-applications-php	

COURSE TITLE		OPERATING SYSTEMS				CREDITS	3		
COURSE CODE		BCB2217	COURSE CATEGORY		PC	L-T-P-S	3-0-0-0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3		
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance	ESE
15%		15%		10%		5%		5%	50%
Course Description		This course covers the basic and advanced concepts of operating system such as components, CPU scheduling algorithms, Deadlocks, file organization techniques.							
Course Objective		<div>1. To describe and explain the fundamental components of a computer operating system.</div> <div>2. To define, restate, discuss, and explain the policies for CPU scheduling</div> <div>3. Describe reasons for using interrupts, dispatching, and context switching to support concurrency in an operating system</div> <div>4. To Identify the relationship between the physical hardware and the virtual devices maintained by the operating system</div> <div>5. To Compare and contrast different approaches to file organization, recognizing the strengths and weaknesses of each.</div>							
Course Outcome		<div>Upon completion of this course, the students will be able to</div> <div>1. Characterize the basic functions of operating systems.</div> <div>2. Design the concepts of process management.</div> <div>3. Implement the concepts of deadlocks.</div> <div>4. Describe virtual memory and filesystem.</div> <div>5. Analyze the File system implementation and disk I/O technique</div>							
Prerequisites: Computer Organization									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	-	1	1	-	1	3	-	-
CO-2	2	-	1	1	2	1	2	3	1
CO-3	3	-	1	1	-	1	3	2	-
CO-4	1	3	2	-	-	1	1	3	1
CO-5	3	2	1	1	-	1	3	-	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION (9L)									
Introduction - Computer System Organization - Computer System Architecture - Computer System Structure - Operating System Operations - Process Management - Memory Management - Storage Management - Distributed Systems - Operating System Services - User Operating System Interface - System Calls - Types of System calls - System Programs - Process Concept - Process Scheduling - Operations on									CO-1 BTL-2

Processes - Inter-process Communication Suggested Readings: Types of Operating Systems		
MODULE 2: SCHEDULING		(9L)
Threads - Overview - Multithreading Models - CPU Scheduling - Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Thread Scheduling - Multiple-Processor Scheduling - The Critical-Section Problem - Peterson's Solution - Synchronization Hardware - Semaphores Suggested Readings: CPU Scheduling algorithms		CO-2 BTL-3
MODULE 3: DEADLOCKS		(9L)
System Model - Deadlock Characterization - Methods for handling Deadlocks - Deadlock Prevention-Deadlock-avoidance Deadlock detection recovery from Deadlock Storage Management - Swapping- Contiguous Memory allocation Suggested Readings: Deadlock Prevention and Detection		CO-3 BTL-3
MODULE 4: PAGING AND FILE SYSTEM		(9L)
Paging- Demand Paging - Copy-on Write - Page Replacement - Allocation of frames – Thrashing- Virtual Memory -File Concept - Access Methods - Directory and Disk Structure Suggested Readings: File Management system, Directory and Disk Structure		CO-4 BTL-3
MODULE 5: FILE MANAGEMENT		(9L)
File System Structure - File System Implementation - Directory Implementation - Allocation Methods - Free-space Management – Disk Structure – Disk Attachment - Disk Scheduling Disk Management - Swap-Space Management - RAID Structure Suggested Readings: Distributed Operating Systems, Distributed File Systems		CO-5 BTL-2
TEXT BOOKS		
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne(2005), " <i>Operating System Concepts</i> ", Eighth Edition, John Wiley & Sons (ASIA) Pvt. Ltd	
REFERENCE BOOKS		
1	William Stallings(2018), " <i>Operating Systems: Internals and Design Principles</i> ", Prentice Hall of India, 4th Edition	
E BOOKS		
1.	http://www.freebookcentre.net/CompuScience/Free-Operating-Systems-Books-Download.html	
MOOC		
1.	https://www.coursera.org/learn/web-applications-php	

COURSE TITLE		COMPUTER NETWORKS			CREDITS	3
COURSE CODE		BCB2218	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE				
15%	15%	10%	5%	5%	50%				
Course Description	The main emphasis of this course is on the organization and management of local area networks (LANs). The course objectives include learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems. Students are introduced to computer communication network design and its operations, and discuss the following topics: Open Systems Interconnection (OSI) communication model; error detection and recovery; local area networks; bridges, routers and gateways;On completion of the course, students should be able, in part to design, implement and maintain a typical computer network (LAN).								
Course Objective	<div>1. Describe the general principles of data communication.</div> <div>2. Describe how computer networks are organized with the concept of layered approach</div> <div>3. Implement a simple LAN with hubs, bridges and switches.</div> <div>4. Describe how packets in the Internet are delivered.</div> <div>5. Analyze the contents in a given data link layer packet, based on the layer concept</div>								
Course Outcome	<div>Upon completion of this course, the students will be able to</div> <div>1. Describe the basic of Computer Network and the models.</div> <div>2. Comprehend about the transmission.</div> <div>3. Implement multiplexing and Ethernet.</div> <div>4. Analyse the various types of protocol.</div> <div>5. Define the functionalities of layers in networking.</div>								
Prerequisites: Basic Knowledge about Computer Network									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	2	1	1	-	1	3	3	2
CO-2	2	2	1	1	-	-	3	3	-
CO-3	3	-	1	1	1	-	-	3	1
CO-4	-	3	-	1	-	-	3	-	-
CO-5	3	3	1	1	-	-	3	3	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – DATA COMMUNICATIONS						(9L)			
Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media –Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232									CO-1 BTL-3

Interfacing sequences. Suggested Readings: OSI Model		
MODULE 2 – DATA LINK LAYER		(9L)
Error – detection and correction – Parity – LRC – CRC – Hamming code – low Control and Error control - stop and wait – go back -N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet– FDDI - SONET – Bridges. Suggested Readings: Error Detection and Correction		CO-2 BTL-3
MODULE 3 – NETWORK LAYER		(9L)
Internetworks – Packet Switching and Datagram approach – IP addressing methods – Sub netting – Routing – Distance Vector Routing – Link State Routing – Routers. Suggested Readings: Internetworks		CO-3 BTL-3
MODULE 4 – TRANSPORT LAYER		(9L)
Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services Suggested Readings: Transmission Control Protocol (TCP)		CO-4 BTL-3
MODULE 5 – APPLICATION LAYER		(9L)
Domain Name Space (DNS) – SMTP – FTP – HTTP - WWW – Security – Cryptography Suggested Readings: Cryptography		CO-5 BTL-2
TEXT BOOKS		
1	Sanjay Sharma(2013) , “ <i>Computer Networks</i> ”, Publisher- S K Kataria and Sons,	
2	Andrew S. Tanenbaum, David J(2012). <i>Computer Networks</i> , Pearson Education,	
REFERENCE BOOKS		
1.	Harvey M. Deitel(2007), " <i>Operating Systems</i> ", Second Edition, Pearson Education	
E BOOKS		
1.	http://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html	
MOOC		
1.	https://www.coursera.org/learn/fundamentals-network-communications	

COURSE TITLE		DATABASE MANAGEMENT SYSTEMS			CREDITS	3	
COURSE CODE		BCB2219	COURSE CATEGORY		PC	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME							
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance		ESE
15%		15%	10%	5%	5%		50%

Course Description	The course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.								
Course Objective	1. To explain basic database concepts, applications, data models, schemas and instances. 2. To demonstrate the use of constraints and relational algebra operations. 3. To describe the basics of SQL and construct queries using SQL. 4. To emphasize the importance of normalization in databases. 5. To familiarize issues of concurrency control and transaction management.								
Course Outcome	Upon completion of this course, the students will be able to 1. Analyse fundamental elements of a relational database management system. 2. Evaluate the database design and improve the design by normalization. 3. Implement the basic concepts of relational data model, ER model, relational database design and database language SQL. 4. Construct ER diagrams for simple database application scenarios. 5. Identify the creation and formation of queries for the table creation.								
Prerequisites: Basic knowledge of C or C++									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	-	-	-	-	-	3	2	1
CO-2	-	2	2	-	-	1	-	-	1
CO-3	3	-	-	-	-	-	3	2	1
CO-4	-	2	2	-	1	-	-	-	1
CO-5	3	2	2	2	-	1	3	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION TO DATABASE BASICS (9L)									
Introduction- Database Systems- Characteristics of DBMS – Architecture of DBMS – Database Models - System Analysis and Design – System Definition – System Development Life Cycle – DFD – ER Model. Suggested Readings: ER Model								CO-1 BTL-3	
MODULE 2: RELATIONAL ALGEBRA AND NORMAL FORMS (9L)									
Relational Database Model – Structure of Relational Model – Keys – Relational Algebra -Functional Dependencies - Normalization – 1NF – 2NF-3NF- BCNF – 4NF – Oracle Database Server. Suggested Readings: Normalization								CO-2 BTL-3	
MODULE 3: SQL BASICS AND SUB QUERIES (9L)									
Introduction – Data Retrieval – SQL Plus – Single Row Functions – Group Function – Set Function – Sub Query – Joins. Suggested Readings: Joins								CO-3 BTL-3	
MODULE 4: ORACLE COMMANDS (9L)									
Introduction – Insert Statement – Update Statement – Delete Statement –								CO-4	

Transaction Control Language – View – Defining Constraints. Suggested Readings: Transaction Control Language		BTL-3
MODULE 5: QUERY CONCEPTS (9L)		
Query Processing, Optimization & Execution – Hashing – Distributed Architecture -Concurrency Control – Backup & Recovery Techniques – Oracle Architecture. Suggested Readings: Hashing		CO-5 BTL-3
TEXT BOOKS		
1.	Pranab Kumar Das Gupta & P. RadhaKrishna(2013)." <i>Database Management Systems Oracle SQL and PL/SQL</i> ",Second Edition, Published by Asoke K. Gosh, PHI Learning Pvt Ltd.	
REFERENCE BOOKS		
1.	Elmasri ,Navathe(2000), " <i>Fundamentals of Database System</i> " 3rd edition, Pearson Education,	
E BOOKS		
1.	https://www.amazon.com/Database-Management-Systems-Raghu-Ramakrishnan/ dp/0072465638	
MOOC		
1.	https://www.coursera.org/learn/core-database	

COURSE TITLE		ENTERPRISE RESOURCE PLANNING			CREDITS	3
COURSE CODE		BCB2220	COURSE CATEGORY	PC	L-T-P-S	3-0-0-0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		To make student able to build an understanding of the fundamental concepts of ERP systems, their architecture, and working of different modules in ERP. Students will also able to develop and design the modules used in ERP systems, and can customize the existing modules of ERP systems.				
Course Objective		<ol style="list-style-type: none">1. To demonstrate a good understanding of basic issues in Enterprise Systems.2. To explain the scope of common Enterprise Systems (e.g., MM, SCM, CRM, HRM, procurement).3. To explain the challenges associated with implementing enterprise systems and their impacts on organisations.4. To describe the selection, acquisition and implementation of enterprise systems.5. To use a leading Enterprise Systems package (SAP) to support business operations and decision-making.				

Course Outcome	Upon completion of this course, the students will be able to								
	1. Analyse the basic concepts of ERP.								
	2. Apply the concept of Modelling of ERP.								
	3. Design and analyse about various ERP packages.								
	4. Apply the concept of Commercial ERP package.								
	5. Analyse and apply the architecture of SAP.								
Prerequisites: Agility, Improve customer relationship, integration & visible SCM									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	1-	1	-	1	3	2
CO-2	-	3	2	-	1	1	1	2	-
CO-3	3	2	2	2	-	-	2	3	2
CO-4	-	3	-	-	1	1	1	-	2
CO-5	3	-	3	-	1	-	1	3	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION									(9L)
Integrated Management Information Seamless Integration – Supply Chain Management – Integrated Data Model – Benefits of ERP – Business Engineering and ERP – Definition of Business Engineering – Principle of Business Engineering – Business Engineering with Information Technology. Suggested Readings: Supply Chain Management									CO-1 BTL-3
MODULE 2: BUSINESS MODELLING FOR ERP									(9L)
Building the Business Model – ERP Implementation – An Overview – Role of Consultant, Vendors and Users, Customisation – Precautions – ERP Post Implementation Options- ERP Implementation Technology –Guidelines for ERP Implementation. Suggested Readings: ERP Implementation									CO-2 BTL-3
MODULE 3: ERP AND THE COMPETITIVE ADVANTAGES									(9L)
ERP domain MPGPRO – IFS/Avalon – Industrial and Financial Systems – Baan IV SAP- Market Dynamics and Dynamic Strategy. Suggested Readings: ERP domain MPGPRO									CO-3 BTL-3
MODULE 4: COMMERCIAL ERP PACKAGE									(9L)
Description – Multi-Client Server Solution – Open Technology – User Interface- Application Integration. Suggested Readings: Multi-Client Server Solution									CO-4 BTL-3
MODULE 5: ARCHITECTURE									(9L)
Basic Architectural Concepts – The System Control Interfaces – Services – Presentation Interface – Database Interface. Suggested Readings: The System Control Interfaces									CO-5 BTL-3
TEXT BOOKS									
1.	Rajesh J.Ray(2010) , “Enterprise Resource Planning: Text &Cases: 1st Edition” MC Graw Hill Publisher								
REFERENCE BOOKS									

1.	Jose Antonio Fernandez(2006), " <i>The SAP R/3 Handbook</i> ", Tata McGrawHill
E BOOKS	
1.	http://14.139.156.108/jspui/bitstream/1/844/1/a-guide-to-erp.pdf
MOOC	
1.	https://www.coursera.org/learn/planning-auditing-maintaining-enterprise-systems

COURSE TITLE		RELATIONAL DATABASE MANAGEMENT SYSTEMS LABORATORY					CREDITS	1	
COURSE CODE		BCB2241	COURSE CATEGORY		PC	L-T-P-S		0-0-2-0	
VERSION	1.0	APPROVAL DETAILS		26th ACM 23-03-2019			LEARNING LEVEL	BTL-3	
ASSESSMENT SCHEME									
CIA								ESE	
80%								20%	
Course Description		In this course, you will learn the essential concepts behind relational databases and Relational Database Management Systems (RDBMS). The students will learn relational data models and discover how they are created and what benefits they bring, and how you can apply them to your own data.							
Course Objective		1. To Understand the role and nature of relational database management systems (RDBMS) in today’s IT environment; 2. To Translate written business requirements into conceptual entity-relationship data models; 3. To Convert conceptual data models into relational database schemas using the SQL Data Definition Language (DDL); 4. To understand Query and manipulate databases using the SQL Data Manipulation Language (DML); 5. To Understand SQL.							
Course Outcome		Upon completion of this course, the students will be able to 1. Apply the DDL, DML and TCL commands 2. Analyse and perform ODBC connection and combining VB with oracle SQL. 3. Design different views of tables for different users and to apply embedded and nested queries. 4. Create and execute procedure for an application using exception handling and cursors. 5. Design an application using package.							
Prerequisites: Database Technology									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	-	-	-	-	-	3	2	1
CO-2	-	2	2	-	-	1	-	-	1

CO-3	3	-	-	-	-	-	3	2	1
CO-4	-	2	2	-	1	-	-	-	1
CO-5	3	2	2	2	-	1	3	2	1

1: Weakly related, 2: Moderately related and 3: Strongly related

LAB /MINI PROJECT/FIELD WORK

Creation of Database and performing the operations given below: Insertion, Deletion, Modification, Generating a simple report for the following.

1. Payroll Processing
2. Mark sheet Processing
3. Saving bank account for banking
4. Inventory System
5. Library information System
6. Student information System
7. Electricity bill preparation System
8. Telephone directory maintenance

TEXT BOOKS

1. Pranab Kumar Das Gupta & P. RadhaKrishna(2013).” *Database Management Systems Oracle SQL and PL/SQL*”.

REFERENCE BOOKS

1. Jefferey A.Hoffer, Mary Prescott(2006), “*Modern Database Management*” Pearson Education

MOOC

1. <https://www.amazon.com/Database-Management-Systems-Raghu-Ramakrishnan/dp/0072465638>
2. <https://www.coursera.org/learn/core-database>

COURSE TITLE		OPERATING SYSTEMS LABORATORY			CREDITS	1	
COURSE CODE		BCB2242	COURSE CATEGORY		PC	L-T-P-S	0-0-2-0
VERSION	1.0	APPROVAL DETAILS		26th ACM 23-03-2019		LEARNING LEVEL	BTL-4
ASSESSMENT SCHEME							
CIA							ESE
80%							20%
Course Description		This course gives a detail understanding about the practical exposure of using operating system commands, to know about shell programming, to write and execute system calls and to implement operating system commands using the programming language C.					
Course Objective		1. To understand the basics of operating system commands. 2. To understand shell programming techniques. 3. To implement the operating system commands using C programs.					

Course Outcome	Upon completion of this course, the students will be able to 1. Execute shell programming using basic functions 2. Implement shell programming, expansions, substitutions 3. Identify and perform effectively a program using UNIX OS 4. Implement Patterns 5. Implement loops								
Prerequisites: Computer Organisation									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	2	1	2	1	1	2	-	1
CO-2	2	1	1	1	1	1	3	2	1
CO-3	2	1	1	2	1	1	-	-	1
CO-4	2	2	1	2	1	1	3	2	-
CO-5	2	1	1	1	1	1	3	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
LAB /MINI PROJECT/FIELD WORK									
(Implement the following on LINUX platform. Use C for high level language implementation) 1. Shell programming- command syntax- write simple functions- basic tests 2. Shell programming- loops- patterns- expansions- substitutions 3. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, open dir, read dir 4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc) 5. Write C programs to simulate UNIX commands like ls, grep, etc. 7. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. For FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time 8. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. 9. Implement the Producer – Consumer problem using semaphores. 10. Implement some memory management schemes – I 11. Implement some memory management schemes – II									
TEXT BOOKS									

1.	Stephen G. Kochan, Patrick Wood(2016), Shell Programming in Unix, Linux and OS X , Pearson Education
REFERENCE BOOKS / Link	
1.	William Stallings(2018), " <i>Operating Systems: Internals and Design Principles</i> ", Prentice Hall of India, 4th Edition,
E-BOOK	
1	https://www.cl.cam.ac.uk/teaching/1011/OpSystems/os1a-slides.pdf
MOOC	
1.	https://www.coursera.org/learn/os-power-user

SEMESTER V

COURSE TITLE		MULTIMEDIA SYSTEMS				CREDITS	3		
COURSE CODE		BCB2301	COURSE CATEGORY		PC	L-T-P-S	3-0-0-0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3		
ASSESSMENT SCHEME									
First Periodical Assessment	Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz	Attendance	ESE		
15%	15%		10%		5%	5%	50%		
Course Description	A Multimedia System is a system capable of processing multimedia data and applications. It is characterized by the processing, storage, generation, manipulation and rendition of Multimedia information.								
Course Objective	<div>1. To identify, formulate, and solve complex engineering problems by applying principles</div> <div>2. To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment,</div> <div>3. To apply engineering design to produce solutions that meet specified needs</div> <div>4. To develop and conduct appropriate experimentation, analyze and interpret data.</div> <div>5. To acquire and apply new knowledge as needed, using appropriate learning strategies.</div>								
Course Outcome	<div>Upon completion of this course, the students will be able to</div> <div>1. Apply the knowledge of the basic fundamental's components of Multimedia</div> <div>2. Create animation effects for basic multimedia formats</div> <div>3. Perform image and video compression</div> <div>4. Describe the hardware components and software tool devices</div> <div>5. Create a webpage incorporating multimedia contents</div>								
Prerequisites: Machine learning algorithms									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	-	1	-	3	2	1
CO-2	3	2	3	-	-	-	3	2	1
CO-3	3	2	3	-	-	1	3	2	1
CO-4	3	2	3	-	-	-	3	1	1
CO-5	3	3	3	-	-	-	3	1	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION TO MULTIMEDIA								(9L)	
Introduction to making Multimedia- Multimedia Skills and training- Text: Using text in Multimedia- Computer and Text- Font Editing and Design Tools- Hypermedia and Hypertext								CO-1 BTL-3	

Practical component: Adobe Photoshop, Maya and VFX software Suggested Readings: Design Techniques		
MODULE 2: MULTIMEDIA FILE HANDLING (9L)		
Sound – Images – Animation – Video Suggested Readings: Animation and Video editing		CO-2 BTL-3
MODULE 3: DIGITAL VIDEO AND IMAGE COMPRESSION (9L)		
Evaluating a compression system – Redundancy and Visibility-Video compression techniques- Standardization of an algorithm – The JPEG image compression standard- ITU –T Standards – MPEG motion video compression standard-DVI Technology Suggested Readings: File compression and DVI Technology		CO-3 BTL-3
MODULE 4: MULTIMEDIA HARDWARE (9L)		
Multimedia Hardware: Macintosh and Windows production Platforms-Hardware Peripherals: Memory and Storage Devices, Input Devices, Output Devices, Communication Devices, Basic Software Tools Suggested Readings: Multimedia Hardware Systems		CO-4 BTL-3
MODULE 5 : WEB BASICS (9L)		
Internetworking –connections –Internet services –Tools for WWW – Designing WWW. Suggested Readings: World wide web		CO-5 BTL-3
TEXT BOOKS		
1	Tay Vaughan(2004), <i>Multimedia: Making It Work</i> , 7th Edition, Tata Mc-Graw Hill.	
2	John F.Koegel Buford (1994), <i>Multimedia Systems</i> , Pearson Education	
REFERENCE BOOKS		
1	Ranjan Parekh, (2006). <i>Principles of Multimedia</i> , Tata Mc-Graw Hill.	
E BOOKS		
1	https://users.dimi.uniud.it/~antonio.dangelo/MMS/materials/Fundamentals_of_Multimedia.pdf	
MOOC		
1.	https://www.coursera.org/lecture/android-programming-2/multimedia-part-1-	

COURSE TITLE		INTRODUCTION TO JAVA PROGRAMMING			CREDITS	3			
COURSE CODE		BCB2302	COURSE CATEGORY		PC	L-T-P-S	3- 0- 0 -0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-4		
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance	ESE
15%		15%		10%		5%		5%	50%

Course Description	The course explains about object-oriented programming concepts, overview of java features of Java and benefits of OOPS concepts. Object-oriented programming (OOP) is at the core of Java. In fact, all Java programs are to at least some extent object-oriented. OOP is so integral to Java that it is best to understand its basic principles before you begin writing even simple Java programs.								
Course Objective	1. To understand the java basics 2. To design SQL language within MySQL and PHP to access and manipulate databases 3. To implement java classes and objects 4. To demonstrate concepts of inheritance and implement inheritance 5. To implement interfaces and packages								
Course Outcome	Upon completion of this course, the students will be able to 1. Describe the java basics. 2. Implement java control structures, arrays and strings 3. Implement java classes and objects 4. Implement and apply the concepts of inheritance and implement inheritance 5. Implement interfaces and packages								
Prerequisites: Programming skills									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	1	1	2	2	2	3	2	-
CO-2	1	1	1	1	2	1	-	1	2
CO-3	1	1	1	2	2	2	1	-	-
CO-4	1	2	2	2	2	2	2	2	2
CO-5	1	1	1	2	2	2	1	2	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION TO JAVA (9L)									
Features of java - JDK Environment & tools like (java, javac, appletviewer, javadoc, jdb) - OOPs Concepts Class, Abstraction, Encapsulation, Inheritance, Polymorphism -Difference between C++ and JAVA - Structure of java program -Data types, Variables, Operators, Keywords, Naming Convention. Practical component: Inheritance, Polymorphism, Structure of java program -Data types, Variables, Operators Suggested Readings: OOPs Concepts Class									CO-1 BTL-3
MODULE 2: CONTROL STRUCTURES, ARRAYS AND STRINGS (9L)									
Decision Making (if, switch), Looping (for, while)- Type Casting - Array Creating an array Types of Array - One Dimensional arrays - Two Dimensional array - String - Arrays , Methods. - StringBuffer class. Practical component: One Dimensional and Two Dimensional array - String - Methods. - StringBuffer class Suggested Readings: Decision Making (if, switch), Looping(for, while)									CO-2 BTL-4
MODULE 3: CLASSES AND OBJECTS (9L)									

Creating Classes and objects - Memory allocation for objects – Constructor –Simple programs using classes and objects Practical component: Constructor –Simple programs using classes and objects. Suggested Readings: Creating Classes and objects		CO-3 BTL- 4
MODULE 4: INHERITANCE (9L)		
Inheritance – introduction, types of inheritance, implementation of inheritance – uses of extends keyword – implementation of types of inheritance- simple programs using inheritance Practical component: Implementation of inheritance, implementation of types of inheritance Suggested Readings: Uses of extends keyword		CO-4 BTL- 4
MODULE 5: INTERFACE AND PACKAGE (9L)		
Interfaces – introduction, Abstract classes and methods - Implementation of Polymorphism - Method Overloading, Method Overriding - Nested and Inner classes - Packages Packages Concept Creating user defined packages - Java Built in packages java.lang, java.math, java.util, Random, Date, Hashtable , Wrapper classes. Practical component: Method Overloading, Method Overriding - Nested and Inner classes - Packages and interfaces Suggested Readings: Wrapper classes		CO-5 BTL-4
LAB / MINI PROJECT/FIELD WORK		
TEXT BOOKS		
1	E Balagurusamy, (2014). <i>Programming with JAVA</i> , 5 th edition,Tata McGraw Hill	
REFERENCE BOOKS		
1	Surbhi Kakar(2017), <i>A Textbook of Java Programming</i> , IK International Publishing House first edition	
E BOOKS		
1.	https://www.pdfdrive.net/java-the-complete-reference-7th-edition-e3625514.html	
MOOC		
1.	https://www.coursera.org/specializations/object-oriented-programming	

COURSE TITLE		INTRODUCTION TO PYTHON PROGRAMMING			CREDITS	3		
COURSE CODE		BCB2303	COURSE CATEGORY		PC	L-T-P-S	3- 0- 0 -0	
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL		BTL-3	
ASSESSMENT SCHEME								
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz		Attendance	ESE
15%		15%		10%	5%		5%	50%

Course Description	This course explains about the concepts of programming language, strings, lists, tuples, functions, files and directories. It starts from theoretical concepts along with syntax to understand and implement.								
Course Objective	1. To understand preliminary concepts of programming language and fundamentals 2. To understand about strings 3. To explain about lists concepts 4. To understand the tuples and functions 5. To understand the files and directories								
Course Outcome	Upon completion of this course, the students will be able to 1. Describe the Preliminary Concepts of Programming Language & syntax and Semantics methods 2. Perform string manipulation 3. Define the Lists concept 4. Implement the Tuples and functions 5. Implement file and Directories								
Prerequisites: Programming skills									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	1	1	2	2	2	3	2	2
CO-2	1	1	1	1	2	1	3	2	2
CO-3	1	1	1	2	2	2	3	2	2
CO-4	1	2	2	2	2	2	3	2	2
CO-5	1	1	1	2	2	2	3	2	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION (9L)									
Python Introduction, History of Python, Python features, Python Installation, Python Environment Variables, Running Python, Simple Programs, Python Identifiers, Reserved words, Lines and Indentation, Multi line statements, Quotation in Python, Comments in Python, Command line arguments, Assigning values to the variables, Multiple assignment, Standard data types, Type Conversion, Operators in Python. Practical component: Simple Programs, Python Identifiers, Reserved words, Lines and Indentation, Multi line statements, Quotation in Python, Comments in Python Suggested Readings: History of Python, Python features									CO-1 BTL-3
MODULE 2: STRINGS (9L)									
Assigning values in strings, String manipulations, String special operators, String formatting operators. Practical component: String special operators, String formatting operators Suggested Readings: Assigning values in strings									CO-2 BTL-4
MODULE 3: LISTS (9L)									
Lists- Introduction, accessing values in list, List manipulations, List Operations, Indexing, slicing & matrices. Practical component List manipulations, List Operations, Indexing, slicing & matrices.									CO-3 BTL-4

Suggested Readings: Accessing values in list:	
MODULE 4: TUPLES AND FUNCTIONS	
(9L)	
Built –in Functions and methods, Tuples- introduction, accessing values, Tuple functions, Dictionary Introduction, Accessing values, Functions Practical component: Accessing values, Tuple functions, Dictionary Introduction, Accessing values, Functions Suggested Readings: Built –in Functions and methods	CO-4 BTL- 4
MODULE 5: FILES AND DIRECTORIES	
(9L)	
I/O function, Opening and closing files, file object attribute, manipulations of the files, Directories in python, File and Directory related methods. Practical component: Manipulations of the files Suggested Readings: I/O function	CO-5 BTL-4
LAB / MINI PROJECT/FIELD WORK	
TEXT BOOKS	
1	PovelSolín, Martin Novák, (2012), <i>Introduction to Python Programming</i> , NCLab Public Computing
REFERENCE BOOKS	
1	John C. Luthy, (2012), <i>An Introduction to Python</i> , The University of Alabama
E BOOKS	
1.	https://users-cs.au.dk/chili/PBI/python_tutorial_jakobfredslund.pdf
MOOC	
1.	https://www.coursera.org/learn/interactive-python-1

COURSE TITLE		MULTIMEDIA SYSTEMS LABORATORY			CREDITS	1
COURSE CODE		BCB2331	COURSE CATEGORY	PC	L-T-P-S	0-0-2-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
CIA						ESE
80%						20%
Course Description	This purpose of this course is to introduce to students to create interactive media using industry-standard authoring tools. The focus of this course will be on the integration of text, images, animation, audio, and video into Web-based applications.					
Course Objective	<ol style="list-style-type: none">1. Create a well-designed, interactive Web site with respect to current standards and practices2. Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language3. Determine the appropriate use of interactive verses standalone Web applications.4. Create time-based and interactive multimedia components.					

Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 1. Describe graphic computing techniques to plan, develop, evaluate and manage a solution to a particular problem based on graphic systems using Flash. 2. Implement and evaluate graphic-system techniques to plan, develop, evaluate and manage a solution to a particular problem based on virtual environments by Flash. 3. Create interactive works involving different design logics 4. Create Macromedia Motion movies using different tool mechanisms. 5. Create multimedia applications
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CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	1	1	2	2	2	3	-	1
CO-2	1	1	1	1	2	1	1	2	1
CO-3	1	1	1	2	2	2	2	-	2
CO-4	1	2	2	2	2	2	2	2	-
CO-5	1	1	1	2	2	2	3	-	1

1: Weakly related, 2: Moderately related and 3: Strongly related

LAB / MINI PROJECT/FIELD WORK

- 1) Create a simple painting program using Flash or equivalent.
- 2) Create a simple animated banner using Flash or equivalent.
- 3) Design an object dragging program.
- 4) Prepare a photo album using Flash or equivalent.
- 5) Create animated buttons which is used for web design using Adobe Photoshop or equivalent.
- 6) Design image mapping using Flash or equivalent.
- 7) Create image morphing using adobe Photoshop or equivalent.
- 8) Make animations using macromedia Flash or equivalent.
- 9) Create animated Gifs for use as banners, titles and buttons.
- 10) Create short film in Flash or equivalent using any theme.
- 11) To perform animation using any animation software.
- 12) To perform image editing using basic tool, masking effect and rendering effects using Photoshop or equivalent.

TEXT BOOKS

1.	Tay Vaughan(2004), <i>Multimedia: Making It Work</i> , 7th Edition, Tata Mc-Graw Hill.
2	John F.Koegel Buford (1994), <i>Multimedia Systems</i> , Pearson Education

REFERENCE BOOKS

1.	Ranjan Parekh, (2006). <i>Principles of Multimedia</i> , Tata Mc-Graw Hill.
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E BOOKS

1.	https://users.dimi.uniud.it/~antonio.dangelo/MMS/materials/Fundamentals_of_Multi-media.Pdf
MOOC	
1.	https://www.coursera.org/learn/copyright-for-multimedia

COURSE TITLE		JAVA PROGRAMMING LABORATORY				CREDITS		1	
COURSE CODE		BCB2332	COURSE CATEGORY		PC	L-T-P-C-S		0-0-2-0	
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL		BTL-4	
ASSESSMENT SCHEME									
CIA								ESE	
80%								20%	
Course Description		This course will cover the fundamentals of java, features of Java programming, classes and objects, overloading, overriding, inheritance and its types of inheritance, interfaces, packages, arrays and control structures							
Course Objective		1. To have a better understanding of classes and objects. 2. To learn and implement the classes and objects. 3. To learn and implement the overloading and overriding 4. To learn and implement the inheritances and its types, inython pterfaces and packages 5. To learn and implement the arrays and control structures							
Course Outcome		Upon completion of this course, the students will be able to 1. Apply classes and objects 2. Implement overloading and overriding methods 3. Define inheritance 4. Design interfaces and packages 5. Evaluate and perform arrays and control structures							
Prerequisites: Basic Programming									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	1	1	2	2	2	3	2	1
CO-2	1	1	1	1	2	1	3	2	1
CO-3	1	1	1	2	2	2	3	2	1
CO-4	1	2	2	2	2	2	3	2	1
CO-5	1	1	1	2	2	2	3	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
LAB / MINI PROJECT/FIELD WORK									
1. Implementation of Classes and Objects 2. Write a java program to implement the constructor with its types 3. Write a java program to implement the overloading and overriding 4. Write a java program to implement the inheritance with its types									

5. Write a java program to implement the Strings with its functions
6. Write a java program to implement the Arrays
7. Write a java program to implement the Control structures
8. Write a java program to implement the abstract classes
9. Write a java program to implement the Interfaces
10. Write a java program to implement the Packages

TEXT BOOKS

- | | |
|---|--|
| 1 | E Balagurusamy, (2014). <i>Programming with JAVA</i> , 5 th edition, Tata McGraw Hill |
|---|--|

REFERENCE BOOKS

- | | |
|---|--|
| 1 | Surbhi Kakar(2017), <i>A Textbook of Java Programming</i> , IK International Publishing House, first edition |
|---|--|

E BOOKS

- | | |
|----|---|
| 1. | https://www.pdfdrive.net/java-the-complete-reference-7th-edition-e3625514.html |
|----|---|

MOOC

- | | |
|----|---|
| 1. | https://www.coursera.org/specializations/object-oriented-programming |
|----|---|

SEMESTER VI

COURSE TITLE		COMPUTER GRAPHICS				CREDITS		3	
COURSE CODE		BCB2316	COURSE CATEGORY		PC		L-T-P-S		3- 0- 0 -0
Version	1.0	Approval Details		26th ACM 23-03-2019			LEARNING LEVEL		BTL-4
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance	
15%		15%		10%		5%		5%	
Course Description		The objective of this course is to familiarize students with fundamental algorithms and data structures that are used in today’s interactive graphics systems as well as programming and architecture of high-resolution graphics computers. The principles and practise of computer graphics are described from their mathematical foundations to the modern applications domains of scientific visualisation, virtual reality, computer games and film animation.							
Course Objective		1. To introduce to the students the concepts of computer graphics. 2. To provide an interactive computer graphics, two-dimensional system and mapping. 3. To discuss the important drawing algorithm, two-dimensional transformation Clipping and filling.							
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the fundamentals of Graphics system, display devices and techniques. 2. Implement various algorithms to scan, convert the basic geometrical primitive’s area filling. 3. Create and manage the transmission of Two-Dimensional Multimedia 4. Analyze about the Three-Dimensional transformations 5. Apply the various surface detection methods to simulate the user visibility in different applications.							
Prerequisites: Programming skills in C.									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	1	-	1	3	2	1
CO-2	-	2	3	-	-	-	2	1	1
CO-3	3	-	2	1	1	-	3	2	2
CO-4	1	2	3	-	-	2	3	-	1
CO-5	3	3	2	1	-	-	-	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – OVERVIEW OF COMPUTER GRAPHICS SYSTEM									(9L)
Over View of Computer Graphics System – Video display devices – Raster Scan and random scan system – Input devices – Hard copy devices.									CO-1 BTL-2

Practical component: Study of Fundamental Graphics Functions. Suggested Readings: Fundamentals of Graphics system, display devices		
MODULE 2 – OUTPUT PRIMITIVES AND ATTRIBUTES		(9L)
Drawing line, circle and ellipse generating algorithms – Scan line algorithm – Character generation –attributes of lines, curves and characters – Antialiasing. Practical component: Implementation of Line drawing algorithms: DDA Algorithm, Bresenham's Algorithm. Mid-Point Algorithm. Suggested Readings: Basic Geometric Shape generating algorithm and its attributes.		CO-2 BTL-2
MODULE 3 – TWO DIMENSIONAL GRAPHICS TRANSFORMATIONS AND VIEWING		(9L)
Two-dimensional Geometric Transformations – Windowing and Clipping – Clipping of lines and clipping of polygons. Practical component: Implementation of 2D Transformation and Clipping Techniques. Suggested Readings: Two Dimensional Transformation, Clipping Techniques.		CO-3 BTL-3
MODULE 4 – THREE DIMENSIONAL GRAPHICS AND VIEWING		(9L)
Three-dimensional concepts – Object representations- Polygon table, Quadric surfaces, Splines Bezier curves and surfaces – Geometric and Modelling transformations – Viewing - Parallel and perspective projections. Practical component: Implementation of 3D Transformation. Suggested Readings: Three Dimensional Transformation, Projection Techniques.		CO-4 BTL-3
MODULE 5 – REMOVAL OF HIDDEN SURFACES		(9L)
Visible Surface Detection Methods – Classification- Computer Animation-- Creating interactive multimedia – Multimedia Authoring Systems. Practical component: To Perform different operations (rotation, scaling move etc..) on objects Suggested Readings: Visible Surface Detection Methods - Computer Animation.		CO-5 BTL-3
TEXT BOOKS		
1	Hearn, D. and Pauline Baker(2002) ,M., <i>Computer Graphics (C-Version)</i> , 2nd Edition, Pearson Education.	
REFERENCE BOOKS		
1	Neuman, W.M., and Sproull , R.F., <i>Principles of Interactive Computer Graphics</i> , 2nd Edition, McGraw Hill Book Co.	
E BOOKS		
1	http://www.freebookcentre.net/CompuScience/Free-Computer-Graphics-Books-Download.html	
MOOC		
1	https://www.mooc-list.com/tags/computer-graphics	

COURSE TITLE		DATA WAREHOUSING AND DATA MINING				CREDITS		3			
COURSE CODE		BCB2317		COURSE CATEGORY		PC		L-T-P-S		3-0-0-0	
Version	1.0	Approval Details			26th ACM 23-03-2019			LEARNING LEVEL		BTL-3	
ASSESSMENT SCHEME											
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance		ESE	
15%		15%		10%		5%		5%		50%	
Course Description		This course focus on issues relating to the feasibility, usefulness, effectiveness, and scalability of techniques for the discovery of patterns hidden in large data sets. This course presents an overall picture of the field, introducing interesting data mining techniques and systems and discussing applications and research directions									
Course Objective		1. To understand the basic concepts, modeling, design architectures, and general implementations of data warehouses 2. To apply methods for data cleaning, data integration, data reduction, data transformation, and data discretization 3. To mine frequent patterns, associations, and correlations in large data sets 4. To understand the basic concepts and methods for classification. 5. To discuss the basic concepts and methods for data clustering,									
Course Outcome		Upon completion of this course, the students will be able to 1. Compare data warehouse architecture and operational databases. 2. Illustrate Data preprocessing methods for data mining. 3. Construct Association rules for Data mining. 4. Solve Classification and clustering methods. 5. Describe recent trends in data mining									
Prerequisites: Database Management Systems											
CO, PO AND PSO MAPPING											
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3		
CO-1	-	3	2	-	-	2	2	1	-		
CO-2	3	1	-	1	-	2	-	2	-		
CO-3	2	3	3	-	2	-	1	-	3		
CO-4	3	1	2	-	-	2	3	3	-		
CO-5	-	-	-	3	3	-	3	-	3		
1: Weakly related, 2: Moderately related and 3: Strongly related											
MODULE 1: INTRODUCTION AND DATA WAREHOUSING										(9L)	
Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining Suggested Readings: Operational Databases										CO-1 BTL-2	

MODULE 2: DATA PREPROCESSING, LANGUAGE, ARCHITECTURES		(9L)
Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept - Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures Suggested Readings: Data Objects and Attribute types		CO-2 BTL-3
MODULE 3: ASSOCIATION RULES		(9L)
Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases. Suggested Readings: Pattern Mining		CO-3 BTL-3
MODULE 4 : CLASSIFICATION AND CLUSTERING		(9L)
Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis. Suggested Readings: Model Evaluation and Selection, Evaluation of Clustering		CO-4 BTL-3
MODULE 5: RECENT TRENDS		(9L)
Web Mining – Text Mining – Spatial Mining –Applications of Data Mining Suggested Readings: Data mining Applications		CO-5 BTL-3
TEXT BOOKS		
1.	J. Han, M. Kamber(2011), <i>“Data Mining: Concepts and Techniques”</i> , Harcourt India / Morgan Kauffman	
2	Margaret H.Dunham(2002), <i>“Data Mining: Introductory and Advanced Topics”</i> , Pearson Education	
REFERENCE BOOKS		
1.	Alex Bezon, Stephen J.Smith(2001), <i>“Data Warehousing, Data Mining & OLAP”</i> , McGraw- Hill	
E BOOKS		
1.	http://charuaggarwal.net/Data-Mining.pdf	
MOOC		
1.	https://nptel.ac.in/courses/106105174/	

COURSE TITLE		PROJECT WORK			CREDITS	4
COURSE CODE		BCB2346	COURSE CATEGORY	PC	L-T-P-S	0-0-8-0
VERSION	1.0	APPROVAL DETAILS		26th ACM 23-03-2019	LEARNING LEVEL	BTL-4
ASSESSMENT SCHEME						
CIA					ESE	
50%					50%	
Course Description		This course will be conducted as an individual or small group project under the direct supervision of a academic staff. The specific project topic undertaken will reflect the common interests and expertise of the student(s) and guide				

Course Objective	1. To perform a literature review 2. To study the detailed technical work 3. To develop a solution for the problem and develop an application by using relevant computer application concepts 4. To produce progress reports or maintain a professional journal to establish work completed and deliver a seminar on the general area 5. To present the work in a forum involving poster presentations								
Course Outcome	Upon successful completion of the course students will be able to: 1. Demonstrate a sound technical knowledge of their selected project topic. 2. Identify, formulate a solution for a problem. 3. Construct engineering solutions to complex problems utilising a systems approach. 4. Demonstrate the project 5. Analyse and publish the work								
Prerequisites: Software Engineering , Programming Skills									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO1	2	1	3	1	-	-	-	1	2
CO2	1	1	3	1	-	-	-	2	2
CO3	1	2	3	2	2	-	2	3	3
CO4	1	3	3	2	2	2	2	3	3
CO5	2	3	3	3	2	2	3	3	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
Mini Project									
Design and develop practical solutions to real life problems related to needs of the society. The theoretical knowledge gained from the subject should be applied to develop effective solutions to various computing problems. Submit a complete report of the project work carried out.									

B.C.A- Bachelor of Computer Applications
ELECTIVES

COURSE TITLE		MOBILE APPLICATION DEVELOPMENT				CREDITS	3		
COURSE CODE		BCC2351	COURSE CATEGORY		DE	L-T-P-S	3-0-0-0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3		
ASSESSMENT SCHEME									
First Periodical Assessment	Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz	Attendance	ESE		
15%	15%		10%		5%	5%	50%		
Course Description	To learn application development on the Android platform. Students are expected to work on a project that produces a professional-quality mobile application. Projects will be deployed in real-world applications. Course work will include project conception, design, implementation, and pilot testing of mobile phone software applications, using weight loss and physical activity motivation health applications as the target domain.								
Course Objective	<ol style="list-style-type: none">1. To describe those aspects of mobile programming that make it unique from programming for other platforms.2. To critique mobile applications on their design pros and cons.3. To utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.4. To program mobile applications for the Android operating system that use basic and advanced phone features.5. To deploy applications to the Android marketplace for distribution.								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Recognise android application with help of tools.2. Configure the Android Development environment for PhoneGap.3. Perform the events with the help of PhoneGap API.4. Generate the jQuery to handle the events.5. Deploy the mobile applications								
Prerequisites: Knowledge of C,C++ or Java									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	-	3	1	1	-	3	1	1
CO-2	3	2	3	1	-	1-	3	1	1
CO-3	3	-	3	1	-	-	3	1	1
CO-4	3	1	3	1	-	2-	3	1	1
CO-5	3	-	3	1	1	-	3	1	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION								(9L)	
Installing the Android SDK and Prerequisites - The Ingredients of an Android Application								CO-1	

- Getting Your Application into Users’ Hands - Eclipse for Android Software Development - Building a User Interface – example. Suggested Readings: Getting Your Application into Users’ Hands		BTL-3
MODULE 2: PHONEGAP		(9L)
Introduction to PhoneGap - Why Use PhoneGap? - How PhoneGap Works – Phone gap initialization - Configuring an Android Development Environment for PhoneGap - Using PhoneGap Build – build process example Suggested Readings: Configuring an Android Development Environment for PhoneGap		CO-2 BTL-3
MODULE 3: PHONE GAP API		(9L)
Phone gap APIs – camera – capture – compass – contacts – events – file media – example. Suggested Readings: Phone gap APIs		CO-3 BTL-3
MODULE 4: CORDOVA		(9L)
An Introduction to Apache Cordova - Anatomy of a Cordova Application - Configuring a Cordova Development Environment - Using the Cordova Command-Line Interfaces - Mechanics of Cordova Development. Suggested Readings: Anatomy of a Cordova Application		CO-4 BTL-3
MODULE 5: QUERY		(9L)
jQuery Core - DOM Element Selection And Manipulation - Event Handling - Theming and Styling - jQuery UI Widgets - Mouse Interactions - example. Suggested Readings: jQuery Core		CO-5 BTL-3
TEXT BOOKS		
1.	Zigurd Mednieks, Laird Dornin, G. Blake Meike, and Masumi Nakamura(2012), <i>Programming Android</i> , Orielly publisher	
REFERENCE BOOKS		
1.	John M Wargo(2015) - <i>Apache Cordova 4 Programming</i> – Addison Wesley Publisher	
E BOOKS		
1.	https://android.jlelse.eu/top-7-free-ebooks-for-mobile-developers 9b600eeaaaa5?gi=1ff1300b	
MOOC		
1.	https://www.coursera.org/learn/mobile-vr-app-development-unity	

COURSE TITLE		DIGITAL MARKETING			CREDITS	3
COURSE CODE		BCC2352	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz		Attendance	ESE

15%	15%	10%	5%	5%	50%				
Course Description	This course is designed for practical learning, therefore, most concepts will be linked with hands-on training, where students will be expected to work with marketing datasets, dummy display ads, virtual website optimisation, SEO based on instructions in lectures and class discussions. The live experience of analysing responses with analytical software, the launching of dummy display ads, creating optimisation of website through Google Adwords are some of the key features of the programme.								
Course Objective	<ol style="list-style-type: none">1. To analyze the confluence of marketing, operations, and human resources in real-time delivery.2. To demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets3. To explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks4. To investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked.5. To interpret the traditional marketing mix within the context of a changing and extended range of digital strategies and tactics.								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Recognize the importance of conversion and working with digital relationship marketing.2. Analyse cross-cultural and ethical issues in globalised digital markets.3. Describe the essential philosophies and practices of marketing and digital marketing technologies.4. Identify the areas of digital marketing communications.5. Describe methodologies, tools and technologies involved in digital marketing.								
Prerequisites: Knowledge about the social media									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	1	1	-	1	1	-	1	1	-
CO-2	3	1	1	3	1	1	3	1	1
CO-3	2	1	-	2	1	-	2	1	-
CO-4	3	1	2	3	1	2	3	1	-
CO-5	2	1	-	2	1	-	2	1	-
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION						(9L)			
Digital marketing - different from traditional marketing -Ecommerce -new trends and current scenario of the world -marketing a boon or a Bane -digital marketing be a tool of success for companies -Categorization of digital marketing for the business -Understanding a website -Levels of websites -Diff b/w Blog, Portal and Website								CO-1 BTL-3	

Suggested Readings: Categorization of digital marketing for the business		
MODULE 2: SEARCH ENGINE OPTIMIZATION (SEO) (9L)		
SEO - On page optimization techniques – Off page optimization techniques - Reports Suggested Readings: SEO		CO-2 BTL-3
MODULE 3: SOCIAL MEDIA OPTIMIZATION (SMO) (9L)		
Social Media Marketing - Advanced Facebook Marketing - Word Press blog creation-Twitter marketing - LinkedIn Marketing - Google plus marketing - social media Analytical Tools. Suggested Readings: Advanced Facebook Marketing		CO-3 BTL-3
MODULE 4: SEARCH ENGINE MARKETING (9L)		
Introduction to Search Engine Marketing - Tools used for Search engine Marketing - PPC /Google Adwords Tool - Display advertising techniques - Report generation. Suggested Readings: Google Adwords Tool		CO-4 BTL-2
MODULE 5: ADDITIONAL MODULE (9L)		
Google Analytics - Online Reputation Management - EMail Marketing - Affiliate Marketing - Social Media Analytics - Ad designing Suggested Readings: E-mail Marketing		CO-5 BTL-2
TEXT BOOKS		
1.	Ryan Deiss and Russ Hennesberry, (2017.) <i>Digital Marketing for Dummies</i> , publisher for Dummies	
REFERENCE BOOKS		
1.	Cory Rabazinsky (2015.) <i>Google AdWords for Beginners: A Do-It-Yourself Guide to PPC Advertising</i> , Createspace Independent Pub; 1st edition	
2.	Joe Pulizzi(2013), <i>Epic Content Marketing</i> , McGraw Hill Education.	
E BOOKS		
1.	https://blog.hubspot.com/marketing/why-digital-marketing-ebook	
MOOC		
1.	https://www.edx.org/course/digital-marketing-fundamentals	

COURSE TITLE		INFORMATION SECURITY			CREDITS	3
COURSE CODE		BCC2353	COURSE CATEGORY	DE	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-2
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance
15%		15%		10%	5%	5%
						50%

Course Description	In this course students learn basics of information security, in both management aspect and technical aspect. Students understand of various types of security incidents and attacks and learn methods to prevent, detect and react incidents and attacks. Students will also learn basics of application of cryptography which are one of the key technologies to implement security functions.								
Course Objective	1. Understand network security threats, security services, and countermeasures. 2. Learn fundamentals of cryptography and its application to network security 3. Apply methods for authentication, access control, intrusion detection and prevention. 4. Identify and mitigate software security vulnerabilities in existing systems								
Course Outcome	Upon completion of this course, the students will be able to 1. Describe the overview of Information security. 2. Describe the Security investigation. 3. Analyse the security aspects. 4. create Logical design. 5. create physical design.								
Prerequisites: Fundamentals of Computer Systems									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	3	2	2	2	-	2	3	1
CO-2	-	3	2	-	2	-	2	-	1
CO-3	3	-	-	2	1	1	-	3	1
CO-4	3	3	-	2	2	-	2	3	1
CO-5	3	3	2	2	2	-	2	3	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – INTRODUCTION (9L)									
History, what is Information Security? Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC. Suggested Readings: Information Security Incidents, Security Management									CO-1 BTL-2
MODULE 2 – SECURITY INVESTIGATION (9L)									
Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues. Suggested Readings: Human Aspect of Information Security, Terminologies in Information Security, Automated Attack And Penetration Tools									CO-2 BTL-2
MODULE 3 – SECURITY ANALYSIS (9L)									
Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk. Suggested Readings: Identifying Information Assets, Risk Treatment									CO-3 BTL-2

MODULE 4 – LOGICAL DESIGN (9L)	
Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity. Suggested Readings: Security Architecture, Data Encryption Standards	CO-4 BTL-2
MODULE – 5 : PHYSICAL DESIGN (9L)	
Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel. Suggested Readings: Requirements for Secure Communication, Classic Cryptography, Modern Cryptography	CO-5 BTL-2
TEXT BOOKS	
1	Mark Rhodes-Ousley(2013), <i>Information Security: The Complete Reference</i> , McGraw Hill Education
REFERENCE BOOKS	
1	Harold F. Tipton(2007), <i>Information Security Management</i> , CRC Press
E BOOKS	
1	https://securityintelligence.com/free-ebook-practical-guide-to-staying-ahead-in-the-cybersecurity-game/
MOOC	
1	https://www.coursera.org/learn/information-security-data

COURSE TITLE		SKETCHING & DRAWING			CREDITS	3
COURSE CODE		BCC2354	COURSE CATEGORY	DE	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE	
15%	15%	10%	5%	5%	50%	
Course Description	The basic premise behind all beginning-level sketch classes is to provide students with the training necessary to view an object and reconstruct it on paper using basic sketching tools. Students learn how to draw with pencils, pens, charcoals and pastels. They sketch forms and add shading and dimension. Basic sketch classes train students to draw from still shapes or photographs. Beginning sketch classes are taught in a studio or workshop environment, where students can practice sketching while receiving an instructor's guidance.					
Course Objective	<div><div>1.</div><div>To understand the techniques of fine pencil drawing</div></div> <div><div>2.</div><div>To explore different fine art subjects such as animals, birds, flowers, insect, still life, objects, scenery, etc.</div></div>					

	3. To acquire knowledge about the use of pencil and various tools to create textures for different subjects.								
Course Outcome	Upon completion of this course, the students will be able to 1. Apply the techniques/ways to perform sketching and drawings 2. Implement the clay modeling techniques and make the practical models 3. Apply pencil drawing 4. Apply different fine art subjects 5. Create textures								
Prerequisites: Basic Drawing Techniques									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	1	-	-	3	2	1
CO-2	-	2	3	1	1	-	2	1	1
CO-3	3	-	2	1	-	2	3	2	2
CO-4	1	2	3	1	-	-	3	-	1
CO-5	3	3	2	1	-	-	-	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – INTRODUCTION (9L)									
Indoor & Outdoor Sketching & Drawing Basics of Sketching & Drawing (with practice): Lines in different grades of pencils HB+0.8b-Shading in pencil medium- shading in different angles of pencil strokes- formatting in different textures with pencil- shading- simple objects in drawing- simple shapes of geometrical shapes -paper division & forming of sky land- stones- deserts- trees & plants- roadsides- rivers- perspective in lines in land scopes- different head shapes- characters- human anatomy (e.g.: Hands- legs- arms- different characters). Suggested Readings: Basics of Sketching & Drawing									CO-1 BTL-2
MODULE 2 – TYPES OF DRAWING (9L)									
Geometrical Drawing and Perspective Drawing Suggested Readings: Geometrical Drawing and Perspective Drawing									CO-2 BTL-2
MODULE 3 – COMPOSITIONS (9L)									
Still Life- Compositions (Based on historical- Social & Cultural) Suggested Readings: Still Life- Compositions									CO-3 BTL-3
MODULE 4 – MEDIUMS (9L)									
Mediums and techniques of Paintings. Suggested Readings: Mediums and techniques of Paintings.									CO-4 BTL-2
MODULE 5 – CLAY MODELLING (9L)									
Clay Modelling & Practical using Clay Modelling techniques Suggested Readings: Clay Modelling & Practical using Clay Modelling techniques									CO-5 BTL-2
TEXT BOOKS									
1	Paul Calter(2008), <i>Squaring the Circle: Geometry in Art and Architecture</i> , Key College Publishing								
REFERENCE BOOKS									
1.	Claire Harrigan(2013), <i>Abstract and Colour Techniques</i> , Batsford publisher								

E BOOKS	
1.	https://www.getfreebooks.com/18-sites-with-free-drawing-ebooks/
MOOC	
1.	https://www.coursera.org/courses?query=drawing

COURSE TITLE		PRINCIPLES OF COMPUTER SECURITY				CREDITS		3	
COURSE CODE		BCC2355	COURSE CATEGORY		DE	L-T-P-S		3-0-0-0	
Version	1.0	Approval Details		26th ACM 23-03-2019			LEARNING LEVEL	BTL-3	
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz		Attendance		ESE
15%		15%		10%	5%		5%		50%
Course Description		This course give insights into the computer security principles and the key activities: govern, protect, detect and respond. This course also provides how to Identify, detect and manage security risks and implementing security controls to reduce security risks.							
Course Objective		1. To identify, formulate, and solve complex engineering problems by applying principles 2. To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, 3. To apply engineering design to produce solutions that meet specified needs 4. To develop and conduct appropriate experimentation, analyze and interpret data. 5. To acquire and apply new knowledge as needed, using appropriate learning strategies.							
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the broad set of technical, social & political aspects of Computer Security 2. Describe the operational and organizational security Aspects 3. Describe the fundamentals of cryptography 4. Identify Authentication Methods 5. Identify the purpose of Intrusion detection system							
Prerequisites: Security Concepts									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	1	2	1	1	-	3	2	1
CO-2	-	1	-	-	1	-	-	3	-

CO-3	2	-	2	1	-	1	2	-	1
CO-4	-	1	-	1	1	-	3	3	-
CO-5	3	1	2	-	1	-	3	-	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION TO SECURITY TRENDS (9L)									
The Computer Security Problem - Targets and Attacks - Approaches to Computer Security - Ethics - Basic Security Terminology - Security Models. Suggested Readings: Security Terminology									CO-1 BTL-2
MODULE 2: OPERATIONAL AND ORGANIZATIONAL SECURITY (9L)									
Policies, Procedures, Standards, and Guidelines - Security Awareness and Training - Interoperability Agreements - The Security Perimeter - Physical Security - Environmental Issues - Wireless - Electromagnetic Eavesdropping - People—A Security Problem - People as a Security Tool; Suggested Readings: Organizational security									CO-2 BTL-2
MODULE 3: CRYPTOGRAPHY (9L)									
Cryptography in Practice - Historical Perspectives - Algorithms - Hashing Functions - Symmetric Encryption - Asymmetric Encryption - Quantum Cryptography- Cryptography Algorithm Use. Suggested Readings: Cryptography									CO-3 BTL-3
MODULE 4: AUTHENTICATION AND REMOTE ACCESS (9L)									
User, Group, and Role Management - Password Policies - Single Sign-On - Security Controls and Permissions - Preventing Data Loss or Theft - The Remote Access Process - Remote Access Methods Suggested Readings: Authentication and Remote Access									CO-4 BTL-2
MODULE 5 : INTRUSION DETECTION SYSTEMS (9L)									
History of Intrusion Detection Systems - IDS Overview - Network-Based IDSs - Host-Based IDSs-Intrusion Prevention Systems - Honeypots and Honey nets – Tools. Suggested Readings: Intrusion Detection Systems									CO-5 BTL-2
TEXT BOOKS									
1	W.A.Coklin, G.White, (2016), <i>Principles of Computer Security</i> : Fourth Edition, McGrawHill								
2	William Stallings(2017), <i>Cryptography and Network Security Principles and Practices</i> , Seventh Edition, Pearson Education								
REFERENCE BOOKS									
1	Achyut S. Godbole, (2013), <i>Web Technologies: TCP/IP, Web/Java Programming, and Cloud Computing</i> , Tata McGraw-Hill Education								
E BOOKS									
1	https://www.newhorizons.com/promotions/cybersecurity-ebooks								
MOOC									
1.	https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks#syllabus								

COURSE TITLE		SCRIPTING LANGUAGES				CREDITS		3	
COURSE CODE		BCC2361	COURSE CATEGORY		DE	L-T-P-S		3-0-0-0	
Version	1.0	Approval Details		26th ACM 23-03-2019			LEARNING LEVEL		BTL-3
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz		Attendance		ESE
15%		15%		10%	5%		5%		50%
Course Description		The purpose of the course is to prepare students for building scripts that control a sequence of program steps such as those used in developing testing and deploying software.							
Course Objective		1. To Demonstrate the basic techniques used to create scripts for automating system administrative tasks. 2. To Demonstrate the use of regular expressions in processing text 3. To Construct web scraping scripts to programmatically obtain data and content from web pages. 4. To Design, code, and test applications using HTML5,CSS,AJAX scripts. 5. To Analyze Bootstrap and building classes in bootstrap etc.							
Course Outcome		Upon completion of this course, the students will be able to 1. Apply the languages like HTML5,HTML forms and CSS 2. Create and write program using java script, AJAX. 3. Analyze Bootstrap and building classes in bootstrap etc., 4. Implement html, html forms, CSS and CSS in bootstrap with case studies. 5. Analyze and apply the role languages like HTML5, HTML forms and CSS.							
Prerequisites: HTML									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	3	2	-	1	-	3	2	-
CO-2	-	3	3	-	-	-	-	2	1
CO-3	3	-	3	2-	-	1	3	-	-
CO-4	3	2	-	-	-	-	-	2	-
CO-5	3	-	3	1	-	-	3	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: HTML 5 (9L)									
Html 5 Structure – New Structural Tags and Attributes - header - Hgroup Nav – article - selection - aside - footer – figure – figure caption elements - Text – Lists – Links- Images – Tables – Forms Extra Markup - HTML5 Layout. Suggested Readings: HTML tags									CO-1 BTL-2

MODULE 2: BROWSER AND FORMS		(9L)
Browser Handling in HTML5 – Boilerplates - Testing for HTML5 Features – Html 5 web forms – Embedding video and audio with HTML 5 –browser experience with html5 Suggested Readings: Advances in Cyber Security: Principles, Techniques, and Applications		CO-2 BTL-2
MODULE 3: CASCADING STYLE SHEETS		(9L)
Introducing CSS – The Benefits of CSS - power of CSS – style sheet rules - rule order -- selectors – declarations –External style sheets – embedded style sheets – inline style sheets – grouped selectors inheritance – parents and children - Color – Text – Boxes - Lists, Tables & Forms management - Layout management – Images management. Transitions Transforms and animation -CSS transforms– key frame animation Suggested Readings: Style Sheets		CO-3 BTL-3
MODULE 4: AJAX		(9L)
Introduction to AJAX – Ajax Overview – Introduction to Java script – working with java script –deep dive to java script – understanding DOM – AJAX methods – Ajax design issues – Sample application Suggested Readings: Java Script		CO-4 BTL-3
MODULE 5: BOOTSTRAP		(9L)
What Is Bootstrap – Why bootstrap - Downloading and Installing Bootstrap – Bootstrap CDN – Bootstrap Grid classes - Building with Bootstrap - Using the Base CSS Implementing the Bootstrap Base CSS – Bootstrap components - Bootstrap JavaScript Plugins - Customizing Bootstrap – sample application. Suggested Readings: Bootstrap		CO-5 BTL-3
TEXT BOOKS		
1.	Jon Duckett (2014), <i>HTML & CSS: Design and Build Websites + JavaScript & JQuery: Interactive Front-End Web Development (Set of 2 Volumes)</i> , Wiley publisher	
REFERENCE BOOKS		
1	Aravind Shenoy, Ulrich Sossou (2014), <i>Learning Bootstrap</i> , Packt Publishing	
E BOOKS		
1.	http://www.freebookcentre.net/Language/langCategory.html	
MOOC		
1.	https://www.mooc-list.com/tags/programming-languages	

COURSE TITLE		CYBER FORENSICS		CREDITS	3
COURSE CODE		BCC2362	COURSE CATEGORY	DE	L-T-P-S
Version	1.0	Approval Details	26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE

15%	15%	10%	5%	5%	50%				
Course Description	This course provides a solid foundation by introducing digital forensics to those who are new to the field. It guides the student toward becoming a skilled cyber forensics investigator. It introduces the history of digital forensics and explains how the use of electronic evidence developed. It explores current digital forensics software and hardware tools, including those that might not be readily available, and evaluates their strengths and weaknesses.								
Course Objective	1. To illustrate the history of digital forensics and explains how the use of electronic evidence developed 2. To prepare to acquire data from a suspect’s drive and discusses available Linux and GUI acquisition tools. 3. To explain search warrants and the nature of a typical digital forensics case. 4. To explore current digital forensics software and hardware tools, 5. To understand recent trends in cyber forensics.								
Course Outcome	Upon completion of this course, the students will be able to 1. Describe the basic concepts the various ideas about cybercrime. 2. Identify the international and national cybercrime strategy. 3. Formulate and design the procedures for searching and seizing evidence. 4. Evaluate the strengths and weaknesses of cyber forensics tools. 5. Recognize the features of Cyber Forensics to apply in real time scenarios.								
Prerequisites: BCC2355 – Principles of Cyber Security									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	-	2	2	1	3	-	2	3	-
CO-2	3	2	3	-	-	1	3	-	-
CO-3	-	-	2	1	3	-	-	2	1
CO-4	3	3	3	1	2	1	3	3	1
CO-5	3	3	-	1	3	-	3	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: UNDERSTANDING THE THREAT FROM CYBER CRIME						(9L)			
Introduction Cyber Threat – Definition of Cyber Crime – Classification – Current Threats and Trends – Diversity of Cyber Crime – Cyber Hate Crimes – Cyber Terrorism. Suggested Readings: Evolution of cyber security									CO-1 BTL-2
MODULE 2: RESPONDING TO CYBER CRIME						(9L)			
Cyber Strategy – National Security Strategy – Cyber Security Strategy – Organized Crime Strategy –Cyber Crime Strategy - Policy Cyber Crime – International Response – National Cyber Security Structure – Strategic Policy Requirements – Police and Crime Commissioners. Practical component: Write a one-page summary of the licensing requirements in the region you selected.									CO-2 BTL-2

Suggested Readings: Advances in Cyber Security: Principles, Techniques, and Applications		
MODULE 3: INVESTIGATING CYBER CRIME		(9L)
Preventing Cyber Crime – Password Protection – Get Safe Online – Cyber Security Guidance for Business - Cyber Crime Investigation Skills – Criminal Investigation – Code of Ethics – Evidence – Hi-Tech Investigations – Capturing and Analyzing Digital Evidence. Practical component: Analyze different password manages available and it’s features. Suggested Readings: Best practices for Cyber security standards		CO-3 BTL-3
MODULE 4: DIGITAL FORENSICS		(9L)
Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face, Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics. Practical component: Create a chart outlining each tool’s current capabilities, and write a one- to two-page report on the features you found most beneficial. Suggested Readings: OS Forensics tool		CO-4 BTL-3
MODULE 5 : CASE STUDY		(9L)
Latest Study Topics on Cyber Crime and Investigations - Recent Cyber Crime Cases – Recent Digital Forensics Cases – Bridging the Gaps in Cyber Crime Investigations between the cyber security stake holders. Practical component: Investigate a recent cybercrime case and write a detailed report. Suggested Readings: Next-generation digital forensics		CO-5 BTL-3
TEXT BOOKS		
1.	Thomas Halt, Adam M. Bossler and Kathryn C.Seigfried Spellar(2017), “ <i>Cybercrime and Digital Forensics: An Introduction</i> ”, Routledge Taylor and Francis Group	
REFERENCE BOOKS		
1	William, Stallings. (2018). <i>Effective Cyber security: A Guide to Using Best Practices and Standards</i> , Addison - Wesley Professional Publishers, 1st Edition.	
E BOOKS		
1.	http://www.uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf	
MOOC		
1.	https://www.edx.org/course/cybersecurity-fundamentals	
2.	https://www.coursera.org/specializations/cyber-security	

COURSE TITLE		DATA VISUALISTION AND VISUALISATION FRAMEWORKS					CREDITS	3	
COURSE CODE		BCC2363	COURSE CATEGORY		DE	L-T-P-S		3-0-0-0	
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL		BTL-3	
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project		Surprise Test / Quiz	Attendance		ESE	
15%		15%	10%		5%	5%		50%	
Course Description		Axiis is an open-source data visualization framework designed for beginner and expert developers alike. ... Axiis provides both pre-built visualization components as well as abstract layout patterns and rendering classes that allow you to create your own unique visualizations.							
Course Objective		1. To identify, formulate, and solve complex engineering problems by applying principles 2. To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, 3. To apply engineering design to produce solutions that meet specified needs 4. To develop and conduct appropriate experimentation, analyze and interpret data. 5. To acquire and apply new knowledge as needed, using appropriate learning strategies.							
Course Outcome		Upon completion of this course, the students will be able to 1. Compare various visualization techniques. 2. Apply principles of data visualization 3. Acquire, parse, and analyze abstract data sets 4. Design and implement standard visualization techniques 5. Perform Quantitative and qualitative evaluation for existing visualizations							
Prerequisites: Machine learning algorithms									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	1	-	-	3	2	1
CO-2	-	2	3	1	1	-	2	1	1
CO-3	3	-	2	1	-	2	3	2	2
CO-4	1	2	3	1	-	-	3	-	1
CO-5	3	3	2	1	-	-	-	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: VISUALIZATION									(9L)
What is Visualization - Classifications of Visualizations - Infographics vs Data Visualization - Graph Visualizations - Geo mapping Suggested Readings: Various visualizations									CO-1 BTL-3
MODULE 2: COLOR MANAGEMENT									(9L)

What is color – CMYK –Device specific color models – Device independent color models – color profiles –Device profiles – profile limitations – color management workflow Suggested Readings: Color management	CO-2 BTL-3
MODULE 3: VISUALIZATION TYPES WITH R (9L)	
Basic and Interactive Plots - Heat Maps and Dendrograms – pie chart – donut plot sunflower plot – hexbin plot – radial plot – coxcomb plot – candlestick plot – shape files – cartograms – violin plot – density plot – QQ plot – time series plot Suggested Readings: Visualization types with R	CO-3 BTL-3
MODULE 4: FRAMEWORK (9L)	
D3 – dealing with data - The Enter Selection – tipping the Scales, Axes and Lines - Interaction and Transitions Layout – creating charts – line chart –bubble chart bar chart -Three-Dimensional Tools Built with D3. Suggested Readings: Framework	CO-4 BTL-3
MODULE 5 : PYTHON DATA VISUALIZATION (9L)	
Preparing Working Environment - matplotlib, NumPy, and SciPy – Data import methods – data Plots - Scatter – Bar – Histogram – line chart - stacked charts – logarithmic plots Suggested Readings: Visualization techniques	CO-5 BTL-3
TEXT BOOKS	
1	Atmajitsinh Gohil (2015), <i>R Data Visualization Cookbook</i> , Packt Publishing Limited
REFERENCE BOOKS	
1	Bruce Fraser, Chris Murphy, Fred Bunting(2004), <i>Real world color management</i> , 2nd ed, Peach Pit Press
E BOOKS	
1	https://www.coursera.org/learn/datavisualization
MOOC	
1.	https://www.coursera.org/specializations/datavisualization

COURSE TITLE		GRAPHIC DESIGN & VISUAL ARTS			CREDITS	3
COURSE CODE		BCC2364	COURSE CATEGORY	DE	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		Graphic Design is a course that explores graphic communication through the understanding of the elements and principles of design; as well as, the design process, from idea development through the final execution of a document. Professionals use the concepts explored in this course in the following disciplines:				

	advertising, graphic design, web design, illustration, broadcast design, photography and game design and many others								
Course Objective	1. To familiarize the student with basic principles and fundamentals in visual art and design. 2. To develop basic skills using tools and theory used in design process. 3. To understand the creative process, develop techniques and methods of creative problem solving.								
Course Outcome	Upon completion of the course, the students will be able 1. Describe the basic principles and fundamentals in visual art and design 2. Design tools and theory in design process 3. Apply the designing techniques 4. Describe the raster graphics 5. Design creative arts and graphics using Photoshop								
Prerequisites: Basic Knowledge on Graphics									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	3	2	-	1	2	2	3	-
CO-2	1	1	-	-	-	-	3	-	-
CO-3	-	-	-	1	-	1	-	2	1
CO-4	2	1	-	-	1	-	3	3	1
CO-5	-	-	3	-	-	-	3	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – ELEMENTS OF DESIGN									(9L)
Line- Color- Texture- Shape- Form- Value- Size Principles of Compositional Design The principles of design are the recipe for a good work of art. The principles combine the elements to create an aesthetic placement of things that will produce a good design. Center of interest- Balance- Harmony- Contrast- Directional Movement- Rhythm Suggested Readings: Basic Design Techniques									CO-1 BTL-2
MODULE 2 – BASIC DESIGNING SOFTWARE									(9L)
Windows Paint- Basics Concept making and Implement on Computer- Color knowledge- Generating Ideas- Basics About Various software's in Industry for still image manipulating- knowledge about pixels- measuring units in diff image manipulating software's. Suggested Readings: Basics Concept making and Implement on Computer									CO-2 BTL-2
MODULE 3 – VECTOR GRAPHICS									(9L)
Vector Graphics (Designing- Color Theory- Vector Designing & Editing- and Text Formatting): Interface: Working with menus- toolbars- Dockers. Document Setup: Setting Page Size& Orientation- Document Navigation Rulers & Guidelines: Status Bar. Text: Formatting- Text Layout- Skewing and rotating- creating Drop shadow- Text to Path- Extruding text. Objects: Grouping & locking objects- Combining & breaking apart- Transforming & Shaping- Cutting objects apart- Trim- weld & Intersection of objects. Suggested Readings: Vector Graphics									CO-3 BTL-3
MODULE 4 – LINES & CURVES									(9L)

Using freehand & Bezier tool- Line properties- Arrowheads Eraser & artist media tools Nodes & Paths. Color & Fills: Solid Color- Color Palettes- Eyedropper & Paint bucket - Fountain- Fills- Patterns- Texture Fills- Interactive Mesh Fill. Special effects: Envelopes- Blends- Perspective- Shadow Objects- Power Clip Command Transparency- Distortion- Contour- Lens Docker. Complex Shapes: Polygon & Stars Spirals Printing Menu. Suggested Readings: Line properties		CO-4 BTL-2
MODULE 5 – RASTER GRAPHICS		(9L)
Raster Graphics (Designing- Color Theory- Raster Designing & Editing- text Formatting: Getting to Know the Work Area- starting to work in Adobe Photoshop- Color modes- Color- Using the tools- Selecting and using a tool from the toolbox. Using the tool options bar and other palettes- Customizing the workspace- Using Photoshop Help- Embedding information for easy identification- Automating routine tasks- Resolution and image size- Straightening and cropping an image- Adjusting lightness with the Dodge tool- Adjusting saturation with the Sponge tool- Retouching and Repairing- Repairing areas with the Clone Stamp tool- Using the spot Healing Brush tool- Using the Healing Brush and Patch tools- Retouching on a separate layer, Suggested Readings: Raster Graphics		CO-5 BTL-2
TEXT BOOKS		
1	Alex W.White(2011) " <i>The Elements of Graphic Design</i> (Second Edition) , Allworth publisher	
REFERENCE BOOKS		
1.	Ellen and Philips(2015), <i>Graphic Design: The New Basics</i> , Princeton Architectural Press	
E BOOKS		
1.	https://www.creativebloq.com/design/free-ebooks-designers-7133700	
MOOC		
1.	https://www.coursera.org/specializations/graphic-design	

COURSE TITLE		ETHICAL HACKING AND SYSTEMS DEFENSE			CREDITS	3
COURSE CODE		BCC2365	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		Ethical hacking involves an authorized attempt to gain unauthorized access to a computer system, application, or data. ... Also known as “white hats,” ethical hackers are security experts that perform these assessments. The proactive work they do helps to improve an organization's security posture.				

Course Objective	1. To identify, formulate, and solve complex engineering problems by applying principles 2. To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, 3. To apply engineering design to produce solutions that meet specified needs 4. To develop and conduct appropriate experimentation, analyze and interpret data. 5. To acquire and apply new knowledge as needed, using appropriate learning strategies.								
Course Outcome	Upon completion of the course, the students will be able 1. Describe the concepts of ethical hacking 2. Describe the concepts of System hacking 3. Perform TCP/IP and Port scanning 4. Identify desktop and server OS vulnerabilities 5. Describe network protection systems								
Prerequisites: Machine learning algorithms									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	2	1	-	3	2	1
CO-2	3	2	2	2	-	-	3	2	1
CO-3	3	2	2	2	-	1	3	2	1
CO-4	3	2	2	2	-	-	3	2	1
CO-5	3	2	2	2	-	-	3	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION TO ETHICAL HACKING (9L)									
Introduction-Ethical hacking Terminology-types of hacking technologies-phases of ethical hacking-Foot printing-Social Engineering-Scanning and enumeration Practical component : hacking the server(through virtual machine) Suggested Readings: Hacking terminology									CO-1 BTL-3
MODULE 2: SYSTEM HACKING (9L)									
Understanding the password hacking techniques-Rootkits-Trojans-Backdoors-Viruses and worms-sniffers-denial of service-Session hijacking. Practical component: Password hacking Suggested Readings: Trojans and backdoor viruses									CO-2 BTL-3
MODULE 3: TCP/IP OVERVIEW CONCEPTS AND PORT SCANNING (9L)									
Overview of TCP/IP-IP addressing-numbering systems- Introduction to port scanning-types of port scan-port scanning tools-ping sweeps- Understanding scripting-Enumeration. Practical component: Identifying vulnerabilities in OS Suggested Readings: Scanning tools									CO-3 BTL-3
MODULE 4: DESKTOP AND SERVER OS VULNERABILITIES (9L)									

Windows OS vulnerabilities-tools for identifying vulnerabilities in windows-Linux OS vulnerabilities-vulnerabilities of embedded OS. Practical component: Various OS and Vulnerabilities Suggested Readings: Embedded OS		CO-4 BTL-3
MODULE 5: NETWORK PROTECTION SYSTEMS (9L)		
Understanding routers-understanding firewalls-risk analysis tools for firewalls-understanding intrusion and detection and prevention systems-honeypots. Practical component: Routers and Firewall Suggested Readings: Intrusion and Detection		CO-5 BTL-3
TEXT BOOKS		
1	Michael T. Simpson, Kent Backman, James Corley(2016) " <i>Hands-On Ethical Hacking and Network Defense</i> " Delmar Cengage Learning; 2nd edition	
2	Steven DeFino, Barry Kaufman, Nick Valenteen (2015)" <i>Official Certified Ethical Hacker Review Guide</i> " Wiley publisher	
REFERENCE BOOKS		
1	Patrick Engebretson(2011), <i>The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy</i> , Syngress Basics Series	
E BOOKS		
1	https://www.nationalcyberwatch.org/resource/ethical-hacking-systems-defense-national-cyberwatch-center-edition/	
MOOC		
1.	https://www.coursera.org/courses?query=ethical%20hacking	

COURSE TITLE		ONLINE ADS DESIGNS AND MANAGEMENT			CREDITS	3
COURSE CODE		BCC2371	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		This course focuses on advertising creative strategy and execution. You will develop your conceptual, aesthetic and creative sophistication through activities, assignments, and critiques. This course describes the creative process, including how to generate ideas, develop rough layouts, extend ideas across media in a single campaign, and advertising that people will enjoy seeing and hearing. This course will challenge you to enlighten, entertain, enrage, and (most of all) engage with the work.				

Course Objective	1. To recognize well-executed advertising and understand what makes it strategically sound. 2. To generate and develop work that is strategic, memorable and persuasive 3. To practice writing creative briefs and following them when developing campaigns. 4. To develop campaigns that carry a big idea across several media, including traditional and digital spaces. 5. To improve soft skills associated with the ad industry: present, persuade, and think critically and creatively.								
Course Outcome	Upon completion of this course, the students will be able to 1. Outline the best persuasive advertising techniques. 2. Recognize well-executed advertising and understand what makes it strategically sound. 3. Construct Advertisements using the right fonts and design 4. Design an ad to pull customers towards a business. 5. Develop campaigns that carry a big idea across several media, including traditional and digital spaces.								
Prerequisites: Fundamentals of Photoshop									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	3	2	1	-	-	3	2	1
CO-2	3	3	2	1	-	-	3	2	1
CO-3	3	3	2	1	-	-	3	2	1
CO-4	3	3	2	1	-	-	3	2	1
CO-5	3	3	2	1	-	-	3	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION									(9L)
Photoshop - GIMP - Wire Framing - Html 5 Ads - Google Studio For Labs Suggested Readings: GIMP									CO-1 BTL-2
MODULE 2: ADVERTISING DESIGN									(9L)
Fundamentals of Advertising - Fundamentals of Design continued - Color Theory - Graphic Symbolism - Critical Thinking - Digital Layout - Dynamics of Mass Communication - Advertising Copywriting - Introduction to Advertising Campaign - Presentation of Concept proposals - Work in progress – Critique. Suggested Readings: Color Theory									CO-2 BTL-2
MODULE 3: INTRODUCTION TO MODERN GRAPHIC AD DESIGN									(9L)
Introduction to Modern Graphic Design - Design Building Blocks Essentials - All About Typography - Colour and Colour Theory - Advertisements, Publications, Photography and Visual Identity -Logotype Shape Designs and Organisation of Documents - Layout Design and Collage - Graphics Enhancement and Systems - Preparing your Portfolio and Course Consolidation. Suggested Readings: Logotype Shape Designs and Organisation of Documents									CO-3 BTL-3

MODULE 4: ONLINE AD TYPES AND FORMATS (9L)	
Google Search Ads - AdWords Ads - PPC Ads - Bing Ads - Facebook Ads - Twitter Ads - Tumblr Ads - Banner Ads - Google Display Ads - Retargeting Ads - Reddit Ads - Mobile Ads - In-Game Ads - AdMob Ads - Email Ads - Gmail Ads - Video Ads - YouTube Ads - Pinterest Ads - Instagram Ads - Vine Ads - TV Ads - Newspaper Ads - Radio Ads - Urban Ads. Suggested Readings: Google Search Ads, Facebook Ads	CO-4 BTL-2
MODULE 5: CREATING ADS, BANNERS AND POSTERS (9L)	
Create Logo - Create a Banner Advertising for any product(mobile) - Create a Poster for any functions (College cultural) - Design a tumbler Ad - Create Any Instagram, Facebook or Email Ad. Suggested Readings: Create a Banner & Poster	CO-5 BTL-2
TEXT BOOKS	
1.	Robin Landa(2010), Advertising by Design: <i>Generating and Designing Creative Ideas Across Media</i> , Wiley Publisher.
REFERENCE BOOKS	
1.	Tom Altstiel, Jean M. Grow(2019) , <i>Marcel Jennings, Advertising Creative: Strategy, Copy, and Design</i> , SAGE Publications, Inc; 5th edition
E BOOKS	
1.	https://www.creativebloq.com/design/free-ebooks-designers-7133700
MOOC	
1.	https://www.coursera.org/courses?query=advertising&page=1

COURSE TITLE		MACHINE LEARNING -R PROGRAMMING			CREDITS	3
COURSE CODE		BCC2372	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		Machine learning is the science of getting computers to learn and act. This course provides a broad introduction to machine learning and the underlying mathematical concepts and R programming for implementing the machine learning algorithms.				
Course Objective		1. To understand the fundamentals issues and challenges in machine learning 2. To identify strengths and weaknesses of machine learning 3. To understand and underlying mathematical concepts 4. To design and implement various machine learning algorithms 5. To learn about the factoring and array techniques				

Course Outcome	Upon completion of this course, the students will be able to								
	1. Describe the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.								
	2. Identify the strengths and weaknesses of many popular machine learning approaches.								
	3. Describe the mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.								
	4. Design and implement various machine learning algorithms in a range of real-world applications.								
5. Perform factoring and array techniques									
Prerequisites: Basics of Security									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	-	-	1	-	2	-	2
CO-2	-	3	2	-	-	-	2	-	2
CO-3	-	2	3	1	-	1	1	-	-
CO-4	2	2	1	-	-	-	1	-	2
CO-5	-	2	2	1	-	1	1	1	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: SUPERVISED LEARNING (9L)									
What is machine learning – Types of learning- Supervised learning? What is supervised learning – input vectors – output – noise - Logistic regression. Techniques - Classification techniques - Generative learning algorithms. Naive Bayes. Support vector machines. Model selection and feature selection – Use of R for Supervised learning Knime tool, and Weka Tool. Suggested Readings: Basic concepts of AI									CO-1 BTL-2
MODULE 2: UNSUPERVISED LEARNING (9L)									
K means algorithm – dealing with noise – normalization Use of R for Unsupervised learning Knime tool, and Weka Tool. Suggested Readings: UnSupervised learning									CO-2 BTL-2
MODULE 3: R PROGRAMMING (9L)									
Introducing R: Downloading and Installing R from CRAN- The Help Command in R Starting and quitting R Some Simple Math Flow control the for () loop - The if () statement - The while () loop Reading and Getting Data into R - Viewing Named Objects - Types of Data Items -Structure of Data Items - Saving Work in R Suggested Readings: Basics of R Programming									CO-3 BTL-3
MODULE 4: LIST (9L)									
Manipulating Objects -Viewing Objects within Objects Forms of Data Objects - Convert a Matrix to a Data Frame Convert a Data Frame into a Matrix Convert a Data Frame into a List Convert a Matrix into a List Suggested Readings: Objects and Lists in R									CO-4 BTL-2

MODULE 5: GRAPH PACKAGES (9L)	
ggplot - High-level plots - Box-whisker Plots - Scatter Plots - Pie Charts - Line Charts - Bar Charts -Adding Elements to Existing Plots – Heat maps Suggested Readings: Charts in R	CO-5 BTL-2
TEXT BOOKS	
1.	Mark Gardener(2013), <i>Beginning R The Statistical Programming Language</i> , Wiley publisher
REFERENCE BOOKS	
1.	Ian H(2011), <i>Witten Data Mining Practical Machine Learning Tools and Techniques</i> , Elsevier publications
E BOOKS	
1.	https://www.packtpub.com/tech/Machine-Learning
MOOC	
1.	https://www.coursera.org/specializations/machine-learning

COURSE TITLE		HADOOP ADMINISTRATION			CREDITS	3
COURSE CODE		BCC2373	COURSE CATEGORY	DE	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		This course deals about fundamental concepts of Hadoop Distributed File Systems, Hadoop cluster, Hadoop components, need for cluster management, capabilities of cluster management, Hadoop processing and frameworks				
Course Objective		1. To understand the Hadoop file system and implement the related commands 2. To understand installation process of Hadoop cluster and its components 3. explain about the need for cluster management and its capabilities 4. To understand the Hadoop distributed file systems 5. To understand the Hadoop processing and frameworks				
Course Outcome		Upon completion of this course, the students will be able to 1. Describe how to load data into and out of HDFS using the Hadoop File System (FS) commands 2. Describe the setup of Hadoop cluster and its components such as Sqoop. 3. Demonstrate the need for cluster management solutions, and its capabilities. 4. Implement of Hadoop’s Distributed File System				

5. Perform Hadoop processing/computation frameworks									
Prerequisites: Big data analytics									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	3	2	2	-	1	3	2	2
CO-2	-	3	2	1	2	1	-	3	1
CO-3	3	-	-	2	-	2	1	-	2
CO-4	3	3	2	-	2	2	3	2	1
CO-5	3	3	2	2	2	-	2	3	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: HADOOP (9L)									
Data Storage and Analysis - Hadoop eco system - Hadoop versions - Hadoop 1 and Hadoop 2 – installation - Configuration: An Overview - The Hadoop XML Configuration Files - Environment Variables and Shell Scripts -Logging Configuration - Name Node – Data node – Secondary name node– ports. Practical component: The Hadoop XML Configuration Files - Environment Variables and Shell Scripts Suggested Readings: Hadoop eco system									CO-1 BTL- 2
MODULE 2: HDFS (9L)									
The Hadoop Distributed File system – HDFS commands -. Identification and Location - Optimization and Tuning - Formatting the Namenode - Creating a /tmp Directory – copy commands - Checking Filesystem Integrity with fsck - Hadoop I/O - Files formats – Jason – Avro – file compression – compression types – High availability. Practical component: String special operators, String formatting operators Suggested Readings: Assigning values in strings									CO-2 BTL-3
MODULE 3: YARN (9L)									
Need for YARN – Yarn architecture – Yarn installation – Yarn and Hadoop ecosystems - The FIFO Scheduler - The Fair Scheduler - The Capacity Scheduler – Scheduler configuration – Yarn administration – Yarn Frameworks. – Failures in Yarn Suggested Readings: Yarn and Hadoop ecosystems									CO-3 BTL-3
MODULE 4: HADOOP ADMINISTRATION (9L)									
Cluster Types - Setting Up a Hadoop Cluster – Cluster configuration files – Cluster installation - Adminstrating Hadoop. - HDFS Maintenance Task -Safe Mode – User creation – User quota management - Commissioning and Decommissioning - Balancing HDFS Block Data - Dealing with a Failed Disk. Practical component: Setting Up a Hadoop Cluster – Cluster configuration files – Cluster installation Suggested Readings: Commissioning and Decommissioning									CO-4 BTL-3
MODULE 5: DATA TRANSFORMATION (9L)									
Hive- Installing Hive, - commands – types of tables - table creation and management - An Example, Running HBase – basics, Concepts, Installation, Clients, example data management - Data ingestion – Sqoop.									CO-5 BTL-3

Practical component: Hive- Installing Hive, - commands	
Suggested Readings: Running HBase	
LAB / MINI PROJECT/FIELD WORK	
TEXT BOOKS	
1	Tom White(2015), " <i>Hadoop: The Definitive Guide</i> ", 4th Ed., O'Reilly Media.
REFERENCE BOOKS	
1	Shumin Guo,(2013), <i>Hadoop Operations and Cluster Management Cookbook</i> , Safari.
E BOOKS	
1.	https://www.kobo.com/fi/en/ebook/expert-hadoop-administration
MOOC	
1.	https://www.coursera.org/learn/hadoop

COURSE TITLE		2-D ANIMATION			CREDITS	3
COURSE CODE		BCC2374	COURSE CATEGORY	DE	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		2D animation is the art of drawing to create the illusion of life and is an extraordinary medium for storytelling and expression. In this course students become familiar with animation principles for object and character motion and use digital art and animation software to explore unique storytelling possibilities and create a portfolio of animation. Upon successful completion of this course students gain an understanding of how to manipulate images and draw and color frames for animation to show weight and expression in character and object motion and to add animated visual effects to live footage.				
Course Objective		Upon completion of this course, the students will be able to 1. To provide insights into animation 2. To explore principles of object and character motion 3. To use digital art 4. To draw and manipulate images 5. To create visual effects				
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the fundamentals of animation 2. Perform 2-D Animation using software 3. Apply 2-D graphics editing and frame sequencing techniques using software 4. Create animated visual effect				

		5. Create motion graphics							
Prerequisites: Basic Knowledge on 2 D									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	-	-	1	-	2	-	2
CO-2	-	3	2	-	-	-	2	-	2
CO-3	-	2	3	1	-	1	1	-	-
CO-4	2	2	1	-	-	-	1	-	2
CO-5	-	2	2	1	-	1	1	1	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – DIGITAL 2D ANIMATION ORIENTATION								(9L)	
Basic factors affecting the illusion of motion – Impact of digital techniques on the craft of film and video animation – Professional animation practice and job description – Prevailing file format standards and other compatibility issues – History and future trends of computer animation application in the visual arts Suggested Readings: Basic factors affecting the illusion of motion								CO-1 BTL-2	
MODULE 2 – 2D ANIMATION APPLICATION SOFTWARE INTERFACE								(9L)	
Default setting and user preferences – Document setup. Import and export formats – Document and timeline window feature – Tools and commands palettes – Media-selection tools and techniques Asset-management features Suggested Readings: Media selection tools and technique								CO-2 BTL-2	
MODULE 3 – 2D GRAPHICS-CREATION FEATURES								(9L)	
Underlying data type: raster – vector – Raster painting and/or import features – Vector shapes – Vector free-form and control-point placement tools – Features specific to the program in use. Suggested Readings: Vector shapes								CO-3 BTL-3	
MODULE 4 – 2D GRAPHICS EDITING FEATURES								(9L)	
Basic geometric transformation – Boolean operations on shapes – Object stroke attributes – Object fill attributes – Shading techniques (blends – gradients) – Packaged effects (extensions – Plug-ins) – Features specific to the program in use. Suggested Readings: Basic Geometric Transformation								CO-4 BTL-2	
MODULE 5 – 2D ANIMATION FRAME-SEQUENCING FEATURES								(9L)	
Straight-ahead animation – Key frames animation – Motion paths – Applying geometric transformations over time – Intertwining options – Looping and palindrome motion – Features specific to the program in use Suggested Readings: Key Frames Animation								CO-5 BTL-2	
TEXT BOOKS									
1	Watson-Guptill(2008) , <i>Beginner's Guide to Animation: Everything you Need to Know to get Started</i> Paperback – Import, Publisher: Watson-Guptill								
REFERENCE BOOKS									

1.	Catherine winder , Zahra Dowlatabadi(2011) , <i>Producing Animation</i> (Editor) Publisher: Focal Press;
E BOOKS	
1.	http://www.animationmentor.com/resources/ebooks/
MOOC	
1.	https://www.mooc-list.com/tags/2d

COURSE TITLE		NETWORK SECURITY					CREDITS		3	
COURSE CODE		BCC2375	COURSE CATEGORY			DE	L-T-P-S		3-0-0-0	
Version	1.0	Approval Details		26th ACM 23-03-2019			LEARNING LEVEL		BTL-3	
ASSESSMENT SCHEME										
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project		Surprise Test / Quiz		Attendance		ESE
15%		15%		10%		5%		5%		50%
Course Description		Network security is a broad term that covers a multitude of technologies, devices and processes. The goal of this course is to set of rules and configurations designed to protect the integrity. Students will learn the network architecture is complex and is faced with a threat environment.								
Course Objective		1. To understand the concept of network security management. 2. To understand the concept of network security tools. 3. To understand the concept of threat environment 4. To exploit vulnerabilities. 5. To understand confidentiality and accessibility of computer networks								
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the Basic concepts of Network Security 2. Identify the attacks on WWW 3. Describe the Internet Security Protocols 4. Identify and explore the authentication mechanisms over internet 5. Describe wireless security.								
Prerequisites: Basics of Cyber Security										
CO, PO AND PSO MAPPING										
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO -1	PSO-2	PSO-3	
CO-1	3	2	2	1	1	1	3	2	1	
CO-2	2	-	2	1	-	1	3	-	1	
CO-3	1	2	2	-	1	-	-	2	-	
CO-4	3	2	-	1	1	-	3	2	1	
CO-5	3	2	2	1	-	1	3	2	-	
1: Weakly related, 2: Moderately related and 3: Strongly related										
MODULE 1: INTRODUCTION TO CYBER SECURITY (9L)										

Introduction to Cyber Security, Need for security, Concept of Cyber Space, Cyber Crimes and Cyber-attack. Fundamental security principles – threats, attacks and vulnerability. Key Security triad – Confidentiality, Integrity and Availability. Practical component: Detection of various cyber-attacks using Wireshark. Suggested Readings: Evolution of cyber security		CO-1 BTL-2
MODULE 2: SECURITY ATTACKS, PRINCIPLES AND MANAGEMENT (9L)		
Introduction to different classes of security attacks - active and passive. Impact of attacks on an organization and individuals. Principles of Cybersecurity - Apply cybersecurity architecture principles. Cybersecurity models (the CIA triad, the star model, the Parkerian hexad). Practical component: Packet sniffing using Wireshark. Suggested Readings: Advances in Cyber Security: Principles, Techniques, and Applications		CO-2 BTL-2
MODULE 3: SECURITY PLANS, POLICIES AND PROCEDURES (9L)		
Defining a Cyber Security policy, General security expectations, roles and responsibilities in the organization – Stakeholders. Practical component: Managing securing policies using tcpdump, dumpcap using Wireshark. Suggested Readings: Best practices for Cyber security standards		CO-3 BTL-3
MODULE 4: OVERVIEW OF SECURITY COUNTERMEASURE TOOLS (9L)		
Introduction to key security tools including firewalls, anti-virus and cryptography – Identify security tools and hardening techniques – Prevention of cyber-attacks. Security Countermeasure tools and techniques - Encryption standards. Practical component: Security analysis and reporting using Wireshark. Suggested Readings: Cyber-attacks, countermeasures and protection schemes		CO-4 BTL-2
MODULE 5: TESTING, DIGITAL FORENSICS AND NEXT GENERATION SECURITY (9L)		
Cyber security testing – Penetration testing. System Level Solutions - Intrusion Detection System (IDS) and Intrusion Protection System (IPS). Basic Concept of Ethical Hacking. Protecting against Cyber Crime – Identity Theft, Cyber Stalking and Investment fraud. Practical component: PenTest (Penetration Testing) using Wireshark. Suggested Readings: Next-generation digital forensics		CO-5 BTL-2
TEXT BOOKS		
1.	William Stallings, (2016)“ <i>Principle of Computer Security</i> ”, McGraw Hill Education, Fourth Edition	
REFERENCE BOOKS		
1	William, Stallings. (2018). <i>Effective Cyber security: A Guide to Using Best Practices and Standards</i> , Addison - Wesley Professional Publishers, 1st Edition.	
E BOOKS		
1.	https://bookauthority.org/books/best-network-security-ebooks	
MOOC		
1.	https://www.coursera.org/specializations/computer-security-systems-management	
2.	https://www.coursera.org/specializations/computer-network-security	

COURSE TITLE		ARTIFICIAL INTELLIGENCE				CREDITS		3	
COURSE CODE		BCC2381	COURSE CATEGORY		DE	L-T-P-S		3- 0- 0 -0	
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL		BTL-2	
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance		ESE	
15%		15%		10%	5%	5%		50%	
Course Description		This course deals about fundamental concepts of artificial intelligence, searching techniques with real time example, searching algorithms, knowledge representation, learning and its types and learning processes							
Course Objective		1. To understand the basic concepts of artificial intelligence 2. To understand searching techniques with its algorithm 3. To explain about the knowledge representation 4. To understand the learning and its types 5. To understand the learning processes							
Course Outcome		Upon completion of this course, the students will be able to 1. Describe artificial intelligence 2. Describe the searching techniques 3. Depict knowledge representation 4. Design learning rules 5. Implement real time applications							
Prerequisites: Mathematical concepts									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	-	-	1	-	2	-	2
CO-2	-	3	2	-	-	-	2	-	2
CO-3	-	2	3	1	-	1	1	-	-
CO-4	2	2	1	-	-	-	1	-	2
CO-5	-	2	2	1	-	1	1	1	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION (9L)									
Intelligent agents – agents and environments - good behavior – the nature of Environments – structure of agents - Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies – avoiding repeated states – searching with partial information. Suggested Readings: searching for solutions – uniformed search strategies									CO-1 BTL-3
MODULE 2: SEARCHING TECHNIQUES (9L)									
Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces –									

online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance. Suggested Readings: Structure of problems - Adversarial Search – Games – Optimal decisions in games		CO-2 BTL-2
MODULE 3: KNOWLEDGE REPRESENTATION (9L)		
First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation – Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects Suggested Readings: Ontological Engineering - Categories and objects		CO-3 BTL-2
MODULE 4: LEARNING (9L)		
Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods - Learning with complete data – Learning with hidden variable - EM algorithm – Instance based learning - Neural networks - Reinforcement learning – Passive reinforcement learning -Active reinforcement learning - Generalization in reinforcement learning. Suggested Readings: Passive reinforcement learning -Active reinforcement learning - Generalization in reinforcement learning		CO-4 BTL- 2
MODULE 5: APPLICATIONS (9L)		
Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation – Discourse understanding – Grammar induction – Probabilistic language processing - Probabilistic language models – Information retrieval – Information Extraction – Machine translation. Practical component: Hive- Installing Hive, - commands Suggested Readings: Probabilistic language models		CO-5 BTL-2
TEXT BOOKS		
1	Stuart Russell, Peter Norvig, (, 2016)“ <i>Artificial Intelligence – A Modern Approach</i> ”, 3rd Edition, Pearson, Education / Prentice Hall of India	
REFERENCE BOOKS		
1	Elaine Rich and Kevin Knight, “ <i>Artificial Intelligence</i> ”, 3rd Edition, Tata McGraw- Hill,	
E BOOKS		
1.	https://www.getfreebooks.com/16-sites-with-free-artificial-intelligence-ebooks/	
MOOC		
1.	https://www.coursera.org/learn/machine-learning	

COURSE TITLE		E-COMMERCE				CREDITS	3		
COURSE CODE		BCC2382	COURSE CATEGORY		DE	L-T-P-S	3-0-0-0		
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3		
ASSESSMENT SCHEME									
First Periodical Assessment		Second Periodical Assessment		Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE		
15%		15%		10%	5%	5%	50%		
Course Description		This course focuses on principles of e-commerce from a business perspective, providing an overview of business and technology topics, business models, virtual value chains and social innovation and marketing strategies. In addition, some of the major issues associated with e-commerce—security, privacy, intellectual property rights, authentication, encryption, acceptable use policies, and legal liabilities—will be explored. Students will build their own web presence and market it using an online platform.							
Course Objective		1. To Identify and apply relevant problem-solving methodologies 2. To design components, systems and/or processes to meet required specifications for a web presence 3. To communicate effectively in ways appropriate to the discipline, audience and purpose. 4. To work as an effective member or leader of diverse teams within a multi-level, multi-disciplinary and multi-cultural setting for the Group Website Research Project 5. To appreciate ethical implications of professional practice							
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the commercial transactions. 2. Categorize security technologies. 3. Describe about electronic payment mode. 4. Identify E- Commerce providers. 5. Design online commerce environment.							
Prerequisites: Knowledge in Commerce									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	2	-	-	1	-	2	-	2
CO-2	-	3	2	-	-	-	1	1	2
CO-3	1	2	2	1	-	1	-	-	-
CO-4	2	1	1	-	-	-	1	2	1
CO-5	-	2	1	1	-	1	1	1	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION								(9L)	
Networks and Commercial Transactions - Internet and Other Novelties - Electronic								CO-1	

Transactions Today - Commercial Transactions - Establishing Trust - Internet Environment - Internet Advantage - World Wide Web. Suggested Readings: Electronic Transactions Today		BTL-2
MODULE 2: SECURITY TECHNOLOGIES (9L)		
Why Internet is Unsecure - Internet Security Holes - Cryptography: Objective - Codes and Ciphers - Breaking Encryption Schemes - Data Encryption Standard - Trusted Key Distribution and Verification - Cryptographic Applications - Encryption - Digital Signature – Non repudiation and Message Integrity. Suggested Readings: Data Encryption Standard		CO-2 BTL-2
MODULE 3: ELECTRONIC PAYMENT (9L)		
Traditional Transactions: Updating - Offline and Online Transactions - Secure Web Servers - Required Facilities - Digital Currencies and Payment Systems - Protocols for the Public Transport - Security Protocols - SET - Credit Card Business Basics. Suggested Readings: Digital Currencies and Payment Systems		CO-3 BTL-3
MODULE 4: ELECTRONIC COMMERCE PROVIDERS (9L)		
Online Commerce Options - Functions and Features - Payment Systems : Electronic, Digital and Virtual Internet Payment System - Account Setup and Costs - Virtual Transaction Process – Info Haus - Security Considerations – Cyber Cash: Model - Security - Customer Protection - Client Application - Selling through Cyber Cash. Suggested Readings: Electronic, Digital and Virtual Internet Payment System		CO-4 BTL-2
MODULE 5: ONLINE COMMERCE ENVIRONMENTS (9L)		
Servers and Commercial Environments - Payment Methods - Server Market Orientation - Netscape Commerce Server - Microsoft Internet Servers - Digital Currencies - DigiCash - Using Ecash - Ecash Client Software and Implementation - Smart Cards - The Chip - Electronic Data Interchange - Internet Strategies, Techniques and Tools. Suggested Readings: DigiCash		CO-5 BTL-2
TEXT BOOKS		
1.	Pete Loshin(2004), “ <i>Electronic Commerce</i> ”, 4th Edition, Firewall media, An imprint of Laxmi Publications Pvt. Ltd., New Delhi	
REFERENCE BOOKS		
1.	Ravi Kalakota(1996) , Andrew B.Winston, “ <i>E-Commerce</i> ” Pearson Education	
E BOOKS		
1.	https://www.bigcommerce.com/resource-center/ebooks/	
MOOC		
1.	https://www.coursera.org/learn/elearning	

COURSE TITLE		SOFT COMPUTING			CREDITS	3
COURSE CODE		BCC2383	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE				
15%	15%	10%	5%	5%	50%				
Course Description	Soft Computing encourages the integration of soft computing techniques and tools into both every day and advanced applications.								
Course Objective	<ol style="list-style-type: none">1. To identify, formulate, and solve complex engineering problems by applying principles2. To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment,3. To apply engineering design to produce solutions that meet specified needs4. To develop and conduct appropriate experimentation, analyse and interpret data.5. To acquire and apply new knowledge as needed, using appropriate learning strategies.								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Apply concepts of fuzzy sets, fuzzy logic and heuristics-based systems.2. Derive appropriate rules for inference systems.3. Describe the mathematical background to optimize neural network learning.4. Implement optimization algorithms5. Perform Supervised Learning in Neural networks.								
Prerequisites: Machine learning algorithms									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	2	-	-	1	-	2	-	1
CO-2	-	3	2	-	-	-	-	2	2
CO-3	-	2	-	1	-	1	1	-	-
CO-4	2	1	1	-	-	-	-	-	2
CO-5	-	2	2	1	-	1	1	1	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: FUZZY SET THEORY (9L)									
Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and parameterization – Fuzzy Rules and Fuzzy Reasoning Suggested Readings: Fuzzy Rules and Fuzzy Reasoning								CO-1 BTL-2	
MODULE 2: EXTENSION PRINCIPLE AND FUZZY RELATIONS (9L)									
Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Surgeon Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling. Suggested Readings: Fuzzy models								CO-2 BTL-2	
MODULE 3: OPTIMIZATION (9L)									

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton’s Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms Suggested Readings: Optimization		CO-3 BTL-3
MODULE 4: NEURAL NETWORKS : SUPERVISED LEARNING (9L)		
Supervised Learning Neural Networks – Perceptrons - Adeline – Backpropagation Multilayer Perceptrons – Radial Basis Function Networks Suggested Readings: Back propagation		CO-4 BTL-2
MODULE 5 : NEURAL NETWORKS : UN SUPERVISED LEARNING (9L)		
Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohen Self- Organizing Networks – Learning Vector Quantization – Hebbian Learning Suggested Readings: Unsupervised Learning		CO-5 BTL-2
TEXT BOOKS		
1	Kaushik, S., & Tiwari, S., (2018), <i>Soft Computing: Fundamentals, Techniques and Applications</i> . McGraw-Hill Education .	
REFERENCE BOOKS		
1	Kumar S Ray (2014), Amazon, “ <i>Soft Computing and Its Applications, Fuzzy Reasoning and Fuzzy Control: Volume 2</i> , Apple Academic Press	
E BOOKS		
1	https://www.amazon.in/Soft-Computing-Fundamentals-Applications-Pratihara/dp/8184873387	
MOOC		
1.	https://www.classcentral.com/course/swayam-introduction-to-soft-computing-	

COURSE TITLE		3D ANIMATION			CREDITS	3
COURSE CODE		BCC2384	COURSE CATEGORY	DE	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details	26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE	
15%	15%	10%	5%	5%	50%	
Course Description	3D animation is the art of using motion to bring characters, vehicles, props, and more to life within TV shows, films, and games. 3D Artists are often involved in several early steps of the VFX pipeline in order to ensure they deliver an animation-ready model. For example, in order to give a character, the right personality traits and movements, the Animator needs to make sure that whoever is rigging the model does it with those things in mind. During the rigging process, the character is given bones, skin weights, and constraints that allow it to move in specific ways. If this is not done with the Animator’s needs in mind, the model will be sent back.					

Course Objective	1. To provide an introduction to creating, editing, and analysing 3D models. 2. To develop foundational skills to work with, and navigate the digital 3D modelling workspace to create 3D objects. 3. To examine basic elements of the 3D development of modelling, texturing, lighting, animating, and rendering.								
Course Outcome	Upon completion of this course, the students will be able to 1. Perform 3D animation using software 2. Create 3D models 3. Apply texturing, lighting, animating and rendering 4. Perform rigging, primary motion and secondary motion 5. Apply dynamics and rendering								
Prerequisites: Basic Knowledge on 2D									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	-	-	1	-	2	-	2
CO-2	-	3	2	-	-	-	2	1	2
CO-3	-	2	3	1	-	1	-	-	-
CO-4	2	2	1	-	-	-	1	-	2
CO-5	-	2	2	1	-	1	1	1	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – OVERVIEW OF ANIMATION									(9L)
Overview of World Cinema & Animation- History of animation and its implementation- Development of Animation through time- manual to digital- Different Medium for making animation Pipeline for making an animation Film Suggested Readings: Development of Animation									CO-1 BTL-2
MODULE 2 – INTRODUCTION TO 3D									(9L)
Basics of 3D: 3D Production Pipeline- Concepts and methods of 3D Modelling, Basic Modelling: Introduction to Nurbs Curves- Nurbs surface editing- Polygon surface editing- Modifying and deforming geometry. Basic of Character Modelling: • Basic Character design and 3D Modelling using Poly character modelling Suggested Readings: Basics of 3D									CO-2 BTL-2
MODULE 3 – TEXTURE AND LIGHTING									(9L)
Basic of Texture Creating Texture Maps- BasicUv unwrap- Bump mapping- Procedural Texturing- Background Texturing Basic of Lighting: Lighting Fundamentals- Light types- Attributes of Light- Lighting objects & Shadows- 3 Point Lighting- Lighting a character- Lighting a scene to matching the environment- To enlarge the repertoire of tools to create animation Suggested Readings: Basic of Texture									CO-3 BTL-3
MODULE 4 – RIGGING									(9L)
Normal controller based rigging - TSM rigging- Binding- Set driven key and it's utilization on rigging- Weight paint Basic of Animation Key frame animation- Blocking- Breakdown- Primary motion- Secondary motion- Graph editor- Text editor- Dope sheet- Blend shape- Biped and quadruped movement- Lip sync and									CO-4 BTL-2

expression. Suggested Readings: Basic of Animation		
MODULE 5 – DYNAMICS & RENDERING		(9L)
Basic of Dynamics: Rigid body and soft body- Field- Fluid- Particle- Cloth- Hair and fur- Effects Rendering: Type of rendering- Render passes- GI and FG- AO. Suggested Readings: Rendering		CO-5 BTL-2
TEXT BOOKS		
1	Adam Watkins(2006) , <i>Introduction to 3d Graphics and Animation Using Maya</i> (Graphics Series) Publisher: Charles River Media	
REFERENCE BOOKS		
1.	<u>Dariush Derakhshani(2014), <i>Introducing Autodesk Maya 2013</i> (Autodesk Official Training Guides), Sybex; 1st edition</u>	
E BOOKS		
1.	http://www.animationmentor.com/resources/ebooks/	
MOOC		
1.	https://www.mooc-list.com/tags/3d-animation	

COURSE TITLE		CYBER SECURITY TECHNIQUES AND TOOLS			CREDITS	3
COURSE CODE		BCC2385	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-4
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		This course gives you the background needed to understand basic Cybersecurity. You will learn the history of Cybersecurity, types and motives of cyber-attacks to further your knowledge of current threats to organizations and individuals. Key terminology, basic system concepts and tools will be examined as an introduction to the Cybersecurity field. You will learn about critical thinking and its importance to anyone looking to pursue a career in Cybersecurity.				
Course Objective		<ol style="list-style-type: none">1. Assess the current security landscape, including the nature of the threat, the general status of common vulnerabilities, and the likely consequences of security failures;2. Assess how all domains of security interact to achieve effective system-wide security at the enterprise level.3. Appraise the interrelationships among elements that comprise a modern security system, including hardware, software, policies, and people; Compare and contrast logical and physical security;				

Course Outcome	Upon completion of this course, the students will be able to								
	1. Outline the Cyber Issues in Real World.								
	2. Describe the Installation of VMware and can Inspect Kali Linux								
	3. Evaluate the trends and patterns that will determine the future state of cybersecurity.								
	4. Describe the Metasploit framework for hacking								
	5. Assess the security in mobile devices								
Prerequisites: Introduction to Network Security									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	-	-	1	-	2	-	2
CO-2	-	3	2	-	-	-	2	-	2
CO-3	-	2	3	1	-	1	1	-	-
CO-4	2	2	1	-	-	-	1	-	2
CO-5	-	2	2	1	-	1	1	1	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – CYBER ISSUES									(9L)
Window Password Hacking and Cracking – Steganography - Hiding Secret Message - Anonymous Call, Message and Email Header Analysis - Access Darknet or Darkweb Using TOR : Anonymous Browsing - Access Darknet or Darkweb Using TOR : Anonymous Browsing. Practical Component: Implementation of Steganography Suggested Readings: Steganography									CO-1 BTL-3
MODULE 2 – VIRTUAL LAB SET UP									(9L)
Installing VMware -Setting Up Kali Linux - Target Virtual Machines - Creating the Windows XP Target - Setting Up the Ubuntu 8.10 Target - Creating the Windows 7 Target. Practical Component: Implementation of Symmetric and Asymmetric cryptography. Suggested Readings: VMware, Kali Linux									CO-2 BTL-3
MODULE 3 – KALI LINUX									(9L)
Linux Command Line - The Linux Filesystem - User Privileges - File Permissions - Editing Files- Data Manipulation - Managing Installed Packages - Processes and Services - Managing Networking - Netcat: The Swiss Army Knife of TCP/IP Connections - Automating Tasks. Practical Component: Implementation of Windows security using firewall and other tools Suggested Readings: The Linux Filesystem, Netcat									CO-3 BTL-3
MODULE 4– METASPLOIT FRAMEWORK									(9L)
Starting Metasploit - Finding Metasploit Modules - Setting Module Options - Payloads - Types of Shells - Setting a Payload Manually - Msfcli - Creating Standalone Payloads with Msfvenom - Using an Auxiliary Module. Practical Component: Implementation to identify web vulnerabilities Suggested Readings: Metasploit, Msfcli									CO-4 BTL-3

MODULE 5– MOBILE HACKING (9L)	
Mobile Attack Vectors - The Smartphone Pentest Framework - Remote Attacks - Client-Side Attacks - Malicious Apps - Mobile Post Exploitation Practical Component: Implementation of Mobile Audit and generate the report of the existing Artifacts Suggested Readings: Pentest Framework	CO-5 BTL-3
TEXT BOOKS	
1.	Gautam Kumawat(2017), <i>Ethical Hacking & Cyber Security Course: A Complete Package</i> , Udemy Course (First Unit)
2.	Georgia Weidman(2014) , <i>Penetration testing A Hands- On Introduction to Hacking</i> , no starch press II-V unit)
REFERENCE BOOKS	
1.	Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies (2015), <i>Security in Computing</i> , 5th Edition , Pearson Education .
E BOOKS	
1	https://www.newhorizons.com/promotions/cybersecurity-ebooks
MOOC	
1	https://www.udemy.com/course/hands-on-penetration-testing-labs-30/

COURSE TITLE		SOFTWARE TESTING			CREDITS	3
COURSE CODE		BCC2391	COURSE CATEGORY	DE	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		This course deals about fundamental concepts of software testing, test processes, test case design, types of testing, level of testing, test management and automation tools.				
Course Objective		1. To understand the basic concepts of software testing 2. To understand testing process and test case design 3. To explain about the types of testing and level of testing 4. To analyze the test management 5. To understand automation tools				
Course Outcome		Upon completion of this course, the students will be able to 1. Analyse the Testing process 2. Evaluate about the Test Case Design strategy 3. Identify about Levels of testing 4. Analyse the test management				

5. Perform automated testing									
Prerequisites: Software Engineering									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	-	-	2	2	-	2
CO-2	-	3	3	2	-	3	3	2	2
CO-3	-	2	2	3	1	2	2	3	-
CO-4	2	2	2	1	-	2	2	1	2
CO-5	-	2	2	2	1	2	2	2	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: INTRODUCTION (9L)									
Testing as an Engineering Activity – Testing as a Process – testing axioms – Basic Definitions – Software Testing Principles – The Tester’s Role in a Software Development Organization –Origins of Defects – cost of defects - Defect Classes – The Defect Repository and Test Design –Defect Examples – Developer/Tester Support for Developing a Defect Repository – Defect Prevention Strategies Suggested Readings: Origins of Defects – cost of defects - Defect Classes									CO-1 BTL- 2
MODULE 2: TEST CASE DESIGN (9L)									
Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Requirements based testing – Boundary Value Analysis – Decision tables - Equivalence Class Partitioning - State-based testing – Cause-effect graphing – Error guessing -Compatibility testing – User documentation testing – Domain testing Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White-box Based Test Design – code complexity testing – Evaluating Test Adequacy Criteria. Suggested Readings: Test Adequacy Criteria – static testing vs. structural testing – code functional testing									CO-2 BTL- 2
MODULE 3: LEVELS OF TESTING (9L)									
The Need for Levels of Testing – Unit Test – Unit Test Planning –Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing - Regression Testing –Internationalization testing – Ad-hoc testing - Alpha , Beta Tests – testing OO systems – stability and Accessibility testing – Configuration testing - Compatibility testing Suggested Readings: Testing the documentation									CO-3 BTL- 3
MODULE 4: TEST MANAGEMENT (9L)									
People and organizational issues in testing – organization structures for testing teams – testing services - Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test									CO-4 BTL-3

specialist		
Suggested Readings: Test Plan Components		
MODULE 5: TEST AUTOMATION		(9L)
Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements –project, progress and productivity metrics		CO-5 BTL-3
Suggested Readings: Test metrics and measurements		
TEXT BOOKS		
1	SrinivasanDesikan and Gopalaswamy Ramesh(2006), “ <i>Software Testing – Principles and Practices</i> ”, Pearson education.	
REFERENCE BOOKS		
1	Ilene Burnstein(2003), “ <i>Practical Software Testing</i> ”, Springer International Edition.	
E BOOKS		
1.	http://www.Testingtools.com	
MOOC		
1.	https://www.coursera.org/courses?query=software%20testing	

COURSE TITLE		BUSINESS INTELLIGENCE			CREDITS	3
COURSE CODE		BCC2392	COURSE CATEGORY	DE	L-T-P-S	3- 0- 0 -0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%		15%	10%	5%	5%	50%
Course Description		This course deals about fundamental concepts of business analytics, data ware housing, components of data warehouse with building new data warehouse, data cleaning factoring and array techniques				
Course Objective		1. To understand the basic concepts of business analytics, data warehousing 2. To understand components of data warehouse with building new data warehouse 3. To analyze the data cleaning with data set 4. To analyze the real data 5. To understand data visualization techniques				
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the business analytics, data warehousing, components of data warehouse 2. Create a new data model and build new data warehouse etc., 3. Apply the data cleaning with data set				

		4. Analyse the real data 5. Describe the data visualization techniques							
Prerequisites: Business basics									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	2	-	-	2	-	-	2	-	-
CO-2	3	2	-	3	2	-	3	2	-
CO-3	2	3	1	2	3	1	2	3	1
CO-4	2	1	-	2	1	-	2	1	-
CO-5	2	2	1	2	2	1	2	2	1
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: DATA WAREHOUSE CONCEPTS								(9L)	
Data warehousing 1.0 - Data warehouse 2.0 - Enterprise data warehouse platform - Failures of Past Decision-Support Systems - Data Warehouses - Data Marts - Cubes and multidimensional analysis - Data warehousing Components – Source Data Component - Data Staging Component - Data Storage Component -Information Delivery Component - Metadata Component - Management and Control Component. Suggested Readings: Data Storage Component -Information Delivery Component								CO-1 BTL- 2	
MODULE 2: BUILDING DATA WAREHOUSE								(9L)	
Building a Data warehouse – Dimensional Analysis - Information Packages - Requirements Gathering Methods - Requirements Definition - Data Modeling - Data Extraction - Data Transformation - Data Loading - Data Quality - Queries and Reports - Workload Management - Defining workloads - Understanding workloads - Data warehouse outbound - Data warehouse inbound - Query classification ETL and CDC workloads Suggested Readings: Understanding workloads								CO-2 BTL- 2	
MODULE 3: NEW DATA WAREHOUSE								(9L)	
Components of the new data warehouse. Data layer Algorithms Technology layer Integration strategies Data-driven integration Physical component integration and architecture External data integration. Hadoop & RDBMS Big Data appliances Data virtualization Semantic framework Lexical processing Clustering Semantic knowledge processing Information extraction Visualization Data- Driven Architecture for Big Data Metadata management Suggested Readings: Semantic framework Lexical processing Clustering								CO-3 BTL-2	
MODULE 4: USE OF PYTHON FOR DATA CLEANING								(9L)	
Data Loading - Storage, and File Formats - Web Scraping - Binary Data Formats Data Wrangling: Clean, Transform, Merge, Reshape Combining and Merging Data Sets - Reshaping and Pivoting - Data Transformation - String Manipulation - String Object Methods - Regular expressions. Practical Components: Implement python programming for Web Scraping - Binary Data Formats Data Wrangling: Clean, Transform, Merge Suggested Readings: String Manipulation								CO-4 BTL-3	

MODULE 5: QLIKVIEW (9L)	
Installing QlikView – Rank analysis – Data visualization for Data marts – Trend analysis – line chart – Multivariate analysis - Distribution analysis – correlation analysis – What if analysis – Dash boards – Tableau as an equivalent tool Practical Components: Trend analysis, line chart Suggested Readings: Distribution analysis	CO-5 BTL-3
TEXT BOOKS	
1	Fernandez, I. & Sabherwal(2013), R., <i>Business Intelligence</i> , John Wiley & Sons Publication
REFERENCE BOOKS	
1	Carlo Vercellis(2013), <i>Business Intelligence Data Mining and Optimization for Decision Making</i> , John Wiley
E BOOKS	
1.	http://wciconsulting.com/resources/business-intelligence-ebook/
MOOC	
1.	https://www.coursera.org/learn/business-intelligence-tools

COURSE TITLE		SOFTWARE QUALITY MANAGEMENT			CREDITS	3	
COURSE CODE		BCC2393	COURSE CATEGORY		DE	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019		LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME							
First Periodical Assessment		Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance		ESE
15%		15%	10%	5%	5%		50%
Course Description		This course gives a detail understanding about the basics of software quality management, to know about the software quality assurance, to develop software quality components and to build project life cycle, to define software quality metrics, standards, certification and assessments to check the quality of the developed projects					
Course Objective		1. To understand the basics of software quality management and software quality assurance system and architecture. 2. To learn about software quality assurance components and project life cycle 3. To understand about software quality infrastructure. 4. To learn about the software quality management and metrics. 5. To learn about the standards, certification and assessments to be assigned for the developed projects.					
Course Outcome		Upon completion of this course, the students will be able to 1. Describe the basics of software quality management					

	2. Depict SQA components and project life cycle 3. Explore the knowledge about software quality infrastructure 4. Describe d about software quality management 5. Identify standards, certification and assessments								
Prerequisites: Data Mining									
CO, PO AND PSO MAPPING									
CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO1	3	2	1	2	-	1	2	1	2
CO2	2	-	1	2	1	1	-	1	-
CO3	-	3	-	-	-	1	2	-	2
CO4	2	2	1	2	1	1	-	1	-
CO5	2	2	1	3	1	1	2	1	2
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1 – INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE (9L)									
Managing Software quality – Quality challenges – Software quality factors – Role of Software quality assurance (SQA)– SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans. Suggested Readings: Software Quality Management									CO-1 BTL-3
MODULE 2 – SQA COMPONENTS AND PROJECT LIFE CYCLE (9L)									
Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – Software maintenance quality – Project Management Suggested Readings: Software quality assurance methodologies tools and processes.									CO-2 BTL-2
MODULE 3 – SOFTWARE QUALITY INFRASTRUCTURE (9L)									
Procedures and work instructions – Templates – Checklists – 3S development – Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit - Documentation control – Storage and retrieval Suggested Readings: Software Quality Infrastructure Components									CO-3 BTL-3
MODULE 4 – SOFTWARE QUALITY MANAGEMENT & METRICS (9L)									
Project process control – Computerized tools – Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model Suggested Readings: Measuring Software Quality using Quality Metrics									CO-4 BTL-2
MODULE 5 – STANDARDS, CERTIFICATIONS & ASSESSMENTS (9L)									
Quality management standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM and CMMI assessment methodologies – Bootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 –									CO-5 BTL-2

Organization of Quality Assurance – Department management responsibilities – Project management responsibilities – SQA units and other actors in SQA systems. Suggested Readings: Software Quality Assurance Certification.	
TEXT BOOKS	
1.	Daniel Galin(2004), “ <i>Software Quality Assurance</i> ”, Pearson Publication.
REFERENCE BOOKS	
1	Mordechai Ben-Menachem(2014), “ <i>Software Quality: Producing Practical Consistent Software</i> ”, International Thompson Computer Press.
E BOOKS	
1.	http://www.uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf
MOOC	
1.	https://www.mooc-list.com/tags/quality-assurance

COURSE TITLE		SECURE CODING PRACTICES			CREDITS	3
COURSE CODE		BCC2394	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	1.0	Approval Details		26th ACM 23-03-2019	LEARNING LEVEL	BTL-3
ASSESSMENT SCHEME						
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project		Surprise Test / Quiz	Attendance	ESE
15%	15%	10%		5%	5%	50%
Course Description	The course gives the insights of coding practices to ensure any software developed has checks and system in place that helps strengthen the software and get rid of any security issues like vulnerabilities.					
Course Objective	1. To understand the basic concepts of programming errors 2. To identify and analyze the security problems 3. To understand and correct and incorrect use of formatted output functions 4. To understand the common vulnerabilities 5. To recommend the specific development practices					
Course Outcome	Upon completion of this course, the students will be able to 1. Identify the most frequent programming errors leading to software vulnerabilities. 2. Analyze security problems in software and integral security issues 3. Implement the correct and incorrect use of formatted output functions. 4. Apply their knowledge to the common vulnerabilities associated with file I/O 5. Develop practices for improving the overall security of your C / C++ application.					
Prerequisites: Basics of Security						
CO, PO AND PSO MAPPING						

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PSO-1	PSO-2	PSO-3
CO-1	3	2	-	2	-	2	2	-	1
CO-2	-	3	2	1	1	1	1	1	1
CO-3	-	2	3	1	-	1	1	-	-
CO-4	3	2	1	1	-	1	1	-	2
CO-5	-	2	3	1	1	1	1	1	3
1: Weakly related, 2: Moderately related and 3: Strongly related									
MODULE 1: SOFTWARE SECURITY CONCEPTS (9L)									
Gauging the Threat - Security Concepts - C and C++ - Development Platforms - Strings - Character Strings - Common String manipulation Errors - String Vulnerabilities and Exploits - Mitigation Strategies - String handling functions - runtime protection strategies - notable vulnerabilities Suggested Readings: Evolution of Software security									CO-1 BTL-2
MODULE 2: POINTER SUBTERFUGE AND INTEGER SECURITY (9L)									
Data Locations - Function Pointers - Object Pointers - Modifying the Instruction Pointer - Global Offset Table - The dtors Section - Virtual Pointers - The atexit() and on_exit() Functions - The longjmp() Function - Exception Handling - Mitigation Strategies - Integer Security - Integer Conversions - Integer Operations - Integer Vulnerabilities - Mitigation Strategies. Suggested Readings: Security algorithms									CO-2 BTL-2
MODULE 3: FORMATTED OUTPUT FUNCTIONS (9L)									
Variadic Functions - Exploiting Formatted Output Functions - Stack Randomization- Mitigation Strategies - Notable Vulnerabilities Suggested Readings: Vulnerabilities									CO-3 BTL-3
MODULE 4: FILE I/O (9L)									
File I/O Basics - File I/O Interfaces - Access Control - File Identification - Race Conditions - Mitigation Strategies Suggested Readings: File Handling									CO-4 BTL-2
MODULE 5: RECOMMENDED PRACTICES (9L)									
The Security Development Lifecycle - Security Training -Requirements -Design-Implementation – Verification Suggested Readings: Security Development Model									CO-5 BTL-2
TEXT BOOKS									
1.	Seacord, R. C.(2013), <i>Secure Coding in C and C++</i> , Addison Wisley for Software Engineering Institute, 2nd edition.								
REFERENCE BOOKS									
1.	Daswani N., Kern C., Kesavan A(2007)., <i>Foundations of Security</i> , Apress.								
E BOOKS									
1.	https://www.newhorizons.com/promotions/cybersecurity-ebooks								
MOOC									
1.	https://www.coursera.org/learn/secure-coding-principles?specialization=secure-coding-practices								