



HINDUSTAN

INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

CHENNAI

DEPARTMENT OF COMPUTER APPLICATIONS

B.C.A-Bachelor of Computer Applications
Specialization in Cyber Security

(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
Specialization in Cyber Security**

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

- PSO1:** Assess cyber security risk management policies in order to protect an organizations critical information.
- PSO2:** Ability to formulate, update and communicate short- and long-term organization cyber security strategies and policies
- PSO3:** Improve the analytical knowledge of the students to design a cyber security model to secure the data using modern tools and techniques.

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	BCB2302	Introduction to Java Programming	3	0	0	3	0	3
2	PC	BCB2303	Introduction to Python Programming	3	0	0	3	0	3
3	PC	BCB2304	Cyber Security and SIEM	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	BCB2332	Java Programming laboratory	0	0	2	1	0	2
7	PC	BCB2333	Python 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									

Specialization in Cyber Security

LIST OF ELECTIVES									
SEM	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
5	DE	BCC2355	Principles of Computer Security	3	0	0	3	0	3
5	DE	BCC2362	Cyber Forensics	3	0	0	3	0	3
5	DE	BCC2365	Ethical Hacking and Systems Defence	3	0	0	3	0	3
6	DE	BCC2375	Network Security	3	0	0	3	0	3
6	DE	BCC2385	Cyber Security Techniques and Tools	2	0	2	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

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 language 2. To provide an environment to Speak in English at the formal and informal levels and use it for daily conversation, presentation, group discussion and debate 3. 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 statements 4. To enhance the oral communication skills of the students via functions in clusters and respond to daily conversations naturally 5. 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 sentences 2. Develop the skill to listen to speeches, lectures, telephone conversations, recorded versions of all the above, and responding non-verbally as well as verbally 3. Develop a conscious awareness about the processes of metacognitive skills by considering societal and environmental contexts 4. Apply and analyse the contextual knowledge through reading the passages and participate in group activities and task-based activities 5. 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:</p>									CO-2 BTL-3

<p>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> <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 	
<p>MODULE 3 : CRITICAL THINKING (9L)</p>	
<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>
<p>MODULE 4 : ORAL COMMUNICATION SKILLS (9L)</p>	
<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>CO-4 BTL-3</p>

<p>Suggested sources: 1. Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016.</p>		
<p>MODULE 5 – FUNCTIONAL GRAMMAR</p>		<p>(9L)</p>
<p>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</p> <p>Suggested Activities: Exercises related to grammatical aspects and its function in functional English (day to day conversations)</p> <p>Suggested Sources: 1. Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition</p>		<p>CO-5 BTL-1</p>
<p>TEXT BOOKS</p>		
1.	Steve Hart et al (2016), Embark, <i>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.	
<p>REFERENCE BOOKS</p>		
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.	
<p>E BOOKS</p>		
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/	
<p>MOOC</p>		
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	<ol style="list-style-type: none"> To obtain the knowledge of equations To understand the application of Arithmetic and Geometric Progression To able to reflect on geometric properties of plane and linear systems To understand the expansion of trigonometric ratios To able to reflect the chance that an event will happen using Baye's theorem. 								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Describe the relation between roots and coefficients. Apply mathematical Thinking through the application of summation of series Interpret the mathematical results using geometric properties of plane and get solution to linear system through cramer's rule. Apply the knowledge of trigonometric expansion to solve the problems 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)

<p>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.</p>	<p>CO-1 BTL-3</p>
<p>MODULE 2: SEQUENCES AND SERIES (9L)</p>	
<p>Binomial, Exponential and logarithmic series (without proof)-Arithmetic progression- Geometric progression- Applications to summation of series Suggested Readings: Problems dealings with AP and GP</p>	<p>CO-2 BTL-2</p>
<p>MODULE 3: LINEAR ALGEBRA (9L)</p>	
<p>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</p>	<p>CO-3 BTL-3</p>
<p>MODULE 4: TRIGONOMETRY (9L)</p>	
<p>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.</p>	<p>CO-4 BTL-2</p>
<p>MODULE 5: PROBABILITY (9L)</p>	
<p>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</p>	<p>CO-5 BTL-3</p>
<p>TEXT BOOKS</p>	
<p>1. Narayanan, S. and Manickavachagam Pillai(2009), <i>Calculus</i>, Vol. I & Vol. II, S. Viswanathan Printers & Publishers</p>	
<p>REFERENCE BOOKS</p>	
<p>1. Shanthi Narayanan(2005), <i>Differential Calculus</i>, S Chand & Co Ltd</p>	
<p>E BOOKS</p>	
<p>1. https://www.e-booksdirectory.com/details.php?ebook=10512</p>	
<p>MOOC</p>	
<p>1. https://www.coursera.org/learn/trigonometry</p>	

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		<ol style="list-style-type: none"> To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, To identify, formulate, and solve complex engineering problems by applying principles To apply engineering design to produce solutions that meet specified needs To develop and conduct appropriate experimentation, analyze and interpret data. To acquire and apply new knowledge 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"> Describe the basics of computer Apply word processing techniques Implement word processing using spreadsheets Analyze the problem-solving techniques 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		<ol style="list-style-type: none"> 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		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> To impart adequate knowledge on the need of programming languages and problem solving techniques. To develop an in-depth understanding of functional and logical concepts of C Programming. To provide exposure to problem-solving through C programming. To familiarize the basic syntax and semantics of C Language To access files and to read and write content in files 								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Describe the basic terminology used in computer programming and can able to use different data types in a computer program. Implement and be able to develop logics using looping concepts which will help them to create programs, applications in C. Design and implement programs involving functions and recursions in C language. Write, compile and debug programs using various types of arrays and structures. 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: Variables, Constants and Operators.</p>	<p>BTL-2</p>
<p>MODULE 2 – OVERVIEW PROGRAMMING IN C</p>	<p>(9L)</p>
<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: Control flow statements and blocks, Looping statements.</p>	<p>CO-2 BTL-2</p>
<p>MODULE – 3 : FUNCTIONS & RECURSIONS</p>	<p>(9L)</p>
<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: Function call, Storage Classes.</p>	<p>CO-3 BTL-3</p>
<p>MODULE – 4 : ARRAYS</p>	<p>(9L)</p>
<p>Arrays - Defaming 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: Arrays. Strings. Multidimensional arrays and matrices</p>	<p>CO-4 BTL-3</p>

MODULE – 5 : POINTERS		(9L)
Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Files: Creating, Processing, Opening and Closing a data file. Practical component: 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 i a file 4. Pay roll problems Suggested Readings: Pointers, File input-output in C		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.Ritheie(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	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	<ol style="list-style-type: none"> 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									
<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<p>Upon completion of this course, the students should be able to</p> <ol style="list-style-type: none"> 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									
<ol style="list-style-type: none"> 1 Input / output function 2 Control statements 3 Functions 4 Arrays 5 Pointers 6 Structures and Unions 7 Files <p>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.</p>									
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	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 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"> To communicate effectively with grammatical accuracy and socio-cultural appropriacy with friends, classmates and other persons in the social circle To design and formulate one's own ideas, investigate and develop solutions for problems and make effective presentations 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 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) To use modern tools and learning materials such as MOOC, NPTEL and display a passion for extensive reading 								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Describe objects, places, landscapes, people, natural processes and upgrade from grammatical competence to communicative competence through problem solving tasks Develop presentation skills and effective seminar participation Develop business communication Identify and list natural ways of functioning in contexts, based on short extracts taken from news reading, advertisements, plays, or dialogues from media 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

<p>Suggested sources: Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition</p>		
<p>MODULE – 4 : WRITING FOR MEDIA (PRACTICE)</p>		<p>(9L)</p>
<p>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</p> <p>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</p> <p>Suggested sources: Embark, English for Under Graduates by Steve Hart, Arvind Nair, Veena Bhambhani, Cambridge University Press 2016.</p>		<p>CO-4 BTL-3</p>
<p>MODULE - 5 COMPREHENSION STRATEGIES</p>		<p>(9L)</p>
<p>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</p> <p>Suggested Activities: Reading primary sources—reading secondary sources and supporting the points already gathered from the primary sources</p> <p>Suggested Sources: Essential English Grammar by Raymond Murphy, Cambridge University Press, 2016 edition</p>		<p>CO-5 BTL-1</p>
<p>TEXT BOOKS</p>		
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.	
<p>REFERENCE BOOKS</p>		
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.	
<p>E BOOKS</p>		
1	https://www.britishcouncil.in/english/courses-business	
2	http://www.bbc.co.uk/learningenglish/english/features/pronunciation	
<p>MOOC</p>		
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	<ol style="list-style-type: none"> To obtain the knowledge to represent statistical data in occurrence with time. To understand to variable measure changes over the time in magnitude To able to reflect the chance that an event will happen. To understand and implement the sampling techniques. To understand the statistical relationship between two variables. 								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Describe the components of time series with examples. Compare and contrast the general level of magnitude of a group of related variables in two or more situation. Apply Baye's theorem and can find the probability of the events. Formulate sampling techniques according to their sample size. Recognize the statistical relationship between two variables and perform rank correlation and regression. 								
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	<ol style="list-style-type: none"> 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	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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 them 2. To understand the concept of marketing, scope and importance and approaches of marketing, and traditional and modern concept of marketing 3. To understand the fundamentals of book keeping, accounting concepts and conventions and the process of accounting and reconciling cash balance 4. To understand the preparation of final accounts, the adjustments involved 5. 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 businesses 2. Apply the concepts of marketing in real world, and the application of traditional and modern concept of marketing 3. 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	<ol style="list-style-type: none"> 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 them 2. To understand the concept of marketing, scope and importance and approaches of marketing, and traditional and modern concept of marketing 3. To understand the fundamentals of book keeping, accounting concepts and conventions and the process of accounting and reconciling cash balance 4. To understand the preparation of final accounts, the adjustments involved 5. To understand the accounts of non-trading concerns, receipts and payments account and income and expenditure account 				
Course Outcome		Upon completion of this course, the students will be able to <ol style="list-style-type: none"> 1. Differentiate the different forms of businesses 2. Apply the concepts of marketing in real world, and the application of traditional and modern concept of marketing 3. 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									
<ol style="list-style-type: none"> 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 <p>Other Features and Report Generation</p>									
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		<ol style="list-style-type: none"> 1. To understand the graphic design principles that relate to web design and learn how to implement theories into practice. 2. To develop skills in analyzing the usability of a web site. 3. To develop how to plan and conduct user research related to web usability. 4. To learn the language of the web: HTML and CSS. 5. To develop skills in DHTML 								
Course Outcome		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 1. Develop a web page using HTML simple tags. 2. Implement the various use of cascading style sheet 3. Analyze and write the functions using scripting language 4. Evaluate the website using event handling mechanism 5. Analyze the use of DHTML 								
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	<ol style="list-style-type: none"> 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	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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. Suggested Readings: Model The OSI model-TCP/ IP Model		CO-2 BTL-2
MODULE 3: ROUTERS AND SWITCHES		(9L)
Routers- Switches- Configuration-Modems-Hubsetc-Wired and Wireless technology. Suggested Readings: Wired and Wireless technology		CO-3 BTL-3
MODULE 4: NETWORK BASIC AND CONFIGURATION		(9L)
Network basic and configuration- Setting IP addresses- Sharing files and folders- Network troubleshooting. -PING test, ipconfig etc. Suggested Readings: Network basic and configuration		CO-4 BTL-2
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. Suggested Readings: servers and network security		CO-5 BTL-2
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 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 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. Describe the basics Software Engineering 2. Evaluate the Software Requirement Analysis 3. Design about the Structured Analysis 4. Identify the Software Design 5. 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	<ol style="list-style-type: none"> To Understand the Object -Oriented Programming basic concepts and functions To Analyze the overview of programming language To apply the concept of inheritance To analyze the structure of overloading and Polymorphism To Understand File Concepts and Exception Handling 								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Describe the OOPS fundamentals Identify the class, objects and constructor and destructor Implement functions and its overloading Identify and perform the various types of overloading and virtual functions 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_uyHaj9b2FLNGIFQmc2SEU/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		<ol style="list-style-type: none"> 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		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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	
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), " <i>C++ Complete Reference</i> ", Fourth edition, TMH
REFERENCE BOOKS	
1.	BjarneStroustrup, (2013)" <i>The C++ programming language</i> ", 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	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	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	<ol style="list-style-type: none"> To Design and create websites. To conduct exploratory user interface design. To understand the components involved in user interface design. To understand the web apps, mobile apps. 								
Course Outcome	Upon completion of this course, the students will be able to <ol style="list-style-type: none"> Create web pages using HTML simple tags. Create cascading style sheet Write functions using scripting language Create website using event handling 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									
<ol style="list-style-type: none"> Write a HTML program to illustrate body and pre tags Write a HTML program to illustrate text font tags Write a HTML program to illustrate comment, header and div tags Write a HTML program to illustrate text formatting tags Write a HTML program to illustrate List tags Write a HTML program to illustrate nested and definition tags Write a HTML program to illustrate image and table tags Write a HTML program to illustrate hyper link and form tags Write a java script program for addition of two numbers Write a script to create an array of 10 elements and display its contents. 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</i> , Web Publishing								
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	<ol style="list-style-type: none"> To design web pages using PHP To design SQL language within MySQL and PHP to access and manipulate databases To create PHP code that utilizes the commonly used library functions 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 <ol style="list-style-type: none"> Develop web pages using PHP Demonstrate to execute and connect MySQL and PHP to access and manipulate databases Create PHP code that utilizes the commonly used library functions Demonstrate use of cookie, session, and authentication programming in PHP 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	<ol style="list-style-type: none"> To describe and explain the fundamental components of a computer operating system. To define, restate, discuss, and explain the policies for CPU scheduling Describe reasons for using interrupts, dispatching, and context switching to support concurrency in an operating system To Identify the relationship between the physical hardware and the virtual devices maintained by the operating system To Compare and contrast different approaches to file organization, recognizing the strengths and weaknesses of each. 								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Characterize the basic functions of operating systems. Design the concepts of process management. Implement the concepts of deadlocks. Describe virtual memory and filesystem. Analyze the File system implementation and disk I/O technique 								
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	<ol style="list-style-type: none"> 1. Describe the general principles of data communication. 2. Describe how computer networks are organized with the concept of layered approach 3. Implement a simple LAN with hubs, bridges and switches. 4. Describe how packets in the Internet are delivered. 5. Analyze the contents in a given data link layer packet, based on the layer concept 								
Course Outcome	Upon completion of this course, the students will be able to <ol style="list-style-type: none"> 1. Describe the basic of Computer Network and the models. 2. Comprehend about the transmission. 3. Implement multiplexing and Ethernet. 4. Analyse the various types of protocol. 5. Define the functionalities of layers in networking. 								
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) , “Computer Networks”, 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	<ol style="list-style-type: none"> 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	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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
15%		15%		10%	5%	5%
ESE		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"> To demonstrate a good understanding of basic issues in Enterprise Systems. To explain the scope of common Enterprise Systems (e.g., MM, SCM, CRM, HRM, procurement). To explain the challenges associated with implementing enterprise systems and their impacts on organisations. To describe the selection, acquisition and implementation of enterprise systems. 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								
	<ol style="list-style-type: none"> Analyse the basic concepts of ERP. Apply the concept of Modelling of ERP. Design and analyse about various ERP packages. Apply the concept of Commercial ERP package. 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), “The SAP R/3 Handbook”, 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	<ol style="list-style-type: none"> To Understand the role and nature of relational database management systems (RDBMS) in today’s IT environment; To Translate written business requirements into conceptual entity-relationship data models; To Convert conceptual data models into relational database schemas using the SQL Data Definition Language (DDL); To understand Query and manipulate databases using the SQL Data Manipulation Language (DML); To Understand SQL. 								
Course Outcome	Upon completion of this course, the students will be able to <ol style="list-style-type: none"> Apply the DDL, DML and TCL commands Analyse and perform ODBC connection and combining VB with oracle SQL. Design different views of tables for different users and to apply embedded and nested queries. Create and execute procedure for an application using exception handling and cursors. 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	<ol style="list-style-type: none"> 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)									
<ol style="list-style-type: none"> 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 5. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc) 6. 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		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	<ol style="list-style-type: none"> To understand the java basics To design SQL language within MySQL and PHP to access and manipulate databases To implement java classes and objects To demonstrate concepts of inheritance and implement inheritance To implement interfaces and packages 								
Course Outcome	Upon completion of this course, the students will be able to <ol style="list-style-type: none"> Describe the java basics. Implement java control structures, arrays and strings Implement java classes and objects Implement and apply the concepts of inheritance and implement inheritance 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.									CO-1 BTL-3

Practical component: Inheritance, Polymorphism, Structure of java program -Data types, Variables, Operators Suggested Readings: OOPs Concepts Class		
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		<ol style="list-style-type: none"> 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		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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)	
<p>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.</p> <p>Practical component: Simple Programs, Python Identifiers, Reserved words, Lines and Indentation, Multi line statements, Quotation in Python, Comments in Python</p> <p>Suggested Readings: History of Python, Python features</p>									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. Suggested Readings: Accessing values in list:		CO-3 BTL-4
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		CYBER SECURITY AND SIEM				CREDITS	3			
COURSE CODE		BCB2304	COURSE CATEGORY		PC	L-T-P-S	3-0-0-0			
Version	1.0	Approval Details		34 th ACM 05-05-2022	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 SIEM and Log Management exposes the relevance of various types of logs generated from different systems and also exposes the concept of SIEM which is used for Log correlation and alerts.								
Course Objective		<ol style="list-style-type: none"> To identify the different types of logs and log formats. To make use of the Python and SHELL scripting for log analysis. To acquire knowledge about SIEM Tools and apply for log analysis. To acquire knowledge on log Management Policies for audits. To apply the concepts of service management in Ticketing. 								
Course Outcome		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Apply the knowledge of the basic fundamental's components of Multimedia Create animation effects for basic multimedia formats Identify about compression and applying the video settings Describe the hardware components and software tool devices Create a web page for any real time applications 								
Prerequisites:										
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	-	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 (9L)										
<p>Concepts of Log, What Should the Logs Log? Everything - The 5 Ws (Who, What, When, Where, and Why) - Unix Logs – Windows Logs - Windows Event ID - Events and Event Lifecycle - Linux Logs - Types of logs - Security logs - Application logs – System Logs</p> <p>Practical component: Run an application on Linux to see the Linux logs. Export log to text files. Script for searching logs.</p> <p>Suggested Readings: Syslog help documents.</p>									<p>CO-1 BTL-3</p>	

MODULE 2: LOG FORMATS		(9L)
Log files – Log formats – CLF - Application specific Log Formats – Apache Logs Format – IIS Log Format – JSON Log Format – Log 4J Format - Mail logs Format – Mail Error Code – HTTP Error Code - Firewall Logs Format– vendor Specific Logs Format. Practical component: Import Apache logs to Excel and summarize. Identify the HTTP error. Suggested Readings: HTTP error code, mail error code.		CO-2 BTL-3
MODULE 3: MANAGING LOG FILES		(9L)
Log tools – SYSLOG – Python Scripting - SHELL Scripting - Open-source Log analyzers - Log File Conversion Log Rotation and Archival - Determining an Archiving Methodology -Separating Logs, Security Controls - Log Management Policies Case Studies. Practical component: Write a log management policy for log management. Suggested Readings: Shell scripting.		CO-3 BTL-3
MODULE 4: LOG COLLECTION		(9L)
Event Correlation - Event Normalization, Correlation Rules - Rule Engine - Rule Management - Log Collection - Push Log, Pull Log Collection - Prebuilt Log Collection - Custom Log - Parsing/Normalization of Logs - Correlation Engine - SIEM Tools Demonstration- Reports Generation. Practical component: Run SIEM Tool. Suggested Readings : Regular Expressions.		CO-4 BTL-3
MODULE 5: SERVICE DELIVERY		(9L)
Introduction and Key concepts of service management -Four dimensions of service management – Ticketing System - ITIL Service value system - Principles - Service Value chain Practices - Case Studies. Practical component: Ticketing workflow. Suggested Readings: ITIL V4		CO-5 BTL-3
TEXT BOOKS		
1	ITIL 4: <i>Acquiring and Managing Cloud Services</i> , AXELOS, 2021.	
2	ITIL 4: <i>Create, Deliver and Support</i> , AXELOS, 2021.	
3	Robert Johnston, Michael Shulver, Nigel Slack and Graham Clark(2021), <i>Service Operations Management</i> – Pearson 5 th Edition. (2021).	
4	Betsy Page Sigman and Erickson Delgado (2016), <i>Splunk Essentials</i> 2 nd Edition.	
REFERENCE BOOKS		
1	Don Murdoch (2019). <i>Blue Team Handbook: SOC, SIEM, and Threat Hunting Use Cases</i>	
2	Phillip Q. Maier (2006). <i>Audit and Trace Log Management Consolidation and Analysis</i>	

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	<ol style="list-style-type: none"> 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	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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									
<ol style="list-style-type: none"> 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

COURSE TITLE		PYTHON PROGRAMMING LABORATORY				CREDITS	1		
COURSE CODE		BCB2333	COURSE CATEGORY		PC	L-T-P-S	0-0-2-0		
Version	1.0	Approval Details		34th ACM 05-05-2022	LEARNING LEVEL		BTL-4		
ASSESSMENT SCHEME									
CIA							ESE		
80%							20%		
Course Description		The purpose of this course is to introduce to students to code fundamentals of python using Strings, tuples, files, directories and to implement the concepts related to security.							
Course Objective		<ol style="list-style-type: none"> 1. To understand preliminary concepts of programming language and fundamentals 2. To understand about strings 3. To have better understanding on tuples. 4. To learn and implement files and directories. 5. To implement security related concepts 							
Course Outcome		Upon completion of this course, the students will be able to <ol style="list-style-type: none"> 1. Describe the Preliminary Concepts of Programming Language & syntax and Semantics methods 2. Implement String manipulation 3. Apply tuples. 4. Explain and implement files and directories. 5. Explain security using python scripts. 							
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	
<ol style="list-style-type: none"> 1. Write a python program to implement Data Types, Operators and Expressions. 2. Write a python program to implement Conditional and Control Statements. 3. Write a python program to implement Functions. 4. Write a python program using List. 5. Write a python program using Files. 6. Write a python program to analyse the Apache access log and error log. 7. Write a python program for Buffer overflow Exploitation. 8. Write a python program to transfer file from client/server. 9. Write a python program script to hack ciphers. 10. Write a python program to perform port scan. 	
TEXT BOOKS	
1	PovelSolin, Martin Novak(2012), Introduction to Python Programming
REFERENCE BOOKS	
1	John C. Lusth(2011), An Introduction to Python
E BOOKS	
1.	https://users-cs.au.dk/chili/PBI/python_tutorial_jakobfredslund.pdf
MOOC	
1.	https://www.coursera.org/learn/interactive-python-1

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		ESE
15%		15%		10%		5%		5%		50%
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		<ol style="list-style-type: none"> 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		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> To perform a literature review To study the detailed technical work To develop a solution for the problem and develop an application by using relevant computer application concepts To produce progress reports or maintain a professional journal to establish work completed and deliver a seminar on the general area To present the work in a forum involving poster presentations 								
Course Outcome	Upon successful completion of the course students will be able to: <ol style="list-style-type: none"> Demonstrate a sound technical knowledge of their selected project topic. Identify, formulate a solution for a problem. Construct engineering solutions to complex problems utilising a systems approach. Demonstrate the project 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.									

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	These cyber security principles are grouped into four key activities: govern, protect, detect and respond. Govern: Identifying and managing security risks. Protect: Implementing security controls to reduce security risks. Detect: Detecting and understanding cyber security								
Course Objective	<ol style="list-style-type: none"> To identify, formulate, and solve complex engineering problems by applying principles To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, To apply engineering design to produce solutions that meet specified needs To develop and conduct appropriate experimentation, analyze and interpret data. 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"> Describe the broad set of technical, social & political aspects of Computer Security Describe the operational and organizational security Aspects Describe the fundamentals of cryptography Identify Authentication Methods 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: Fourth Edition</i> , McGrawHill	
2	William Stallings(2017), <i>Cryptography and Network Security Principles and Practices, Seventh Edition</i> , 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		CYBER FORENSICS				CREDITS		3		
COURSE CODE		BCC2362	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 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		<ol style="list-style-type: none"> 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		<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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. Suggested Readings: Advances in Cyber Security: Principles, Techniques, and Applications		CO-2 BTL-2
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		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		<ol style="list-style-type: none"> To identify, formulate, and solve complex engineering problems by applying principles To function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, To apply engineering design to produce solutions that meet specified needs To develop and conduct appropriate experimentation, analyze and interpret data. To acquire and apply new knowledge as needed, using appropriate learning strategies. 							
Course Outcome		Upon completion of the course, the students will be able <ol style="list-style-type: none"> Describe the concepts of ethical hacking Describe the concepts of System hacking Perform TCP/IP and Port scanning Identify desktop and server OS vulnerabilities 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							CO-1 BTL-3		

Practical component : hacking the server(through virtual machine) Suggested Readings: Hacking terminology		
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		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	<ol style="list-style-type: none"> To understand the concept of network security management. To understand the concept of network security tools. To understand the concept of threat environment To exploit vulnerabilities. To understand confidentiality and accessibility of computer networks 								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Describe the Basic concepts of Network Security Identify the attacks on WWW Describe the Internet Security Protocols Identify and explore the authentication mechanisms over internet 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									CO-2 BTL-2

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		
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		CYBER SECURITY TECHNIQUES AND TOOLS			CREDITS	3				
COURSE CODE		BCC2385	COURSE CATEGORY	DE	L-T-P-S	2-0-2-0				
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	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> 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							(6L+6P)			
Window Password Hacking and Cracking – Steganography - Data frauds - data diddling - scavenging - data theft - data leakage – squatting - Id theft - Password theft – key							CO-1 BTL-3			

logger - Job Racketing - Marketing and Advertisement Rackets - Nigerian frauds- pay per click scams – web defacement - ATM frauds - IP spoofing - email & ip address – Software piracy - software license - commercial piracy. Practical Component: Implementation of Steganography Suggested Readings: Steganography	
MODULE 2 – VIRTUAL LAB SET UP	(6L+6P)
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	(6L+6P)
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	(6L+6P)
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	(6L+6P)
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		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	<ol style="list-style-type: none"> To understand the basic concepts of programming errors To identify and analyze the security problems To understand and correct and incorrect use of formatted output functions To understand the common vulnerabilities To recommend the specific development practices 								
Course Outcome	<p>Upon completion of this course, the students will be able to</p> <ol style="list-style-type: none"> Identify the most frequent programming errors leading to software vulnerabilities. Analyze security problems in software and integral security issues Implement the correct and incorrect use of formatted output functions. Apply their knowledge to the common vulnerabilities associated with file I/O 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 .ctors 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	