ORDINANCE

—— FOR ——

B.TECH COMPUTER SCIENCE AND ENGINEERING WITH SPECIALIZATION IN CYBER SECURITY

GNA UNIVERSITY

Inspiring Innovation.....

(THIS ORDINANCE HAS BEEN APPROVED IN THE MEETING OF BOARD OF STUDIES HELD ON DATED JUNE 8, 2022)

APPLICABLE W.E.F. ACADEMIC SESSION 2022-2023

GNA UNIVERSITY

SRI HARGOBINDGARH, PHAGWARA – HOSHIARPUR ROAD, PHAGWARA 144401, PUNJAB

B.TECH COMPUTER SCIENCE AND ENGINEERING(CYBER SECURITY)

SHORT TITLE AND COMMENCEMENT

I. This ordinance shall be called the ordinance for the B. Tech Computer Science and Engineering with specialization in cyber security at GNA University, Phagwara.

II. This ordinance shall come into force with effect from academic session 2022-23.

1. Name of Program: B.Tech. Computer Science and Engineering (CYBER SECURITY)

2. Name of Faculty: Faculty of Engineering Design and Automation (FEDA)

3.Program Educational Objectives: The program educational objectives of B. Tech programme of Computer Science & Engineering with specialization in cyber security at GNA University are:

PEO1: High-level accomplishment of key principles and practices of computation, mathematics and basic principles of engineering to guarantee that graduates are able to apply their software development skills in design and implementation of practical systems consisting of software and/or hardware components.

PEO2: Observe real-life problems and impart science-based engineering education to develop professional skills that will prepare the students for immediate employment in the industry. Graduates will be actively engaged in learning, understanding, design and applying new ideas and technologies as the field evolves along with participation in creative, synthetic and integrative activities of the relevant branch of engineering.

PEO3: Excellence in professionalism, moral and ethical conduct, understanding of social context and interpersonal skills with adaptable communication to develop a global view among graduates so that they can appreciate diversity in the world and in intellectual pursuits.

3. Program Outcomes:

The following are the program outcomes of the course:

Po1: Engineering Knowledge: Apply the knowledge of Mathematics, Science, Engineering Fundamentals, and an Engineering specialization to the solution of complex engineering problems.

Po2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Po3: Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Po4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Po5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Po6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Po7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Po8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Po9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Po10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Po11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Po12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

4. Program Specific Outcome: By the completion of B.Tech CSE(CC) program the student will have following Program specific outcomes.

PSO1: Foundation of Computer System: Ability to understand the principles and working of computer systems. Students can assess the hardware and software aspects of computer systems.

PSO2: Foundations of Hardware and Software development: Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process. Familiarity and practical competence with a broad range of programming language and open-source platforms.

PSO3: Foundation of basic Sciences: Ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm.

PSO4: Applications of Computing and Entrepreneurship Ability: Ability to use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations.

5. General Regulations for Faculty of Engineering, Design and Automation:

5.1 The University may introduce programs under Faculty of Engineering, Design and Automation which are specified under the UGC Act 1956. The Governing Body may approve the introduction, suspending or phasing out a program on their commendation of the Academic Council either on its own or on the initiative of faculty.

5.2 The admissions to a Faculty of Engineering, Design and Automation programs shall be generally governed by the rules of the UGC/AICTE or another competent authority of the MHRD or as approved by Governing Body of University and shall be as notified in the admission notification of the respective academic year.

5.3 The minimum entry qualification for admission to the students of Faculty of Engineering, Design and Automation shall be such as may be laid down in the regulations or specified by the Governing Body like Minimum qualification for admission to the first year program of Faculty of Engineering, Design and Automation shall be the Senior Secondary School Certificate (10+2) examination in non-medical, while deciding the admission procedure, the University may lay down compulsory subjects in qualifying examination for admission for various programs in the admission policy.

5.4 A student shall be required to earn a minimum number of credits through various academic components of a curriculum, as provided for in the regulations.

5.5 A student shall be required to complete all the requirements for the award of the degree within such period as may be specified in the regulations.

5.6 A student may be granted such scholarship as may be specified in accordance with the directions of the Governing Body from time to time or regulations laid down for the same.

5.7 A student admitted to the programs shall be governed by the rules, regulations and procedures framed and implemented by the University from time to time.

5.8 The students shall abide by the regulations mentioned in student handbook issued by the University. These standing regulations shall deal with the discipline of the students in the Hostels, Faculty, and University premises or outside. The standing orders may also deal with such other matters as are considered necessary for the general conduct of the students' co-curricular and extra-curricular activities.

5.9 In exceptional circumstances the chairman of Academic Council may, on behalf of the Council, approve amendments, modifications, Insertions or deletions of an Ordinance(s) which in his/her opinion is necessary or expedient for the smooth running of the program: provided all such changes are reported approved to the Council in its next meeting.

6. General Regulations for the B.Tech. Computer Science and Engineering (Cyber Security):

6.1 Short Title and Commencement: These regulations shall be called regulations for the UG program in Faculty of Engineering, Design and Automation of the University and shall come into force on such a date as the Academic Council may approve.

6.2 Duration: The duration of the UG program leading to degree of Bachelor of Technology shall be minimum four years and each year will comprise of two semesters. However, the duration may be extended up-to six years from the registered batch. The maximum duration of the programs excludes the period of withdrawal, due to medical reasons. However, it shall include the period of rustication or any other reason of discipline/academics e.g. detention, willful absence by the student, not getting promotion to the next class due to poor academic performance etc. Under detention, the student shall attend the University for an additional semester or more time, as equated to period of absence/suspension.

6.3 Starting or Phasing out of Program: The University may offer such Under graduate programs in Engineering leading to award the degree of Bachelor of Technology, as per no men cloture lay by the UGC/AICTE regulations on the subject. A program may be phased out on recommendations of the Academic Council and approval of the Governing Body, on account of continuous low registration in the program or any other justifiable reason like becoming obsolete etc. Similarly, the Academic Council may approve starting of a new program or modifying the existing one on the recommendations of the Academic Council.

6.4 Admissions: Admission in Engineering programs shall be made as per procedure approved by the Governing Body and may be reviewed periodically as required. Fee structure, refund policy, total number of seats, reservation policy, and or direct entry into II year through lateral entry scheme etc. shall be defined in the admission policy.

6.5 Eligibility for Admission: 10+2 (Non –Medical) with 55% equivalent with (45 % for SC/ST/OBC) marks in aggregate from any recognized board. The Lateral Entry into this programme enables candidates with a 3 years diploma in Engineering (any stream) or an equivalent degree to get admitted directly to 2nd Year (3rd semester).

6.6 Semester System: The Engineering academic programs in the University shall be based on Semester System; namely, even (Jan to June) and Odd (July to Dec) Semesters, in an academic year. The courses whether offered in regular semester shall be evaluated as per the policy and procedure laid down.

6.7 Semester Duration: Total duration of the Program shall be of four years and each year will comprise of two semesters. In addition, each semester shall normally have 90 working days.

7.Curriculum: The four years curriculum has been divided into eight semesters and shall include lectures/ tutorials/ Lab work/ field work/ outreach activity/ project work/ viva/ seminars/ presentations/ term papers/ assignments etc. or a combination of some of these. The curriculum will also include other curricular, co-curricular and extra-curricular activities as may be prescribed by the university from time to time.

8. Choice Based Credit System: The University has adopted Choice Based Credit System (CBCS), which provides an opportunity to the students to choose courses from the offered courses comprising of Core, Elective, Ability Enhancement and Audit Courses. The choice-based credit system provides a "flexible" approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Following are the types

of courses and structure for the program:

Course Categories:

I.	BSC:	Basic Science Courses
II.	ESC:	Engineering Science Courses
III.	HSMC:	Humanities and Social Sciences including Management courses
IV.	PCC:	Professional core courses
V.	PEC:	Professional Elective courses
VI.	OEC:	Open Elective courses
VII.	MC:	Mandatory courses (Audit Course)
VIII.	PROJ:	Project

I. Basic Science Courses: A Basic Science Course includes Mathematics, Physics, Chemistry and English to all the 1st year engineering streams.

II. Engineering Science Courses: These are the courses which are extension of basic science course to be used in the Engineering.

III. Professional Core Course: A course, which should compulsorily be studied by a candidate as a core requirement to complete the requirement of program in as a discipline of study.

IV. Professional Elective Course: Generally, a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/subject of study or which provides an extended scope, or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/ skills called an Elective Course.

i. Discipline Specific Elective (DSE) Course: The main discipline/subject of study may order elective courses, is referred to as Discipline Specific Elective. The University/Institute may also order discipline related Elective courses from unrelated discipline (to be ordered by main discipline/subject of study).

ii. Open Elective Course (OEC): An elective course chosen generally from an unrelated discipline/subject, with an intention to add generic proficiency to the students.

Note: A core course ordered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective. Elective Course(s) may also be called an "Open Elective"

V. Mandatory Course (MC) or Audit Course (AC)

The introduction of two Audit courses covering subjects of developing desired attitude among the learners is on the line of initiatives such as Unnat Bharat Abhiyan, Yoga, Value education, Disaster management, Sanskrit, Pedagogy, Constitution of India, Personality development through Indian culture, Environmental Science etc.

9. Medium of Instructions:

9.1. The medium of instructions and examination will be English.

9.2. Practical work/Project Work / Project Report / Dissertation / Field Work Report / Training Report etc., if any, should be presented in English.

10. Mode:

The program is offered in 'Full Time' mode of study only.

11. Attendance Requirement to be Eligible to Appear in End Semester Examination:

a. Every student is required to attend at least 75% of the lectures delivered squaring tutorials, practical and other prescribed curricular and co-curricular activities.

b. Dean of Faculty may give a further relaxation of attendance up to 10% to a student provided that he/she has been absent with prior permission of the Dean of the Faculty for the reasons acceptable to him/her.

c. Further, relaxation up to 5% may be given by the Vice Chancellor to make a student eligible under special circumstances only.

d. No student will be allowed to appear in the end semester examination if he/she does not satisfy the attendance requirements. Further, the attendance shall be counted from the date of admission in the University or commencement of academic session whichever is later.

e. Attendance of N.C.C/N.S.S. Camps or Inter-Collegiate or Inter-University or Inter-State or International matches or debates or Educational Excursion or such other Inter-University activities as approved by the authorities' involving journeys outside the city in which the college is situated will not be counted as an absence. However, such absence shall not exceed four weeks per semester of the total period of instructions. Such type of facility should not be availed twice during the study.

12. Credit: Each course, except a few special audit courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and/or Lab contact hours in a week.

A letter grade, corresponding to a specified number of grade points, is awarded in each course for which a student is registered. On obtaining a passing grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average. A minimum number of credits should be acquired to qualify for the programs.

12.1 Earned Credits (EC): The credits assigned to a course in which a student has obtained 'D' (a minimum passing grade) or a higher grade will be counted as credits earned by him/her. Any course in which a student has obtained F, or W or "I" grade will not be counted towards his/her earned credits.

A unit by which the course is measured. It determines the number of hours of instruction required per week.

Definition of Credit	
1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
2 Hours Practical (Lab) per week	1 credit

13. Program Structure: As per GNA University

Details of Courses under B.TECH (COMPUTER SCIENCE AND ENGINEERING)

S.No	Course	Theory (A)	Theory & Tutorials B	Theory & Tutorials C	Practical/ Training (D)	Total
01.	Basic Science Courses (BSC)	NIL	4x5=20 (LTP-310)	NIL	1x2=02 (LTP-002)	22
02.	Engineering Science Courses(ESC)	NIL	4x2=08 (LTP-310)	5x4=20 (LTP-302) 3x1=03 (LTP-104)	1x1=01 (LTP-002) 3x1=03 (LTP-004)	34
03.	Humanities and Social Science Including Management Courses (HSMC)	2x3=06 (LTP-300)	NIL	2x3=06 (LTP-202)	NIL	12
04.	Professional Core Courses(PCC)	NIL (LTP-300)	NIL	4x16=64 (LTP-302)	NIL	64
05.	Professional Elective Courses(PEC)	3x5=15 (LTP-300)	NIL	3x4=12 (LTP-302)	NIL	27
06.	Open Elective Courses(OEC)	2x3=06 (LTP-300)	NIL	NIL	NIL	6
07.	Mandatory Courses(MC)	1x2=02 (LTP-200)	NIL	NIL	NIL	2
08.	Project (PROJ)	NIL	NIL	NIL	1x1=01 3x1=03	4
	Total Credits	29A	28B	105C	9D	171

Semester I (First year)

Sr. No	Category	Course Code	Course Title	Teaching Scheme			Examination Scheme		Total	Credits
				L	T	P	Internal	External		
1.	BSC	*BTP101 *BTP102	Engineering Physics Semiconductor Physics	3	1	0	40	60	100	4
2.	BSC	BTM101 *BTM102	Calculus and LinearAlgebra Mathematics-I	3	1	0	40	60	100	4
3.	ESC	BEE101	Basic Electrical & Electronics Engineering	3	1	0	40	60	100	4
4.	HSMC	COM101	English Communication	2	0	0	40	60	100	2
2.	BSC	*BTP121 **BTP122	Engineering Physics Laboratory Semiconductor Physics Laboratory	0	0	2	30	20	50	1
3.	ESC	BEE121	Basic Electrical & Electronics Engineering Laboratory	0	0	2	30	20	50	1
4.	ESC	BCS101	Programming for Problem Solving	3	0	0	40	60	100	3
3.	HSMC	COM121	English Communication Lab	0	0	2	30	20	50	1
4.	ESC	BCS121	Programming for Problem Solving Laboratory	0	0	2	30	20	50	1
4.	MC	ENS001	Environmental Science	2	-	-	40	00	40	S/US (Non-Credit)
	Total Credits			16	3	8	360	380	740	21

*The Course Engineering Physics (BTP101) and Engineering Physics Lab (BTP121) are offered to B. Tech (Mechanical, Civil, Aerospace, Electronics and Communication & Mechatronics Engineering)

**The Course Semiconductor Physics (BTP102) and Semiconductor Physics Lab (BTP122) are offered to B. Tech Computer Science Engineering, B.Tech Mechanical and Automation Engineering and B.Tech. Robotics and Automation Engineering).

+The course Mathematics – I (BTM102) is offered in B. Tech. Computer Science and Engineering only.

Semester II (First year)

Sr. No	Category	Course Code	Course Title	Teaching Scheme			Examination Scheme		Total	Credits
				L	T	P	Internal	External		
1.	BSC	BTC101	Engineering Chemistry	3	1	0	40	60	100	4
2.	BSC	BTM201	Calculus, Ordinary Differential Equations and ComplexVariables	3	1	0	40	60	100	4
		*BTM202	Mathematics-II							
3.	ESC	BCS 302	Object Oriented Programming Language using C++	3	0	0	40	60	100	3
4.	ESC	BME102	Engineering Drawing and Graphics	1	0	4	40	60	100	3
5.	HSMC	COM201	Business Communication	2	0	0	40	60	100	2
6.	BSC	BTC121	Chemistry Laboratory	0	0	2	30	20	50	1
7.	ESC	BME123	Workshop /Manufacturing Practices	0	0	4	60	40	100	2
8.	HSMC	COM221	Business Communication Laboratory	0	0	2	30	20	50	1
9.	ESC	BCS322	Object Oriented Programming Language using C++ Laboratory	0	0	2	30	20	50	1
10.	HSMC	HVE001	Universal Human Values	3	0	0	40	60	100	3
	Total Credits			15	2	14	390	460	850	24

+The course Mathematics - II (BTM202) is offered in B. Tech. Computer Science and Engineering only.

Note: There shall be a summer training of 4 weeks duration at the end of 2nd semester. The assessment for this will be included in the 3rd semester.

Semester III (Second year)

Sr. No	Category	Course Code	Course Title	Teaching Scheme			Examination Scheme		Total	Credits
				L	T	P	Internal	External		
1.	PCC	BCS301	Data structure & Algorithms	3	0	0	40		100	3
2.	PCC	BCS209	Basics of Python	3	0	0	40		100	3
3.	ESC	BEE302	Digital Circuit and Logic Design	3	0	0	40		100	2
4.	BSC	BTM302	Mathematics-III	3	1	0	40	20	50	1
5.	HSMC	DOS001	Foundation Course in Humanities (Development of Philosophy/ Societies)	3	0	0	40		100	2

6.	PCC	BCS321	Data Structure & Algorithms Laboratory	0	0	2	30	20	50	1
7.	PCC	BCS222	Python Laboratory	0	0	2	30	20	50	1
8.	PROJ	BCS300	Institutional Training	-	-	-	40	-	40	S/US
9.	PEC	BTCY301	Fundamentals of Cyber Security and Network Security	3	0	0	40	60	100	3
10.	ESC	BEE322	Digital Circuit and Logic Design Laboratory	0	0	2	30	20	50	1
11.	PCC	BSC501	Computer Networks	3	0	0	40	60	100	3
12.	PCC	BCS521	Computer Networks Laboratory	0	0	2	30	20	50	1
	Total			21	1	8	440	560	940	26

* Students will take online course from Palo Alto (36 hours)

Semester IV (Second year)

Sr. No	Category	Course Code	Course Title	Teaching Scheme			Examination Scheme		Total	Credits
				L	T	P	Internal	External		
1	PCC	BCS401	Operating Systems	3	0	0	40	60	100	3
2	PEC	BCS542	Linux and Shell Programming	3	0	0	40	60	100	3
3	ESC	BEE302	Computer Organization & Architecture	3	0	0	40	60	100	3
4	BSC	BTM402	Discrete Mathematics	3	1	0	40	60	100	4
5	PCC	BCS402	Java Programming	3	0	0	40	60	100	3
6	PEC	BTCY401	Online Course: Cloud Security and Security Operations	0	0	0	-	-	-	S/US (Non-Credit)
7	PCC	BCS502	Database Management Systems	3	0	0	40	60	100	3
8	PCC	BCS421	Operating Systems Laboratory	0	0	2	30	20	50	1
9	PCC	BCS522	Database Management Systems Laboratory	0	0	2	30	20	50	1
10	PEC	BCS524	Linux and Shell Programming Laboratory	0	0	2	30	20	50	1
11	PCC	BCS422	Java Programming Laboratory	0	0	2	30	20	50	1
12	ESC	BCS333	Computer Organization & Architecture Laboratory	0	0	2	30	20	50	1
	Total Credits			18	1	10	390	460	850	24

* Students will take 4-6 weeks summer training in Industry after 4thsemester or students have to undergo global certifications (PCCER-Palo Alto/EC Council etc) and mid term evaluation will be done by an Industry Expert.

Semester V (Third year)

Sr. No	Category	Course Code	Course Title	Teaching Scheme			Examination Scheme		Total	Credits
				L	T	P	Internal	External		
1	PCC	BCS602	Software Engineering	3	0	0	40	60	100	3
2	PCC	BCS503	Formal Language & Automata Theory	3	0	0	40	60	100	3
3	PCC	BCS504	Web Technologies	3	0	0	40	60	100	3
4	PCC	BCS604	Computer Graphics	3	0	0	40	60	100	3
5	PEC	B***	Elective – I 1.Cryptography 2.Blockchain and Cryptocurrencies Biometric and Face Recognition Security Sys	3	0	0	40	60	100	3
6	OEC	******	Open Elective – I	3	0	0	40	60	100	3
7	PCC	BCS622	Software Engineering Laboratory	0	0	2	30	20	50	1
8	PCC	BCS525	Web Technologies Laboratory	0	0	2	40	60	100	1
9	PROJ	BCS500	Summer Internship*	-	-	-	50	50	100	2
10	PEC	B***	Elective – I Laboratory	0	0	2	40	60	100	1
11	PCC	BCS 624	Computer Graphics Laboratory	0	0	2	30	20	50	1
12			Placement Preparation – I	0	0	2	-	-	-	S/US
	Total Credits			18	0	10	430	630	1000	24

* Students may opt for global certifications (AWS CCP).

Semester VI (Third year)

Sr. No	Category	Course Code	Course Title	Teaching Scheme			Examination Scheme		Total	Credits
				L	T	P	Internal	External		
1	PCC	BTCY608	Cyber Security Tools	3	0	0	40	60	100	3
2	PCC	BCS601	Compiler Design	3	0	0	40	60	100	3
3	PCC	BCS603	Design and Analysis of Algorithms	3	0	0	40	60	100	3
4	PEC	BCS***	Enterprise Security Management and Deployment	3	0	0	40	60	100	3
5	PEC	BCS***	Elective – II 1. Distributed Database Security 2. Cyber Law and Security Auditing 3. Security of e- based systems	3	0	0	40	60	100	3
6	PEC	BCS***	Elective – III 1.Mobile Security 2.Ethical Hacking 3.Malware Analysis	3	0	0	40	60	100	3
7	PROJ	BCS721	Project I	0	0	2	40	60	100	3
8	PCC	BCS621	Complier Design Laboratory	0	0	2	30	20	50	1
9	PCC	BCS623	Design and Analysis of Algorithms Laboratory	0	0	2	30	20	50	1
10	PCC	BTCY618	Cyber Security Tools Laboratory	0	0	2	30	20	50	1
11	PEC	B***	Elective-III Laboratory	0	0	2	30	20	50	1
12	PCC		Placement Preparation II	0	0	2	30	20	50	1
	Total Credits			18	0	12	400	500	900	24

Semester VII (Fourth year)

Sr. No	Category	Course Code	Course Title	Teaching Scheme			Examination Scheme		Total	Credits
				L	T	P	Internal	External		
1	PCC	BCS701	Artificial Intelligence	3	0	0	40	60	100	3
2	PCC	BCS942	Computer Vision	3	0	0	40	60	100	3
3	PEC	BTCY701	DEVOPS	3	0	0	40	60	100	3
4	PEC	BCS***	Elective-IV 1.Data Science 2.Data Warehousing and Mining 3.Distributed Databases 4.Data Analytics(AWS)	3	0	0	40	60	100	3
5	PEC	BCS***	Elective-V 1.Natural Language Processing(AWS) 2.Digital Image Processing Network Security and Cryptography	3	0	0	40	60	100	3
	OEC	BCS***	Open Elective – II	3	0	0	40	60	100	3
	PROJ	BCS721	Major Project	0	0	6	50	50	100	3
	PROJ	BCS700	Summer Internship*	-	-	-	50	50	100	2
	PCC	BCS712	Artificial Intelligence Laboratory	0	0	2	30	20	50	1
	PCC	BCS932	Computer Vision Laboratory	0	0	2	30	20	50	1
	PEC	BTCY711	Vulnerability Assessment and Penetration Testing Laboratory	0	0	2	30	20	50	1
	Total Credits			18	0	12	430	520	950	26

* Students will take minimum of 4 weeks summer training in Industry after 6 th semester or Global Certifications (Associate Level)

Semester VIII (Fourth year)

Sr. No	Category	Course Code	Course Title	Teaching Scheme			Examination Scheme		Total	Credits
				L	T	P	Internal	External		
1	PROJ	BTCS801	Semester Training	0	0	0	500	500	1000	16
		Total Credits		18	0	10	430	630	1000	16

LIST OF ELECTIVES

Elective–I

Pre Requisite	Course Code	Course Title
N.A	BTCYS01	Cryptography
N.A	BTCYS02	Blockchain and Cryptocurrencies
N.A	BTCYS03	Biometric and Face Recognition Security System

Elective –II

Pre Requisite	Course Code	Course Title
N.A	BTCY602	Distributed Database Security
N.A	BTCY603	Cyber Law and Security Auditing
N.A	BTCY604	Security of e-based systems

Elective –III

Pre Requisite	Course Code	Course Title
N.A	BCS841	Mobile Security
N.A	BCS645	Ethical Hacking
N.A	BTCY605	Malware Analysis

Elective –IV

Pre Requisite	Course Code	Course Title
N.A	BCS742	Cyber Crime Investigation and Digital Forensic
N.A	BTCY703	System and Network security
N.A	BTCY704	Social Media Security

Elective–V

Pre Requisite	Course Code	Course Title
N.A	BCS747	Intrusion Detection System
N.A	BTCY705	CyberSpace Operations and Design
N.A	BTCY706	Computer security and audit Assurance

LIST OF OPEN ELECTIVES
Open Elective–I& II

Sr No.	Course Code	Course Title	L	T	P	Cr
1	BEE036	Internet of Things	3	0	0	3
2	VAE031	Values and Ethics	3	0	0	3
3	FME031	Fundamentals of Management for Engineers	3	0	0	3
4	BSOP401	MATLAB for Engineers	3	0	0	3
5	BSOP402	Content Management System	3	0	0	3
6	BSOP403	Digital Marketing	3	0	0	3
7	BCS543	Dot Net Technologies	3	0	0	3
8	BSOP404	Statistics for Engineers	3	0	0	3

14. Minor/Major Project:

The objective of Minor/Major Project is to enable the student to take up investigative study in the broad field of Computer Science and Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a supervisor. This is expected to provide a good initiation for the student(s) in R&D work. The assignment to normally include:

1. Survey and study of published literature on the assigned topic;

2. Working out a preliminary Approach to the Problem relating to the assigned topic;

3. Conducting preliminary Development/Analysis/ Modeling/ Simulation/ Experiment/ Design/ Feasibility;

4. Preparing a Written Report on the Study conducted for presentation to the Department;

5. Final Seminar, as oral Presentation before a departmental committee.

The objective of Major Project is to enable the student to extend further the investigative study taken up under Minor Project, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry.

14.1 Trainings: The 4 weeks in-house/summer and 6-8 weeks summer internships are mandatory before completion of the course. This will equip the students with practical understanding and training about industry practices in a suitable industry or organization.

14.2 Examination/ Evaluation System:

a) **Internal Assessment,** which includes attendance, mid semester examination and/or other components (Project 1, Project 2, Mid Term Exam, Attendance, Class Test) carrying a weight age of 40%. This is applicable for all theory courses.

b) **Practical Courses:** The examination/evaluation criteria of the practical courses shall be decided by the respective faculty member and wherever required on the availability of the external experts/visiting faculty. Faculty may set/design the practical exercises out of any marks but the overall weight age shall be in pre-defined percentage, which the concerned faculty/course coordinator shall announce in the first class of the semester and upload on the GU-MS. Methodology for evaluation of Lab component may include day to day work, lab records, quantity/quality of work and Viva/Seminar/Practical as may be decided.

c) **External Assessment** i.e., End Semester Examination, carrying a weight age of 60%.

a) **End Semester Examination:** Controller of Examination shall conduct these examinations. The University shall release the examination dates and schedule.

b) Similar division of marks may be created for special courses like Major Projects, seminars, term papers, internship etc. by respective faculty but same shall also be predefined.

c) Every student has to score at least 25% marks each in Continuous Assessment and End Semester examination. The minimum pass percentage is 40% in aggregate. In case a student scores more than 25% each in Continuous Assessment and End Semester Examination, but overall percentage in the concerned subject remains less than 40%, then student has to repeat End Semester Examination in that subject.

d) Failing to meet Attendance Requirement:

a) A student is required to attend all the classes.

b) If the attendance profile of a student is unsatisfactory, he/she will be debarred. Any student, who has been debarred due to attendance shortage, shall not be allowed to take the supplementary Examination. The student shall have to register for the course in the regular semester when offered.

e) Makeup Examinations for Mid Semester Examination: A student may apply for a makeup examination where he/she is not able to attend the examination schedule due to reasons of personal medical condition or compassionate reason like death of a very close relative. No other contingencies are acceptable. Except in case of medical emergency, a student needs to seek advance approval from appropriate authority before missing the Examination.

Theory Courses:

- A student missing Mid Term Examination only shall be required to take a make-up Examination.
- The students must put-up the request for make-up Examination along with the medical documents to prove the genuineness of the case (for having missed the Examination) within 5 days of last date of Examination.
- The genuineness shall be reviewed and approved by the Vice Chancellor, whose decision shall be final.
- In case a student misses the make-up Examination also, then no further chance will be provided.
- The duration of Examination shall be as decided by the Faculty member.
- Genuine approved cases shall be notified by the Controller of Examination based on the requests received and only such students shall be allowed to take make-up Examination in the subjects where approval has been granted.
- The date sheet need not be taken out as the makeup examination shall be conducted under arrangement concerned faculty, who after evaluation and sharing the evaluated answer sheet with student shall submit marks to the Controller of Examination.

f) Makeup of End Semester Examination: It is mandatory to appear the end semester major examination to obtain any grade for a course. A student who misses the end semester major examination shall follow a similar procedure as outlined above, to obtain approval of the Vice

Chancellor to prove genuineness of the case. The student whose case is approved as genuine shall be awarded "I" Grade in the semester results in the given subject. The student shall be allowed to appear in the supplementary examination of the said subject. However, the grades shall be worked out by computing the marks obtained by students in Mid Term Exams, TA, Lab and supplementary examination (equated to the weightage of end semester examination). The total marks shall be compared with the marks of the class as in the regular semester for award of grade.

g) Makeup of End Semester Viva of Projects: It is mandatory to appear in the final Viva examination to obtain any grade for a project course. In case of student missing the same for genuine reasons; similar method as given for written examination of theory courses shall be followed.

h) Procedure to be adopted by students in case of missing any of the specified Examination(s):

Following procedure shall be adopted for establishing genuineness of the case.

a. Action by the student (Medical Cases)

I. They should report absence from the Examination(s) by fastest possible means to the Controller of Examination. It could be email or written communication by speed post or sent by hand through any means. In case of Hosteller's, if a student falls sick while residing in the hostel, he/she should seek advice of the available qualified doctor.

II. The said report should preferably be sent prior to the Examination, but not later than 5 days after the last date of the said Examination.

III. The student should on rejoining:

a. Report to the Controller of Examination with complete medical documents to include referral/Prescription slip of the doctor specifically indicating the disease and medicine prescribed, investigation/Lab reports and discharge slip in case of admission should be provided.

b. Submit the Documents to the Controller of Examination, not later than 5 days after the last date of Examination.

IV. In case delay beyond 5 days is anticipated the student should arrange for the medical documents to be sent to the University Medical Officer by hand through a friend / relative etc.

and get the said genuineness deposit with the Controller of Examination.

V. No request later than 5 days after the last date of Examination shall be accepted for reasons of ignorance or any other reasons.

b. Action by students (any other reason)

In case the student must miss Examination due to genuine reason other than medical, prior written sanction of Vice Chancellor and in his absence Dean is mandatory. No post facto requests shall be accepted in any case. The approval should be deposited with the Controller of Examination before the examination.

Supplementary Examination:

a.The supplementary examinations shall be held for each commiserating semester in December for Odd semester and May/June for Even semester respectively. For the final semester students, there is privilege to appear in the supplementary exams of all previous semester.

b. Eligibility: Student with 'F' grade is eligible to appear in the Supplementary Examination.

c. Re-appear: Student with backlog of one semester will be carried forward to next semester. Re- appear examinations will be conducted twice in a year after ESE of every semester.

d. Supplementary for Projects: There shall be no supplementary examinations for the projects, except makeup examination for missing the final viva as per rules outlined above.

c. Grading System: Grading System: University follows eight letter grading system (A+, A, B+, B, C+, C, D, and F) that have grade points with values distributed on a 10 point scale for evaluating the performance of student. The letter grades and the corresponding grade points on the 10-point scale are as given in the table below.

Academic Performance	Range of Marks	Grades	Grade Points
Outstanding	≥90	A+	10
Excellent	≥80 &< 90	A	9
Very Good	≥70 &<80	B+	8
Good	≥60 &<70	B	7
Fair	≥50 &< 60	C+	6
Average	>40 &<50	C	5
Minimally Acceptable	40	D	4
Fail	< 40	F	0
Incomplete		I	-
Withdrawal		W	-
Grade Awaited		GA	-
S-Satisfactory,US-Unsatisfactory Minor Project		S/US	-

a. Description of Grades:

A. D Grade: The D grade stands for marginal performance, i.e. it is the minimum passing grade in any course. D grade shall not be awarded below 30% marks, though each teacher may set higher marks for the same.

B. F Grade: The 'F' grade denotes a very poor performance, i.e. failing a course. A student has to repeat all courses in which she/he obtains 'F' grade until a passing grade is obtained. In the case of 'F', no Grade points are awarded. However, the credits of such courses shall be used as the denominator for calculation of GPA or CGPA.

C. W Grade: The 'W' grade is awarded to a student if he/she is allowed to withdraw for an entire Semester from the University on medical grounds for a period exceeding five weeks.

D. I" Grade: The 'I' grade is awarded when the student is allowed additional opportunity like makeup Examination etc. based on which the grade is to be decided along with other components of the evaluation during the semester 2/4. An incomplete grade of 'I' may be given when an unforeseen emergency prevents a student from completing the work in a course. The 'I' must be converted to a performance grade (A to F) within 90 days after the first day of classes in the subsequent regular semester.

E. X Grade: It is equivalent to Fail grade but awarded due to a student falling below the laid down attendance requirement. Students having X grade shall be required to re-register for the course, when offered next.NB: The CGPA can be converted to percentage by using the given formula: CGPA x 10 = % e.g. 7.8 x 10 = 78%

14.3 Cumulative Grade Point Average (CGPA), it is a measure of the overall cumulative performance of a student for all semesters. The CGPA is the ratio of total credit points securedby a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimals places.

14.4 Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (Course title,number of credits, grade secured) along with SGPA of that semester and CGPA earned till thatsemester.

d. General Rules: Examinations:

a) Showing the Answer Scripts: The answer scripts of all written Examinations i.e. Mid Term or end semester examination or any other written work conducted by a teacher shall be shown to the students. Students desirous of seeing the marked answer scripts of End Semester Examination has to ensure their presence before results are declared, as per dates notified by the Controller of Examination.

b) Marks/Answer Sheets of all other tests shall also be shared with the students and thus, there shall be no scrutiny of grades. However, before the grades are forwarded to Registrar/Controller of Examination, they should be displayed on GU-MS and time are given to students, to discuss the same with respective faculty.

c) No appeal shall be accepted for scrutiny of grades.

d) Examination Fee for Supplementary. A fee of Rs.1000/- per course or as decided by the Management from time to time will be charged from the students.

g. Improvement of overall Score: A candidate having CGPA < 5.5 and wishes to improve his/her overall score may do so within two academic years immediately after passing the degree program by reappearing into maximum four course(s)/subject(s). The improvement would be considered if and only if the CGPA becomes > 5.5.

h. Program qualifying criteria: For qualifying the Program every student is required to earn prescribed credits (i.e. 171). If any student fails to earn prescribed credits for the program, then he/she will get a chance to complete his/her Program in two more years than the actual duration of degree.

i. Revision of Regulations, Curriculum and Syllabi: The University may revise, amend, change or update the Regulations, Curriculum, Syllabus and Scheme of examinations through the Board of Studies and the Academic Council as and when required.

j. Conditions for Award of a Degree:

a. Should complete the requirements of the Degree in maximum duration specified for the program. Semester withdrawals due to medical reasons are not counted in six years. However, forced withdrawal of students e.g. rustication or expulsion or nonattendance by student due to any other reasons, shall count in the maximum period of six years and minimum period of four years.

b. Successfully completing the Internship studies.

c. Should have cleared all the foundational and core courses of the programs. In case of lateral entry students (direct entry into second year) the student should have completed the foundational/core courses/equivalent courses, as approved at the time of admission in the programs.

Acceptance of MOOC courses

Faculty of accepts the MOOC course available on SWAYAM platform for credit transfer. 40% of the courses can be taken from the available list of MOOCs on SWAYAM.

Instructions for MOOC courses

1. MOOC courses taken for credit transfer must be approved and recommended by Dean Academics and Dean of the Faculty before the start of the semester.

2. The copy of the list of courses taken by the students for any course has to be submitted to the Controller of the Examination.

3. MOOC course should be done from SWAYAM platform as per the guidelines of UGC.

4. To obtain the credit the student needs to complete the assessment of the course and provide the certificate of the course issued by the SWAYAM/NPTEL. After completing the certificate, the student must submit the certificate within a week to the department.

5. The fees (if any) for the registration and / or assessment of the MOOC course must be borne by the student only.

6. The student can opt for a particular online MOOC course if and only if the credit of that course is equivalently mapped with the program structure.

7. If the student obtains the same course credit which mapped with the course then credit shall be considered for this course and the grade/marks provided by the accessing authority shall be transfer to the student. The result of the MOOC shall be taken on record by the university examination cell and a result declared for these papers.

8. For any particular semester, all results for the MOOC course must be submitted along with the marks of other papers of the same semester by the course coordinator.

9. MOOC course coordinators shall be appointed for each of the course taken by the student.

First Year

GNA UNIVERSITY
Inspiring Innovation....

Course Description: The course aims to equip the students with the with the ability to familiarize the basics of Semiconductor Physics and Lasers so that they can use these in Engineering as per their requirement.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Explain the fundamental principles and properties of electronic materials and semiconductors

CO2: Analyze the design, fabrication, and characterization techniques of Engineered semiconductor materials.

Co3: Describe the importance of Lasers and wave equation in nature and appreciate the mathematical formulation of the same.

Co4: Develop the basic tools with which they can study and test the newly developed devices and other semiconductor applications.

Course Contents:

UNIT I

Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons

UNIT II

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

UNIT III

Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint densityof states, Densityof states for photons, Transition rates (Fermi's goldenrule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model

UNIT IV

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO2), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity.

Suggested Reference Books

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc.(1995)
2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc.,(2007).
3. S. M. Sze: Semiconductor Devices: Physics and Technology, Wiley (2008).
4. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya: Semiconductor Optoelectronic Devices, Prentice Hall of India (1997)

Core Course BTM102: MATHEMATICS-I
Credits: 04

L T P
3 1 0

Pre-Requisites: NA

Course Description: The course aims to equip the students with the ability to familiarize the prospective engineers with techniques in basic calculus and linear algebra and equip them with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes (CO):

The course will enable the student to:

CO1: Apply fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.

CO2: Solve problems related to matrices and linear algebra including linear transformations, eigen values, diagonalization.

CO3: Characterize a set of vectors and linear systems using the concept of linear independence.

CO4: Identify and construct linear transformations of a matrix

Co5: Solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.

Course Contents:

UNIT I

Calculus: Evolute and Involute; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Rolle 's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.

UNIT II

Matrices: Solution of linear systems of equations, linear Independence, rank of a matrix, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination; Eigen values, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigen bases. Diagonalization.

UNIT III

Vector spaces: Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

UNIT IV

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Ordinary differential equations of higher orders: Second order linear differential equations with variable coefficients, method of variation of parameters.

Text Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

Suggested Readings:

5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

BEE101: BASIC ELECTRICAL & ELECTRONICS ENGINEERING

L T P
3 1 0

Credits: 04

Course Description: The course aims to equip the students with the basic concepts of electricity, electrical components and their applications. Also explain the working principle, construction, applications of various electrical machines.

The course includes the basic fundamentals of electronic components, devices and transducers, principles of digital electronics and concepts of basic electricity and electrical circuits which includes SCR, Transformer, magnetic circuits etc.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Describe strong basics of Electrical Engineering and practical implementation of Electrical fundamentals.

CO2: Develop and solve models of magnetic circuits.

CO3: Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state.

Co4: Analyze and solve electric and magnetic circuits, Identify functions of digital multimeter, cathode ray oscilloscope and various devices in the measurement of physical variables.

Course Content

UNIT I

Fundamentals of dc circuits: Introduction of CRO and multimeter, fundamentals of electricity (current, voltage, inductor, capacitor, resistor), ohm's law, Kirchhoff's' current and voltage law, series and parallel resistances and their circuit analysis. Elementary calculations for energy consumption and power factor improvement.

UNIT II

Fundamentals of ac circuits: AC circuits (generation, AC values, waveforms), Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. AC circuits (resistive, capacitive, inductive circuits), Impedance, admittance, polar form and rectangular form in AC circuits.

UNIT III

Principles of Magnetic circuits and transformers: Magnetism and transformers (Electromagnetic Induction, Mutual Induction), Working of Transformers (operation, principle turns ratio and applications), Losses in transformers, Rating and emf equation of transformers. Laws and terminologies in magnetic circuits.

UNIT IV

Electrical Installations & Power Converters: Components of LT Switchgear: Fuse, MCB, ELCB, MCCB, Types of Wires and Cables, Earthing and grounding. Batteries & UPS and its types. Introduction to SCR, DIAC, TRIAC and its VI characteristics.

UNIT V

Basics of Electronics: Introduction to Semi-Conductor materials (PN junction diodes, biasing and construction of PN Diode, Zener diode and its applications), Bipolar Junction Transistors (Construction, Working, configurations of Transistor and Applications).

UNIT VI

Digital Electronics: Introduction, number system and conversion, basic logic gates and their

truth tables, Flip-Flop's, Half and full adder, Half and full subtractor, Multiplexer and De multiplexer encoder, Decoder.

Recommended Books/ Suggested Readings:

1. B.L THAREJA , Fundamentals of Electrical engineering and electronics, S.CHAND 1st 2013.
2. EARL GATES , Introduction to electronics, DELMAR CENGAGE LEARNING, 6th edition 2013.
3. J.B GUPTA , Basic electrical and electronics engineering, S.K Kataria and sons edition 2013.
4. Basic Electrical and Electronics and Computer Engineering by R Muthusubramanian, S Salivahanan,K A Muraleedharan, Tata McgrawHill.
5. Basic electrical and electronics engineering DP KOTHARI 4TH EDITION 2013 MC Graw Hill.

COM101: ENGLISH COMMUNICATION
Credits: 02

L T P
2 0 0

Pre-Requisites: NA
Course Objectives:
1. To make students capable of using English language in context.
2. To enhance effective reading and writing skills.

Course Outcomes:
Upon successful completion of the course, the students should be able to:
Co1: Develop a minute practical knowledge about English grammar and its usage
CO2: Develop an understanding of the importance of free expression

UNIT I
Reading Skills: Comprehension Strategies- Skimming, Scanning&Inferencing, Summarising of Newspaper Articles, Paraphrasing of Complex Sentences

UNIT II
English Grammar and Usage: Parts of Speech, Common Errors in writing, Tenses, Change of Voice, Transformation of Sentences

UNIT III
Basic Writing Practices: Paragraph writing, Picture Composition, University based Notices, Notes Making after listening to a Motivational Speech, Formal Letter based on University concerns, MS Word (font style, size, format, spacing)

UNIT IV
Vocabulary Enrichment: Word Coinage, Synonym, Antonym, Homophones, Idioms and Phrasal verbs

Reference Book:
Functional English Grammar by Graham Lock, 1995

Suggested Readings:
Practical English Usage. Michael Swan OUP. 1995
On Writing Well. William Zinsser. Harper Resource Book. 2001
Communication Skills. Sanjay Kumar and PushpLata.Oxford University Press. 2006 Exercises in Spoken English. CIEFL, Hyderabad. Oxford University Press
Internet Links:
https://www.englishgrammar101.com/
http://learnenglish.britishcouncil.org/en/english-grammar
http://www.englishgrammarsecrets.com/
http://www.myenglishpages.com/
http://www.english-for-students.com/Homonyms-B.html

BTP122: SEMICONDUCTOR PHYSICS LABORATORY
Credits: 01

L T P
2 0 0

Pre-Requisites: NA

Course Description:

The course aims to equip the students with the with the ability to familiarize the basics of Semiconductor Physics and Lasers so that they can use these in Engineering as per their requirement.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.

CO2: Understand the characteristics and the behavior of various materials in a practical manner and gain knowledge about various communication mediums and its usage

Choice of 10-12 experiments from the following:

List of Experiments:

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. To find the quality factor of a damped harmonic oscillator.
3. To study one dimensional collision using two hanging spheres of different materials.
4. To determine the Moment of Inertia of a Flywheel.
5. To find out the frequency of AC mains using electric-vibrator.
6. To determine g by Bar Pendulum.
7. To determine g by Kater's Pendulum
8. To study the magnetic field of a circular coil carrying current.
9. To study B-H curve using CRO.
10. To find out dielectric constant of a dielectric substance.
11. To study the laser beam characteristics like; wave length using diffraction grating aperture
12. To determine numerical aperture of an optical fibre.
13. To determine attenuation & propagation losses in optical fibres.
14. To find the refractive index of a material using spectrometer.
15. To determine the grain size of a material using optical microscope.

Physics virtual lab:

1. To study Zener diode voltage as regulator and measure its line and load regulation.
2. To study the B-H Curve .
3. To draw the static current-voltage (I-V) characteristics of a junction diode
4. To determine the resistivity of semiconductors by Four Probe Method.
5. Verification and design of combinational logic using AND, OR, NOT, NAND and XOR gates.
6. dTo determine the magnetic susceptibilities of paramagnetic liquids by Quincke's Method.

BEE121: BASIC ELECTRICAL & ELECTRONICS ENGINEERING LABORATORY
Credits: 01

L T P
0 0 2

Pre-Requisites: NA

Course Description:

This subject deals with basic circuit solution methods, introduction to electrical machines, electronic equipment's and basics of domestic electrical installations. This course includes the basic concepts of electrical engineering

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Handle basic electrical equipment .

CO2: Understand domestic wiring procedures practically.

CO3: Assemble electronic systems.

Co4: Describe all the fundamental concepts involving electrical engineering

List of Experiments

1. To verify ohm's law and its limitations
2. To calculate the resistances and verify ohm's law for the wires of different material
3. To calculate the resistances of colored resistors
4. To verify Kirchhoff's current and voltage law
5. To study the various functions of CRO and calculate the amplitude and frequency of a sine wave using CRO.
6. To measure power and power factor in a single phase ac circuit.
7. To find out voltage – current relationship in a R-L-C series and parallel circuit and determine the resonance frequency of the circuit
8. To measure the resistance and inductance of a coil by ammeter- voltmeter method.
9. To obtain the characteristics of a pn junction diode.
10. To verify the application of zener diode as a voltage regulator
11. To verify the input and output characteristics of CE, CB and CC npn transistor.
12. To verify the functioning of a transistor as an amplifier
13. To verify the truth table of the various logic gates
14. To study the BCD to decimal encoder kit.

BCS101: PROGRAMMING FOR PROBLEM SOLVING

Credits: 03

L T P
2 0 0

Pre-Requisites: NA

Course Description:

The course aims to equip the students to make students familiar with the use of computers, learn to convert algorithms into programs using C language and how to use programming languages and the logic for writing computer programs.

This course includes components of a computer system, Algorithm and fundamentals of programming, Iteration and loops, functions, sorting, array, Structure and Pointers and File handling.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Formulate simple algorithms for arithmetic and logical problems.

CO2: Implement conditional branching, iteration and recursion.

CO3: Use arrays, pointers and structures to formulate algorithms and programs.

CO4: Apply programming to solve matrix addition and multiplication problems and sorting problems.

Course Content:

UNIT I

Introduction to components of a computer system: Memory, processor, I/O Devices, storage, operating system, Concept of assembler, compiler, interpreter, loader and linker.

Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo code with examples, From algorithms to programs, source code.

Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object and executable code. Components of C language. Standard I/O in C, Fundamental data types, Variables and memory locations, Storage classes.

UNIT II

(Loops & Functions)

Iteration and loops: use of while, do while and for loops, multiple loop variables, use of break and continue statements.

Functions: Introduction, types of functions, functions with array, passing parameters to functions, call by value, call by reference, recursive functions.

UNIT III

Arrays: Arrays (1-D, 2-D), Character arrays and Strings

Basic Algorithms: Searching, Basic Sorting Algorithms, Finding roots of equations, idea of time complexity

UNIT IV

Function and Recursion: Functions (including using built in libraries), Recursion with example programs such as Quick sort, Ackerman function etc.

UNIT V

Structure and Pointers: Pointers, Structures (including self referential structures e.g., linked list, notional introduction)

File handling: Introduction to file handling and its various modes

Text Books:

1. Exploring Microsoft Office 2010 by Robert T. Grauer, Mary Anne S. Poatsy, Michelle Hulett, Cynthia Krebs, Keith Mulberry, Prentice Hall.
2. Computer Fundamentals by P.K. Sinha, BPB Pub, 4th Ed.
3. Let Us C by Yashwant Kanitkar

Suggested Readings:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

COM121: ENGLISH COMMUNICATION LABORATORY

Credits: 01

L T P
0 0 2

Pre-Requisites: NA

Course Description:

1. To make students capable of using English language in context.
2. To gain active listening and responding skills.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: The students will be able to develop better understanding of Standard English accent.

CO2: The students will be able to develop fluency in English language.

Course Content:

UNIT I

Daily Discourse: Common Everyday Situations: Conversations and Dialogues (Unit 1-6), Monologue (2D/4D/5D/6D), and Communication at workplace,

UNIT II

Listening Skills: Listening skills on Social Interactions (Unit 1), work and study (Unit 2), daily life (Unit 3), food (Unit 4), Places (Unit 5) and Family (Unit 6)

UNIT III

Phonetic Skills: Pronunciation, Intonation, Stress (Unit 1-6) and Rhythm

UNIT IV

Speaking Skills: Group Discussion / Debate, Role Plays

Reference Book:

Cambridge English Empower Elementary Student's Book by Cambridge University Press

Suggested Readings:

1. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
2. Study Writing. Liz Hamp-Lyons and Ben Heasly, Cambridge University Press.2006.
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Practical English Usage. Michael Swan. OUP. 1995.

BCS121: PROGRAMING FOR PROBLEM SOLVING LABORATORY

Credits: 01

L T P
0 0 2

Pre-Requisites: NA

Course Description:

The Lab course aims to acquaint students with the usage of computers, demonstrate to them how to transform algorithms into programs using C language, and train them how to utilize programming languages and logic to write computer programs.

This course includes document creation in MS-Word, fundamentals of programming, Iteration and loops, functions, sorting, array, Recursion, Structure and Pointers and File handling.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Create documents using MS-Office

CO2: Formulate the algorithms for simple problems

CO3: Translate given algorithms to a working and correct program

CO4: Correct syntax errors as reported by the compilers

CO5: Identify and correct logical errors encountered at run time

Course Content:

List of experiments: Students should be made to practice the various concepts learned in class room by implementing them in the form of programs. Various programs should be practiced in the lab based on each of the following –age. Michael Swan. OUP. 1995.

1. Create documents using MS-Office exploring its various features.
2. Problem solving using computers: Familiarization with programming environment
3. Variable types and type conversions: Simple computational problems using arithmetic expressions
4. Branching and logical expressions: Problems involving if-then-else structures
5. Loops, while and for loops: Iterative problems e.g., sum of series
6. 1D Arrays: searching, sorting: 1D Array manipulation
7. 2D arrays and Strings, memory structure: Matrix problems, String operations
8. Functions call by value: Simple functions
9. Numerical methods: Root finding, numerical differentiation, numerical integration
10. Recursion, structure of recursive calls: Recursive functions
11. Pointers, structures and dynamic memory allocation: Pointers and structures
12. File handling: File operations

ENS001: ENVIRONMENTAL SCIENCE
Credits: 02

L T P
0 0 2

Pre-Requisites: NA

Course Description: This course deals with the environment components, ecosystems and how to maintain equilibrium in nature, its conservation, and different methods to reduce pollution and maintain our nature.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Learned about environment, its role and importance for living beings.

CO2: Analyze the structure of ecosystem, food chain/web.

CO3: Understand about the natural resources and their uses.

CO4: Recognize about different types of pollution created by human beings and their side effects as well as the methods to reduce these pollutions and their alternatives.

Course Content:

UNIT I

Introduction to environmental studies: Multidisciplinary nature of environmental studies; components of environment – atmosphere, hydrosphere, lithosphere, and biosphere. Scope and importance; Concept of sustainability and sustainable development.

Ecosystems: What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession.

Case studies of the following ecosystems:

a) Forest ecosystem

b) Grassland ecosystem

c) Desert ecosystem

d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT II

- Natural Resources: Renewable and Non-renewable Resources
- Land Resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity, and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international &inter-state).
- Heating of earth and circulation of air; air mass formation and precipitation.
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.
- Biodiversity and Conservation: Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hotspots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

UNIT III

Environmental Pollution

- Environmental pollution: types, causes, effects and controls; Air, water, soil, chemical and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.
- Environmental Policies & Practices: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.
- Environment Laws : Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC).
- Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context

UNIT IV

Human Communities and the Environment

Human population and growth: Impacts on environment, human health, and welfares.

Carbon footprint.(G7)

Resettlement and rehabilitation of project affected persons, case studies.

Disaster management: floods, earthquakes, cyclones, and landslides.

Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.

Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.

Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Suggested Readings

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.

2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.

3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.

4. Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ.Press.

5. Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates,2006.

6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339:36-37.

7. McCully, P.1996. Rivers no more: the environmentaleffects ofdams (pp. 29-64). ZedBooks.

8. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

9. Odum, E.P.,   Odum,   h.T.&   Andrews, J.1971.   Fundamentals   o   f Ecology.Philadelphia:Saunders.

10. Pepper, I.L., Gerba, C.P. &Brusseau, M.L. 2011. Environmental and Pollution Science. AcademicPress.

11. Rao, M.N. & Datta, A.K. 1987. Wastewater Treatment. Oxford and IBH Publishing Co. Pvt.Ltd.

12. Raven, P.H., Hassenzahl, D.M. &Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.

13. Rosencranz, A., Divan, S., &Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.

14. Sengupta, R. 2003.Ecology and economics: An approach to sustainable development.OUP.

15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science andConservation.

S. Chand Publishing, New Delhi.

16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices fromthe Tropics. John Wiley &Sons.

17. Thapar, V. 1998. Land of the Tiger: A Natural History of the IndianSubcontinent.

18. Warren, C.E. 1971. Biology and Water Pollution Control. WB Saunders.

4. Wilson, E.O. 2006. The Creation: An appeal to save life on earth. New York:Norton.

19. World Commission on environment and Development. 1987. Our Common Future. Oxford UniversityPress

20 www.nacwc.nic.in

21 www.opcw.org

BTC101: ENGINEERING CHEMISTRY

L T P
3 1 0

Credits: 04

Pre-Requisites: NA

Course Description: The course aims to equip the students with introduction to crystal field theory and spectroscopic properties, to understand the conditions of chemical equilibrium, periodic properties of elements, molecular shapes, and importance of stereochemistry in organic reactions and explore the synthesis of organic drug molecules.

The course includes quantum chemistry, co-ordination chemistry, solid states, and various spectroscopic techniques, states of matter, thermodynamic and periodic properties, stereochemistry and synthesis of drug molecules.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces and crystal field theory to explain aspects of structural, magnetic and spectroscopic properties.

CO2: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.

CO3: Rationalize bulk properties and processes using thermodynamic considerations.

Co4: Rationalize periodic properties such as ionization potential, electro negativity, oxidation states and electro negativity and also list major chemical reactions that are used in the synthesis of molecules.

Course Content

UNIT I

Atomic structure & Chemical Bonding: Schrodinger equation. Particle in a box solution and their applications for conjugated molecules. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbital theory- general introduction and the energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory- general introduction and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT II

Spectroscopic techniques and applications: Principles of spectroscopy and selection rules – Electronic spectroscopy. Fluorescence and its applications in medicine. IR & microwave (Vibrational and rotational spectroscopy of simple diatomic molecules) Applications. Nuclear magnetic resonance and magnetic resonance imaging proton NMR, surface characterization techniques (FTIR & XRD).

UNIT III

Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

UNIT IV

Polymers: General introduction, classification of polymers, Mechanism of addition and condensation polymerization, Idea of number average and weight average molecular masses of polymers, Properties and uses of polystyrene, polyester, polyamide, epoxy, phenol-

formaldehyde and silicon resins.

Stereochemistry: Representations of three-dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality in organic molecules, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

Organic reactions and synthesis of a drug molecule: Introduction to simple reactions substitution, addition, elimination, oxidation, reduction and cyclizations. Synthesis of a commonly used drug molecules (Aspirin, Metronidazole, Ciprofloxacin).

Recommended Books / Suggested Readings:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition
http://bcs.whfreeman.com/vollhardtschore5e/default.asp

BTM202: MATHEMATICS-II (DIFFERENTAL CALCULUS)

L T P
3 1 0

Credits: 4

Pre-Requisites: BTM 102

Course Description: The course aims to equip the students with the ability to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables & equip them to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

Co1: Use mathematical tools needed in evaluating multiple integrals and their usage.

CO2: Apply effective mathematical tools for the solutions of differential equations in engineering problems.

CO3: Apply concepts of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

Co4: Identify with functions of several variables that are essential in most branches of engineering.

Course Content

UNIT I

Multivariable Calculus (Differentiation): Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence

UNIT II

Multivariable Calculus (Integration): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes; Triple integrals (Cartesian), orthogonal curvilinear coordinates; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes (without Proofs)

UNIT III

Complex Variable – Differentiation: Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT IV

Complex Variable – Integration: Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine

Text Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

Suggested Readings:

1. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.

2. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc- Graw Hill, 2004.

3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

BCS302: OBJECT ORIENTED PROGRAMMING USING C++

Credits: 3

L T P
3 0 0

Course Description: This course will enable students the fundamentals of Object-Oriented Programming (OOP) and C++. Large programs are most likely the most complicated programs developed by humans. Because of their complexity, programs are prone to error, and software failures may be costly and even fatal. Object-oriented programming provides a novel and effective technique to deal with this complexity, serving as the foundation for all other courses based on the Object-Oriented idea.

The course includes basic concepts of OOPs, functions, Structures and Unions, Inheritance and File handling.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Discuss the principles of Object-Oriented Programming.

CO2: Identify classes, objects, members of a class and the relationships among them needed to solve a specific problem.

CO3: Demonstrate the concept of data encapsulation, inheritance, polymorphism and friend functions.

CO4: Analyze the handling formatted I/O and unformatted.

Course Content

UNIT I

Introduction: Beginning with C++, its applications, advantages etc, Difference between C and C++, Creating C++ source file, Editing, Compiling, Linking, Debugging, Difference between Procedure Oriented Programming approach and Object-Oriented Programming approach. C++ Fundamentals: Tokens, Keywords, Data Types, Expressions, Operators, Reference variables, and Manipulators. Control Structures: Decision control statements (if, if-else, if-else-if), Looping statements (while, do-while, for), break, continue, switch statements.

UNIT II

Functions: Different types of functions, Argument passing techniques-Pass by value, Pass by address, Pass by Reference; Inline functions, Function overloading, Default arguments, Recursion. Arrays and Strings: Defining arrays, Initialization, passing one-dimensional array to function, multi-dimensional arrays, Defining and initializing string variables.

UNIT III

Structures and Unions: Declaration and definition, initialization, array of structures, Difference between structure and union. Pointers: Declaration and initialization, array of pointers, pointer to pointer, operations on pointers. Classes and Objects: Class specification, Class objects, defining member functions, declaration of objects to class, accessing class members with objects, access specifiers (private, public, protected), array of objects, Constructors and Destructors, Operator overloading.

UNIT IV

Inheritance: Public, private and protected inheritance, Friend function, Single inheritance, multi- level inheritance, Multiple inheritance and its ambiguity, Hierarchical inheritance, Hybrid inheritance, Virtual base class, Abstract class, Composition. Polymorphism: Compile-time andRun-time polymorphism, Virtual Functions, Pure virtual functions, this pointer.

Exception Handling and File Handling: try-catch block, multiple catch blocks, catching all exceptions, rethrowing exceptions, File handling functions

Recommended Books / Suggested Readings::

1. Object Oriented Programming with C++, E. Balagurusami, Fourth Edition, TataMc-Graw Hill.
2. The C++ Programming Language, BjarnaStroustrup, Third Edition, Addison-Wesley Publishing Company.
3. Object Oriented Programming in C++ by Robert Lafore
4. Let Us C++, YashwantKanitk

BME102: ENGINEERING DRAWING AND GRAPHICS

Credits: 3

L T P
1 0 4

Pre-Requisites: BME122

Course Description:

The course aims to equip the students to make students familiar with the principles of this manufacturing process to produce the product. Engineering drawing is a powerful engineering language. It is the pillar that supports the engineering and technological framework. Furthermore, it serves as a connection between ideas and their execution.

This course includes cad & reverse engineering, liquid based and solid based additive manufacturing systems and medical and bio-additive manufacturing.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Demonstrate comprehensive knowledge of the broad range of AM processes, devices, capabilities and materials that are available.

Co2: Understand the various software tools, processes and techniques that enable advanced/additive manufacturing and personal fabrication.

Co3: Recognize how to create physical objects that satisfy product development/prototyping requirements, using advanced/additive manufacturing devices and processes.

CO4: Articulate the various tradeoffs that must be made in selecting advanced/additive manufacturing processes, devices and materials to suit particular product requirements.

CO5: Design and fabricate an actual multi-component object using advanced/additive manufacturing devices and processes.

Co6: Analyze the latest trends and business opportunities in AM, distributed manufacturing and mass customization

Course Content

UNIT I

Introduction: Overview – History - Need-Classification -Additive Manufacturing Technology in product development-Materials for Additive Manufacturing Technology – Tooling – Applications.

CAD & Reverse Engineering: Basic Concept – Digitization techniques – Model Reconstruction – Data Processing for Additive Manufacturing Technology.

UNIT II

Liquid Based and Solid Based Additive Manufacturing Systems: Classification – Liquid based system – Stereolithography Apparatus (SLA)- Principle, process, advantages and applications - Solid based system –Fused Deposition Modeling - Principle, process.

UNIT III

Powder Based Additive Manufacturing Systems: Selective Laser Sintering ,Principles of SLS process - Process, advantages and applications, Three Dimensional Printing - Principle, process, advantages and applications- Laser Engineered Net Shaping (LENS), Electron BeamMelting.

UNIT IV

Medical and Bio-Additive Manufacturing: Customized implants and prosthesis: Design and production. Bio-Additive Manufacturing- Computer Aided Tissue Engineering (CATE).

Text Books:

1. Chua C.K., Leong K.F., and Lim C.S., ―Rapid prototyping: Principles and applications‖, Third edition, World Scientific Publishers, 2010.

Suggested Readings:

1. Gebhardt A., ―Rapid prototyping‖, Hanser Gardener Publications, 2003.

2. Liou L.W. and Liou F.W., ―Rapid Prototyping and Engineering applications: A tool box for prototype development‖, CRC Press, 2007.

3. FDM Guide Book

List of Experiments:

1. Practical Demonstration of vacuum casting in MK Technology.

2. Practical Implementation and comparison of various Rapid Prototyping Technologies.

3. Practical Demonstration of FDM Printing.

4. To import CAD STL file of the part to be printed in Catalyst Software and set part orientation, units and scale.

5. To add the print model to pack and analyze model and support material requirement and time consumption for the printer.

6. To prepare the Work Table and set up the Material Cartridges in Dimension SST 1200ES for proper loading and unloading.

7. To send the print file to FDM Machine and produce the RP Model.

8. To perform machine maintenance and verify the stable condition of machine nozzles

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COM201: BUSINESS COMMUNICATION

Credits: 2

L T P
2 0 0

Pre-Requisites:NA

Course Objective:

1. To make students develop business writing etiquette in terms of formats.

2. To develop their reading skills and enhance their vocabulary

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

1. The students will be able to develop effective reading and writing skills.

2. The students will learn vocabulary and technical jargons as used in business communication.

Course Content

UNIT I

Communication& Interpersonal Skills: Process of Communication, Types of communication, Modes of Communication, Barriers to Communication, Delivering Effective PPT

UNIT II

Technical Writing: Memorandum, Notices, Blog Writing, Report Making, Minutes of Meeting, E- Mail, Press Note, Resume& Cover Letter, Formal Letter- Complaint Letter, Inquiry Letter, Confirmation Letter, Resignation Letter, Permission Letter,

UNIT III

Vocabulary Building: Misspell words; Techno based Acronyms, Word formation- prefix, suffix, Foreign Words, Phrases

UNIT IV

Functional Grammar: Conditional Sentences, Degrees of Comparison, Punctuation, Question Tags

Reference Book:

1. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

2. Study Writing. Liz Hamp-Lyons and Ben Heasly, Cambridge University Press.2006.

3. On Writing Well. William Zinsser. Harper Resource Book. 2001

4. Practical English Usage. Michael Swan. OUP. 1995.

BTC 121: ENGINEERING CHEMISTRY LABORATORY
Credits: 01

L T P
0 0 2

Pre-Requisites: NA

Course Description: The course aims to equip the students with experimental/practical knowledge of illustrating the principles of chemistry relevant to the study of science and engineering.

The course includes separation techniques, determination of ions in water, rate constants for chemical reactions, cell constants, conductometry, potentiometry, chemical analysis, saponification and chemical oscillations.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Estimate rate constants of reactions from concentration of reactants/products as a function of time

CO2: Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc

CO3: Synthesize a small drug molecule/polymer and analyze a salt sample

Co4: Analyses the inorganic salts and chromatography for separation of compounds.

List of Experiments:

Choice of 10-12 experiments from the following:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. Use of the capillary viscosimeters to demonstrate isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

BME123: WORKSHOP/MANUFACTURING PRACTICES
Credits: 2

L T P
0 0 4

Pre-Requisites: NA

Course Description:

The course aims to equip the students with experimental/practical knowledge of various tools and their application in carpentry, fitting and sheet metal.

This course includes various cutting, filling and joining and workshop practices

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Use one – way, two-way switches, parallel and series connections in house wiring.

CO2: Practices various joints of welding.

CO3: Make use of various fitting tool.

Co4: Perform Cold & Hot forging.

Course Content

UNIT I

Smithy Shop: Introduction; Forging tools and equipment, Hot working process; Cold working process. Forging operations in Smithy shop. Safety measures to be observed in the smithy shop. Introduction to various heat treatment processes e.g annealing, hardening, tempering, normalizing etc.

JOBS

1. To Make A Circular Ring by Cold Forming.
2. To Make A Chisel from Round Bar by Hot Forging.
3. To Forge A Cubical Shape from Round

UNIT II

Fitting Shop: Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. (e.g. Steel, Brass, Copper, Aluminium etc.).Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc. Description and demonstration of various types of work benches. holding devices and files. Safety Precautions while using tools. Description and demonstration of simple opoeration of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade. Introduction to various types of threads (internal, external)- single start, multi-start, left hand and right hand threads. Description and demonstration of various types of drills, taps and dies Selection of dies for threading, selectionof drills and taps for tapping operations.

JOBS

* Prepare a template of given size by hack sawing and filing.
* Prepare a job having internal and external threads.

UNIT III

Electric Shop: Introduction; various electrical materials, Tools & Various electrical instruments used in electric shop, Concept of wiring. Introduction to the construction of a Lead- acid battery and its working. Installation of a battery and to connect two or more batteries in series and in parallel, Charging of a battery and testing it with the help of hydrometer and Cell Tester. Importance of three-phase wiring and its effectiveness. Estimating and costing of power

connection, Safety Measures during electrical works

JOBS

1. To Make Series and Parallel Connections.
2. Domestic Wiring – Connecting Lamp and Fan
3. Stair Case Wiring (2way).
4. Charging and Testing of Battery.

UNIT IV

Welding Shop: Introduction; Types of welding; introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, Electrode holder, electrodes and their specifications, welding screens and other welding related equipment and accessories. Types of welding joints, Concept of Gas welding; Arc welding; MIG welding; TIG welding; Spot welding, Seam welding, Different welding position, Soldering and Brazing. Safety measures during welding operations.

JOBS

1. Practice Arc Welding.
2. Prepare Lap Joint with Arc Welding.
3. Prepare Butt Joint.
4. Prepare T Joint.

RECOMMENDED BOOKS

1. Workshop Technology Part 1-3 by Chapman W A J , Viva Books Pvt. Ltd, New Delhi
2. Work Shop Technology byRaghuwanshi R S, Dhanpat Rai and Sons, New Delhi
3. Production Technology by Jain R K, Khanna Publishers, New Delhi

COM221: BUSINESS COMMUNICATION LABORATORY

Credits: 2

L T P
0 0 2

Pre-Requisites:NA

Course Description:

1. To sharpen listening and speaking skills for workplace.
2. To teach effective conversational skills required in professional environment

Course Outcomes (CO):

1. The students will be able to develop effective reading and writing skills.
2. The students will learn vocabulary and tecAfter completion of this course students will be enable to -

CO1: The students will be able to develop thorough knowledge of professional communication
CO2: The students will be able to make and deliver effective presentations

Course Content

UNIT I

Listening Skills: Listening Exercises on Journeys (Unit 7), Fit and healthy (Unit 8), Clothes and shopping (Unit 9), Communication (Unit 10), Entertainment (Unit 11) and Travel (Unit 12)

UNIT II

Presentation Skills: Making PPT and Presenting Power Point PresentationM

UNIT III

Phonological Skills: Pronunciation, syllables and word stress.

UNIT IV

Speaking Skills: Cambridge English Empower Elementary Student's Book by Cambridge University Press

Suggested Readings:

1. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
2. Study Writing. Liz Hamp-Lyons and Ben Heasly, Cambridge University Press.2006.
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Practical English Usage. Michael Swan. OUP. 1995.

BCS 322: OBJECT ORIENTED PROGRAMMING LABORATORY
Credits: 1

L T P
0 0 2

Course Description:
The course aims to equip the students with the basic programming and error correction. The course helps students to solve real life problems.
This course includes OOPs Concepts, Loops, Array, function, recursion, pointers, structures and develop a mini project.

Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
Co1: Identify and correct logical errors encountered at run time.
CO2: Design real world applications by developing programming skills.
CO3: Demonstrate the use of various OOPs concepts with the help of programs.
CO4: Develop programs with reusability.

List of Experiments
1. Problem solving using computers: Familiarization with programming environment
2. Variable types and type conversions: Simple computational problems using arithmetic expressions
3. Branching and logical expressions: Problems involving if-then-else structures
4. Loops, while and for loops: Iterative problems e.g., sum of series
5. 1D Arrays: searching, sorting: 1D Array manipulation
6. 2D arrays and Strings, memory structure: Matrix problems, String operations
7. Functions call by value: Simple functions
8. Recursion, structure of recursive calls: Recursive functions
9. Pointers, structures and dynamic memory allocation: Pointers and structures
10. Object Oriented Concepts: Polymorphism, abstraction, inheritance, encapsulation File handling: File operations
11. Create a small project using C++ like Tic-tac-toe, Quiz Game, Hangman

UHV001: UNIVERSAL HUMAN VALUES
Credits: 3

L T P
3 0 0

Course Description:
The course aims to equip the students with understanding about the role and importance of human values and ethics in personal, social and professional life.

The course introduces the student to enable students to understand and appreciate ethical concerns relevant to modern lives, to help students develop sensitivity and awareness; leading to Commitment and courage to act on their own belief.

Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
CO1: Analyze the significance of value inputs provided in formal education along with skills and develop a broader perspective about life and education.
CO2: Formulate their aspirations and concerns at different levels of living, and the way to fulfill them in a sustainable manner.
CO3: Evaluate their current state of understanding and living, and model a healthy lifestyle.
Co4: Examine the issues of home sickness, interactions with seniors on the campus, peer pressure with better understanding and feel grateful towards parents, teachers and others.
CO5: Develop more confidence and commitment for value-based living in family, society and nature.

Course Content
UNIT I
Introduction to value education: understanding the need, basic guidelines, Concept of Human Values: Meaning and Importance of Values, basic human aspiration, Method to fulfill the basic aspiration- SVDD, SSDD, SSSS, Understanding and living in harmony at various levels.

UNIT II
Right Understanding (Knowing)- Knower, Known & the Process The domain of right understanding starting from understanding the human being (the knower, the experiencer and the doer) and extending up to understanding nature/existence – its interconnectedness and co-existence; and finally understanding the role of human being in existence (human conduct).

UNIT III
Understanding Harmony in the Family: Relationships, harmony, Emotions and Feelings, understanding harmony in the Family-The basic unit of human interaction, Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between Intention and Competence and other salient values in relationship.

Understanding Harmony in the Society: Comprehensive human goal, Universal human order, Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha)- from family to world family.

UNIT IV
Understanding Harmony in the Society: Comprehensive human goal, Universal human order, Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha)- from family to world family.

UNIT V

Understanding Human Being: Understanding the human being comprehensively as the first step and the core theme of this course; human being as co-existence of the self and the body; the activities and potentialities of the self; Basis for harmony/contradiction in the self.

Understanding harmony in Nature: Understanding the harmony in the Nature, Orders in nature, Interconnectedness and mutual fulfillment among the four orders of nature. Ethical living: - Ethical human conduct, Professional Ethics.

Suggested Readings:

1. R R Gaur, R Sangal,G P Bagaria, 2009, A Foundation Course in Value Education
2. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books
3. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA.

Second Year

BCS 301: DATA STRUCTURE & ALGORITHMS
Credits: 3

L T P
3 0 0

Course Description:

The course aims to equip the students with the basic concepts of data structures and algorithms. The course includes concepts about searching and sorting techniques, the basics stacks, queues, lists, trees and graphs, and to enable the students to solve problems with the help of fundamental data structures.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Analyze the algorithms to determine the time and computation complexity and justify the correctness

CO2: Implement linear search and binary search for a given search problem

CO3: Determine the time and computation complexity for a given problem of Stacks, Queues and linked lists

CO4: Implement Graph search and traversal algorithms and determine the time and computation complexity.

Course Content
UNIT I

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT II

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT III

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

UNIT IV

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms andcomplexity analysis

Recommended Books / Suggested Readings:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni, Computer Science Press.

2. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

3. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education

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BCS 209: BASICS OF PYTHON
Credits: 3

L T P
3 0 0

Course Description:

The course aims to equip the students with the basic concepts of Python programming language. The Python programming language which is one of the most popular programming languages worldwide.

The course includes basic concepts of Python, functions, Data Collections and Language Component, Object and Classes, I/O and Error Handling in Python and Applications.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.

CO2: Demonstrate proficiency in Exceptions, and File Systems.

CO3: Interpret the concepts of Object-Oriented Programming as used in Python.

CO4: Illustrate uses of conditional and iterative statements in Python programs.

Course Content

UNIT I

Introduction to Python Language, Strengths and Weaknesses, Installing IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Built In Functions

UNIT II

Data Collections and Language Component: Introduction, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical Operators, Boolean Operators, Bit Wise Operators, The while Loop, break and continue, The for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections

UNIT III

Object and Classes: Classes in Python, Principles of Object Orientation, Creating Classes, Instance Method, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes

UNIT IV

Functions and Modules: Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function,Mapping Functions in a Dictionary, Lambda, Modules, Standard Modules – sys, Standard Modules – math, Standard Modules – time, The dir Function

UNIT V

I/O and Error Handling in Python: Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions

UNIT VI

Applications of Python(Data Science/ Cyber/ Cloud): Importance of learning data analysis in python, Building Predictive Models, Python Data Structures, Python Libraries. Python programming and packages, Installation of Jupyter/PycharmNotebook and Google colab Control Statement, Object oriented programming in Python, Installation of different packages Brief introduction of Packages of Python for different applications. Django: Introduction, Apps, Models and Views and URL Structure

Reference Book:

1. Dive into Python, Mike
2. Learning Python, 4th Edition by Mark Lutz
3. Programming Python, 4th Edition by Mark Lutz

BEE302: DIGITAL CIRCUITS AND LOGICAL DESIGN

Credits: 3

L T P
3 0 0

Course Description:

The course aims to equip the students with the formal procedures for the analysis and design of combinational and sequential circuits.

The course includes introduction to basic postulates of Boolean algebra and shows the correlation between Boolean expressions, introduce the methods for simplifying Boolean expressions and also introduce the concept of memories and programmable logic devices.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Apply the knowledge of digital number systems, Boolean algebra, and logic gates for logic function minimization.

CO2: Analyze different methods used for simplification of Boolean expressions.

CO3: Design and implement Combinational and Sequential circuits.

CO4: Describe different types of memories and their applications.

Course Content

UNIT I

Number Systems and Boolean Algebra: Number systems, Binary addition and Subtraction, Subtraction using 1's & 2's complements and using 9's &10'scomplements, Binary codes, Error detecting and Correcting codes, Theorems of Boolean algebra, Canonical forms, Logic gates.

UNIT II

Combinational Circuits: Representation of logic functions, Simplification using Karnaugh map, Tabulation method, Implementation of combinational logic using standard logic gates, Multiplexers and DE multiplexers, Encoders and Decoders, Code Converters, Adders, Subtractors, Parity Checker and Magnitude Comparator

UNIT III

Sequential Circuits: Flip flops SR, JK, D and T flip flops Level triggering and edge triggering, Excitation tables Counters –Asynchronous and synchronous type modulo counters, design with state equation state diagram, Shift registers, type of registers, circuit diagrams.

UNIT IV

Digital Logic Families: Introduction to bipolar Logic families: RTL, DCTL, DTL, TTL, ECL and MOS Logic families: NMOS, PMOS, CMOS, Details of TTL logic family -Totempole, open collector outputs, TTL subfamilies, Comparison of different logic families.

UNIT V

D/A and A/D Converters: Weighted resistor type D/A Converter, Binary ladder D/A converter, Steady state accuracy test, D/A accuracy and resolution, Parallel A/D Converter, counter type A/Dconverter, Successive approximation A/D converter, Single and Dual slope A/D converter, A/D accuracy and resolution.

Recommended Books / Suggested Readings:

1. Wakerly J F, Digital Design: Principles and Practices, Prentice-Hall, 2nd Ed., 20022.

2. D. D. Givone, Digital Principles and Design, Tata Mc-Graw Hill, New Delhi, 2003.

3. S. Brown and Z. Vranesic, Fundamentals of Digital Logic with Verilog Design, Tata Mc-Graw Hill, 2008.

BTM 302: MATHEMATICS – III (PROBABILITY AND STATISTICS)

L T P
3 0 0

Credits: 4

Pre-Requisites: NA

Course Description:

The course aims to equip the students with the ability to familiarize the students with statistical techniques and to equip them with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Understand the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

Co2: Implement the basic ideas of statistics including measures of central tendency, correlation and regression.

CO3: Identify the statistical methods of studying data samples.

Co4: Apply the basic ideas of statistics including Curve fitting by method of least squares and testing of significance.

Course Content

UNIT I

Basic Probability: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, Expectation of Discrete Random Variables, Moments, Variance of a sum

UNIT II

Continuous Probability Distributions: Continuous random variables and their properties, distribution functions.

Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions

Bivariate Distributions: Bivariate distributions and their properties, distribution of sums and quotients, Bayes' rule.

UNIT III

Basic Statistics: Measures of Central tendency: Moments, skewness and Kurtosis - Correlation and regression – Rank correlation

UNIT IV

Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Small samples: Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).

3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968

Suggested Readings:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

3. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

DOS001: FOUNDATION COURSE IN HUMANITIES
(Development of Societies/Philosophy)

L T P
3 0 0

Credits: 3

Course Description:

This course will introduce you to some of the main areas of contemporary philosophy. This course will be an introductory overview of several different areas of philosophy.

Course Content

UNIT I

Social Development:

1. Concepts behind the origin of Family, Clan and Society
2. Different Social Systems
3. Relation between Human being and Society
4. Comparative studies on different models of Social Structures and their evolution

UNIT II

Political Development:

1. Ideas of Political Systems as learnt from History
2. Different models of Governing system and their comparative study

UNIT III

Economic Development:

1. Birth of Capitalism, Socialism, Marxism
2. Concept of development in pre-British, British and post British period-Barter, Jajmani
3. Idea of development in current context.
4. E. F. Schumacher's idea of development, Buddhist economics. Gandhian idea of development. Swaraj and Decentralization.

BCS321: DATA STRUCTURE & ALGORITHMS LABORATORY
Credits: 1

L T P
0 0 2

Course Description:
The course aims to equip the students with the basic concepts of data structures and algorithms.
The course includes the implementation of various searching and sorting technique along with space and time complexity

Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
CO1: Analyze the working of various data structures
CO2: Implement linear search and binary search for a given search problem
CO3: Implement solutions for the problem of Stacks, Queues and linked lists
CO4: Write programs for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity
CO5: Implement Graph search and traversal algorithms with the help of programs

List of Experiments
1. **Linear Search**
2. **Binary Search**
3. **Stacks**
4. **Queues:** Simple, Circular, Priority
5. **Linked Lists:** Singly linked list, Doubly Linked List, Circular Linked List
6. **Trees:** Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree
7. **Sorting and Hashing:** Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort
8. **Graph:** Graph search and traversal

BCS 222: PYTHON LABORATORY
Credits: 1

L T P
0 0 2

Course Description: The Python programming language which is one of the most popular programming languages worldwide. The course shows you how to use the free open-source Python to write basic programs and Python, functions, variables, If Else statements, For loops, While loops, iterative and recursive programs and algorithms such as the Insertion Sort algorithm.

Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
CO1: Apply the principles python programming.
CO2: Write clear and effective python code.
CO3: Create applications using python programming.
CO4: Develop and use Web Services using python.

List of Experiments
1. Write python program to print Hello World
2. Write python program to Hello World using string variable
3. Write python program to store data in list and then try to print them.
4. Write python program to do basic trim and slice on string.
5. Write python program to print list of numbers using range and for loop
6. Write python program to store strings in list and then print them.
7. Write python program to let user enter some data in string and then verify data and print welcome to user.
8. Write python program in which a function is defined and calling that function prints Hello World
9. Write python program in which a function (with single string parameter) is defined and calling that function prints the string parameters given to function.
10. Write python program in which a class is define, then create object of that class and call simple print function define in class.

BTCY301: FUNDAMENTALS OF CYBER AND NETWORK SECURITY

Credits: 1

L T P
3 0 0

Course Description:
This course provides the foundation for understanding the key issues associated with protecting information assets. The purpose of the course is to provide the student with an overview of the field of information security and assurance

Course Outcomes (CO):
This course will develop students 'knowledge in/on...

CO1: Analyze the broad set of technical, social & political aspects of Cyber Security.

CO2: Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure.

Co3: Describe the importance of ethical hacking tool.

CO4: Implement the ethical hacking process.

Contents:

UNIT I
INTRODUCTION TO CYBER SECURITY - Importance and challenges in Cyber Security - Cyberspace- Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism – Cyber Securityof Critical Infrastructure -Cyber security –Organizational Implications.

UNIT II
HACKERS AND CYBERCRIMES: Types of Hackers- Hackers and Crackers, Profile, Malicious Software: Viruses, Worms, System Corruption, Attack Agents, Information Theft, Keyloggers, Phishing, Spyware Payload Stealthing, Backdoors, Rootkits, Distributed Denial of Service Attacks, Bots and Botnets.

UNIT III
ETHICAL HACKING AND SOCIAL ENGINEERING: Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance – Threat Modeling-Enterprise Information Security Architecture-Vulnerability Assessment and Penetration, Testing-Types of Social Engineering-Insider Attack- Preventing Insider Threats-SocialEngineering Targets and Defense Strategies.

UNIT IV
NETWORK SECURITY: IP Security Overview, IP Security Policy, IPV4, IPV6, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange (IKE), DHCP, NAT, DNS, FQDN, IoT.

UNIT V
CRYPTOGRAPHY: Basic of cryptography, including conventional and public-key cryptography, hash functions, authentication, and digital signatures. Key Management and Distribution: SymmetricKey Distribution, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure, certificate Authority (CA), SSH and SSL

Text Books:
1. Donaldson,S.,Siegel,S.,Williams,C.K.,Aslam,A.,"EnterpriseCybersecurity –How to Build a Successful Cyber defense Program against Advanced Threats", Apress, 1st Edition, 2015.
2. Nina Godbole, Sumit Belapure, "CyberSecurity", Willey, 2011.
3. Roger Grimes,"Hacking the Hacker", Wiley, Ist Edition,2017.
4. Cyber Law By Bare Act, Govt of India, IT Act 2000

BCS501: COMPUTER NETWORKS

Credits: 3

L T P
3 0 0

Suggested Books:
1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition
4. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India
5. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America

Course Description:
The course aims to equip the students with understanding of modern network architectures from a design and performance perspective.
The course introduces the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs), to provide an opportunity to do network programming, to provide a WLAN measurement idea.

Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
CO1: Discuss the features of computer networks, protocols and network design models.
CO2: Select appropriate congestion control techniques and Quality of Service requirements for a network.
Co3: Illustrate the functions and protocols of network layer, transport layer and application layer in inter-networking.
CO4: Analyze the services and features of various protocol layers in data networks.

Course Content:

UNIT I

Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division; Time division and Wave division, Concepts on spread spectrum.

UNIT II

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

UNIT III

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT IV

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT V

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

BCS521: COMPUTER NETWORKS LABORATORY
Credits: 1
L T P
0 0 2

Course Objectives:
1. To develop an understanding of modern network architectures from design and performance perspective
2. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs)
3. To do network programming
4. To provide a WLAN measurement idea

Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
CO1: Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
CO2: Design for a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) based on the market available component.
CO3: Develop network programming for a given problem related to TCP/IP protocol.
CO4: Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open-source available software and tools.

List of Experiments:

1. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc
3. Preparing straight and cross cables.
4. Configuration of TCP/IP Protocols in Windows.
5. Connect two computers with each other and ping in packet Tracer.
6. Connect with other computers in LAN (Configure the IP address and How to Connect with Other Pcs).
7. Distinguish between Hub and Switch using packet Tracer.
8. Configure network Topologies using packet tracer software.
9. Configure a hybrid network (wired and wireless) in packet tracer.
10. Configure a network using Routers, Switches, Access Points to show the functionality of LAN with
12. Configure a Network and verify ARP protocol.
13. Network Commands (ping, trace route, DNS tools, Telnet, IP config, FTP clients).
14. Configure Network using DHCP protocol.
15. Configure an ICMP protocol on Packet Tracer.
16. Configure Network using various Routing protocol like., RIP.
17. Subnet planning and its implementation.
18. Implementation of various LAN protocols and configurations

BEE322: DIGITAL CIRCUITS AND LOGICAL DESIGN LABORATORY
Credits: 1
L T P
0 0 2

Course Description: The course aims to equip the students with practical experience in design, realization and verification of Dorgan's Theorem, SOP, POS forms.

The course includes Full/Parallel Adders, Subtractors and Magnitude Comparator, Multiplexer using logic gates, Demultiplexers and Decoders, Flip-Flops, Shift registers and Counters.

Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
Co1: Demonstrate the truth table of various expressions and combinational circuits using logic gates.
CO2: Design, test and evaluate various combinational circuits such as adders, subtractors, comparators, multiplexers and de-multiplexers
CO3: Construct flips-flops, counters and shift registers.
Co4: Develop a digital logic and apply it to solve real life problems.

List of Experiments:
FACULTY OF ENGINEERING, DESIGN AND AUTOMATION
B. TECH COMPUTER SCIENCE AND ENGINEERING (CLOUD COMPUTING)2022-2023
1. Design and verification of the truth tables of Half and Full adder circuits
2. Design and verification of the truth tables of Half and Full subtractor
3. Design and implementation of 4-bit binary Adder/ Subtractor and BCD adder using IC7483
4. Design and implementation of code converters using logic gates
a. BCD to excess-3 code
b. Binary to gray code
5. Verification of the truth table of the Multiplexer using IC 74150
6. Verification of the truth table of the De-Multiplexer using IC 74154
7. Design and test of an SR flip-flop using NOR/NAND gates
8. Verify the truth table of a D flip-flop (7474) and JK flip -flop (7476)
9. Verification of the results of 3-bit synchronous up/down counter
10. Verification of 4-bit ripple counter and Mod -10 / Mod-12 Ripple counters
11. Operate the universal shift register 74194
12. Operate a 7 segment LED display through a counter using a low frequency clock.

BCS401: OPERATING SYSTEMS
Credits: 3

L T P
3 0 0

Course Description: The course aims to equip the students with the fundamentals of Operating Systems.

The course includes the mechanisms of OS to handle processes and threads and their communication, mechanisms involved in memory management in contemporary OS, knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Distinguish concepts related to processes, threads, process scheduling, race conditions and critical sections.

CO2: Develop techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time for a given specification of memory organization

CO3: Design and implement file management system

CO4: Illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems.

CO5: Develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Course Content:

UNIT I

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

UNIT II

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits ofthreads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

UNIT III

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

UNIT IV

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

UNIT V

Memory Management: Basic concept, Logical and Physical address map, Memory allocation:

Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set , Dirty page/Dirty bit

– Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT VI

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

Recommended Books / Suggested Readings:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
5. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
6. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

BCS542: LINUX AND SHELL PROGRAMMING

Credits: 3

LTP
300

Course Description: This course explains the fundamental ideas behind the open source operating system approach to programming. Knowledge of Linux helps to understand OS level programming. Like the successful computer languages that came before, Linux is the blend of the best elements of its rich heritage combined with the innovative concepts required by its unique environment. This course involves kernel concepts, basics commands, shell scripting, file processing, Socket programming, Processes, Inter process communication.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.

CO2: Write Shell Programming using Linux commands.

CO3: Design and write application to manipulate internal kernel level Linux File System.

CO4: Develop IPC-API's that can be used to control various processes for synchronization.

CO5: Develop Network Programming that allows applications to make efficient use of resources available on different machines in a network.

Course Content:

UNIT I

INTRODUCTION TO LINUX AND LINUX UTILITIES: A brief history of LINUX, architecture of LINUX, features of LINUX, introduction to vi editor. Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio

UNIT II

INTRODUCTION TO SHELLS: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.

UNIT III

UNIX FILE STRUCTURE: Introduction to UNIX file system, inode (Index Node), file descriptors, system calls and device drivers.

GREP: Operation, grep Family, Searching for File Content. Sed :Scripts, Operation, Addresses, commands, Applications, grep and sed.

File Management : File Structures, System Calls for File Management – create, open, close, read, write,lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

UNIT IV

PROCESS AND SIGNALS: Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks

UNIT V

INTER PROCESS COMMUNICATION: Pipe, process pipes, the pipe call, parent and child processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget, msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands.

INTRODUCTION TO SOCKETS: Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications.

Reference Books:

1. Linux System Programming, Robert Love, O'Reilly, SPD.

2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.

3. UNIX Network Programming, W.R. Stevens, PHI. UNIX for Programmers and Users, 3rd Edition, Graham Glass, King Ables, Pearson Education

BCS303: COMPUTER ORGANIZATION & ARCHITECTURE

Credits: 3

LTP
300

Course Description: The course aims to equip the students with the basic principles of computer architecture. The course includes concepts of Instruction Level Architecture, the art in memory system design and the knowledge of micro programming.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.

CO2: Write assembly language program for specified microprocessor for computing 16-bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication)

CO3: Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.

CO4: Design a memory module, given a CPU organization and instruction, and analyze its operation by interfacing with the CPU

CO5: Assess performance of a given CPU organization, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

Course Content:

UNIT I

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs. Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

UNIT II

Introduction to 8085architectures: Introduction to Microprocessors, microcontroller; 8085 Microprocessor Architecture, pin description, Bus concept and organization; concept of multiplexing and de-multiplexing of buses; concept of static and dynamic RAM, type of ROM, memory map.8085 Microprocessor interfacing: 8255 Programmable Peripheral Interface, 8254 programmable interval timer, interfacing of Input/output device, 8279 Key board/Display interface.

UNIT III

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

UNIT IV

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

UNIT V

Semiconductor Memories: Memory organization, Classification, and characteristics of memories, Sequential memories, ROMs, R/W memories, Content Addressable memories, Charged-Coupled Device memory, PLA, PAL and Gate Array.

Recommended Books / Suggested Readings:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier

2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

3. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill

4. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education

5. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education

BTM402: DISCRETE MATHEMATICS

Credits: 4

L T P
3 1 0

Course Description: The course aims to equip the students with the ability to construct and understand mathematical proofs. The course includes set theory, relation, function, combinatorics, graph theory, trees.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

Co1: Implement the working with mathematical notation and common concepts in discrete mathematics.

Co2: Understand the basic concepts in set theory, logic, combinatorics, and graph theory.

CO3: Identify the challenges for theoretical Computer Science and its contribution to other sciences.

Course Content:

UNIT I

Sets, relations and functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses.

Relation: Definition, types of relation, composition of relations, Inverses

Function: Definition and types of function, composition of functions, Inverses.

UNIT II

Propositional logics: Introduction to first order logic and first order theory, Syntax and Semantics, proof systems, satisfability, validity, soundness, completeness, deduction theorem etc.

Partially ordered sets: Complete partial ordering, chain, and lattice, complete, distributive, modular and complemented lattices. Boolean lattices.

UNIT III

Algebraic Structures: Algebraic structures with one binary operation – semi-group; monoid and group; cosets; Lagrange theorem; normal subgroup; homomorphic sub-group congruence relation and quotient structures, error correcting code; algebraic structures with two binary operations; ring; integral domain and field; Boolean algebra and Boolean ring (Definition and simple examples)

UNIT IV

Introduction to Counting: Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions.

Introduction to Graphs: Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees- All definitions and simple example.

Recommended Books / Suggested Readings:

1. Liu C.L., Elements of Discrete Mathematics, McGraw Hill Int. edn.

2. Kolman B & Busby C.R., Discrete Mathematical Structure for Computer Science, Prentice Hall of India Ltd.

3. Seymour Lipschutz, M. Lipson, "Discrete Mathematics" Tata Mc Graw Hill, 2005. 4. Deo N.,

Graph Theory, Prentice Hall of India.

4. Trembley J.P. & Manohar R., Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill.

BCS402: JAVA PROGRAMMING

Credits: 3

LTP
300

Course Description: The course aims to equip the students with fundamentals of object-oriented programming in Java. The course includes as variables, conditional and iterative execution, methods in JAVA, fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.

CO2: Use object-oriented programming concepts such as classes, objects, constructors, data hiding, inheritance and polymorphism to solve a given problem.

CO3: Implement the inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.

CO4: Illustrate how robust programs can be written in Java.

CO5: Write Graphical User Interface based application programs by utilising event handling features and Swing in Java.

Course Content:

UNIT I

Introduction: The Evolution of Java, Object-Oriented Programming Concepts and Java, Two paradigms, Differences between C++ and Java, The Primary Characteristics of Java, The Architecture, Java class libraries, Java Virtual Machine, Data types, Tokens, Literals, Variable and scope, Symbolic Constants, Data type, Type casting, Operators, Wrapper classes, Installation of Java and IDE(Netbeans/Eclipse)

Control Statements: Introduction, Control Statements, Sequence Control Statement, Decision Control Statement, Case Control Statement, Iteration Control Statement, Jump in Loops, Labeled Loops.

UNIT II

Arrays: Introduction, Array, Need Of Array, Types Of Array, One Dimensional Array, Multidimensional Array, Memory representation of Arrays.

Strings: Introduction, String Methods, String Buffer.

Classes: Introduction, Defining A Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Call By Value And Call By Reference, Recursion, Access Control, Constructors, Method Overloading, Constructor Overloading, Garbage Collection, Finalize( ) Method, This Keyword, Static Members, Nesting Of Methods.

UNIT III

Inheritance: Inheritance, Types of Inheritance, Using Super, Constructor -Order Of Execution In Inheritance, Overriding Methods, Final Keyword, Abstract Methods and Classes, Visibility Control Interface

Packages and Interfaces: Defining, Creating and Accessing a Package, Understanding CLASS PATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces

Exception handling: Exception handling fundamentals, Exception types, Uncaught Exceptions

Usingtry and catch, multiple catch clauses, nested try statements throw, finally Java built in exception creating your own exception sub classes, using exceptions

UNIT IV

Multithreaded Programming: The Java thread model, the main thread, creating thread, creating multiple thread, using isalive(), yield(), sleep() and join(). Thread priorities, synchronization, inter thread communications, daemon threads, suspending, resuming and stopping threads.

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

UNIT V

Applets: Applets basics, Applets HTML tags and attributes, Inter-applet communication

AWT & Swing: Introduction, Components AWT, Introduction to Swing, limitations of AWT, MVC architecture, components, containers, exploring swing-JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons, JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

Recommended Books / Suggested Readings:

1. Java 2: The Complete Reference by Tata McGraw Hill
2. Head First Java by Kathy Sierra
3. Core Java-I (Addison Wesley) by Horstmann
4. Thinking in Java by Bruce Eckel
5. Java: How to program by Deitel & Deitel Modern Operating Systems - Andrew S. Tenenbaum, Pearson Education Asia / PHI

BCS502: DATABASE MANAGEMENT SYSTEMS

L T P
3 0 0

Credits: 3

Course Description: The course aims to equip the students with understanding of different issues involved in the design and implementation of a database system. The course introduces the student to study the physical and logical database designs, database modeling, relational, hierarchical, and network models ,to understand and use data manipulation language to query, update, and manage a database, to develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing, to design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Write relational algebra expressions for that query and optimize the developed expressions.

CO2: Design the databases using ER method and normalization.

CO3: Construct the SQL queries for Open source and Commercial DBMS - MYSQL, ORACLE, and DB2.

CO4: Execute using Query optimization algorithms for a given query optimize

CO5: Determine the transaction atomicity, consistency, isolation, and durability in a transaction-processing system.

CO6: Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Course Content:

UNIT I

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object-oriented data models, integrity constraints, data manipulation operations.

UNIT II

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

UNIT III

Storage strategies: Indices, B-trees, hashing.

UNIT IV

Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

UNIT V

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC

models, Intrusion detection, SQL injection.

UNIT VI

Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining, No SQL

Recommended Books / Suggested Readings:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India

2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press

3. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education

4. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

BCS421: OPERATING SYSTEMS LABORATORY
Credits: 1

L T P
0 0 2

Course Description: The course aims to equip the students with shell programming and the use of filters in the UNIX environment

The course includes programming in C using system calls, file system related system calls, implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Implement deadlock avoidance, and Detection Algorithms

CO2: Compare the performance of various CPU Scheduling Algorithm

CO3: Critically analyze the performance of the various page replacement algorithms

List of Experiments:

- Simulate the following cpu scheduling algorithms: a) FCFS b) SJF c) Round Robin d)Priority
- Simulate the file allocation strategies: a) Sequential b) Indexed c) Linked
- Simulate MVT and MFT
- Simulate all File Organization techniques A) Single level directory b)Two level c)Hierarchical d)DAG
- Simulate Bankers Algorithm for Deadlock Avoidance
- Simulate Bankers algorithm for Deadlock Prevention
- Simulate all page replacement Algorithms a)FIFO b) LRU c) LFU
- Simulate Paging Technique of memory management.
- Write a C program to stimulate the following contiguous memory allocation techniques a) Worst-fit b) Best fit c) First fit to simulate the following contiguo us memory
- Write a C program to stimulate the disk scheduling algorithms. a) FCFS b) SCAN c) C-SCAN
- Write a C program to simulate optimal page replacement algorithms
- Write a C program to simulate the concept of Dining-Philosophers problem.

BCS 522: DATABASE MANAGEMENT SYSTEMS LABORATARY
Credits: 1

L T P
0 0 2

Course Description: The course aims to equip the students with an understanding of different issues involved in the design and implementation of a database system.

The course introduces the student to study the physical and logical database designs, database modeling, relational, hierarchical, and network models, to understand and use data manipulation language to query, update, and manage a database, to design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Write relational algebra expressions for that query and optimize the developed expressions for a given query.

CO2: Construct the SQL queries for Open source and Commercial DBMS - MYSQL, ORACLE, and DB2.

CO3: Optimize its execution using Query optimization algorithms for a given query.

CO4: Execute triggers, cursors, and stored procedures in PL/SQL.

List of Experiments:

1. Introduction to SQL and installation of SQL Server / Oracle /DB2

2. Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements

3. Working with Null Values, matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements

4. Set Operators, Nested Queries, Joins, and Sequences

5. Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands

6.PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters

7. Stored Procedures and Exception Handling. Triggers and Cursor Management in PL/SQL.

BCS422: JAVA PROGRAMMING LABORATORY

Credits: 1

LTP
0 0 2

Course Overview: A Java Programming lab manual is intended to provide a basic knowledge of java programming for students. To develop software development skills in java programming and Students will have the proficiency to develop projects in java programming. The course helps the students to solve the interdisciplinary applications through java programming.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism.

CO2: Utilise datatypes, operators, control statements, built in packages & interfaces, Input/ Output Streams and Files in Java to develop programs.

CO3: Design, code and debug various programs in Java Programming Language.

CO4: Write Graphical User Interface based application programs by utilizing event handling features and Swing in Java

List of Experiments:

1. Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.

2. The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.

3. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer. (use Scanner class to read input)

4. Write a Java program to multiply two given matrices.

5. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)

6. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.

7. Write a Java program for sorting list of names. Read input from command line.

8. Write a Java program to make frequency count of words in a given text.

9. Write a Java programthat implements Quick sort algorithm for sorting a list of names in ascending order

10. Write a Java program to create a Student class with following fields i. Hall ticket number ii. Student Name iii. Department Create 'n' number of Student objects where 'n' value is passed as input to constructor.

11. Write a Java program to demonstrate String comparison using == and equals method.

12. Write a java program to create an abstract class named Shape that contains an empty method named number Of Sides ( ).Provide three classes named Trapezoid, Triangle and Hexagon suchthat each one of the classes extends the class Shape. Each one of the classes contains only the method number Of Sides ( ) that shows the number of sides in the given geometrical figures.

13. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using JTable component.

14. Write a Java program to read copy content of one file to other by handling all file related exceptions.

15. Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

16. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

17. Write a Java program that displays the number of characters, lines and words in a text file.

18. Write a Java program that creates three threads. First thread displays "Good Morning" everyone second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.

19. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

20. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.

21. Write a Java program for handling mouse events.

22. Write a Java program for handling key events using Adapter classes

23. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts.

24. Write a Java program that allows the user to draw lines, rectangles and ovals.

25. Develop simple calculator using Swings.

26. Develop a game e.g. Ball game, Cannon game, Pinball game, tic tac toe, hangman etc.

27. Mini Project

BCS524: LINUX AND SHELL PROGRAMMING LABORATORY

Credits: 1

L T P
0 0 2

Course Description: The course aims to equip the students with basic UNIX/Linux commands from the command line (from a terminal window) and to know how to use UNIX/Linux resources to find additional information about UNIX/Linux command The course introduces the student to be knowledgeable enough about basic UNIX/Linux shell scripting to be able to successfully read and write bash shell scripts.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Use command substitution to capture program output.

CO2: Use conditional statements to control the execution of shell scripts. CO3: Write shell scripts to perform repetitive tasks using while and for loops.

CO4: Design and implement shell functions.

CO5: Customize their UNIX/Linux working environment CO6: Identify and process command-line arguments.

List of Experiments:

1. Experiment 1 (Basic commands)

I. Installation of Unix/Linux operating system.

II. Study of logging/logout details.

III. Study of Unix/Linux general purpose utility command list obtained from (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands.

IV. Study of vi editor

V. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.

VI. Study of Unix/Linux file system (tree structure).

VII. Study of. bashrc, /etc/bashrc and Environment variables.

2. Experiment 2 (Shell scripts)

I. Write a shell script program to display list of user currently logged in.

II. Write a shell script program to display "HELLO WORLD".

III. Write a shell script program to develop a scientific calculator.

IV. Write a shell Script program to check whether the given number is even or odd.

V. Shell script Program to search whether element is present is in the list or not.

3. Experiment 3 (Shell scripts and sed)

I. Shell script program to check whether given file is a directory or not.

II. Shell script program to count number of files in a Directory.

III. Shell script program to copy contents of one file to another.

IV. Create directory, write contents on that and Copy to a suitable location in your home directory.

V. Use a pipeline and command substitution to set the length of a line in file to a variable.

VI. Write a program using sed command to print duplicated lines of Input.

4. Experiment 4 (grep, awk, perl scripts)

I. (a) Write a grep/egrep script to find the number of words character, words and lines in a file.

(b) Write an awk script to develop a Fibonacci series.

II. (a) Write a perl script to compute the power of a given number.

(b) Write an awk script to display the pattern of given string or number.

III. (a) Write a perl script to check a number is prime or not.

(b) Write an egrep script to display list of files in the directory.

5. Experiment 5 (programming)

I. Write a shell script program to display the process attributes.

II. Write a shell script to change the priority of processes.

III. Write a shell script to change the ownership of processes.

IV. Write a program to send back a process from foreground.

V. Write a program to retrieve a process from background.

VI. Write a program to create a Zombie process.

VII. Write a program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.

6. Experiment 6 (Shell script programming)

I. Write a shell script program to check variable attributes of file and processes.

II. Write a shell script program to check and list attributes of processes.

III. Shell Script program to implement read, write, and execute permissions.

IV. Shell Script program for changing process priority.

V. Shell Script program to create Chess Box

**BCS333: COMPUTER ORGANIZATION &
ARCHITECTURE LABORATORY**

L T P
0 0 2

Credits: 1

Course Description:

The course aims to introduce Machine Architecture with coverage of digital logic, machine level data and instruction representation, ALU design, and organization of the processor data path and control. It also examines performance analysis, memory system hierarchy, pipelining, and communication.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO 1: Implement adder circuits using basic gates.

CO 2: Describe the converter circuits using basic gates.

CO 3: Design the working of Multiplexer by using IC 74153

CO 4: Discuss the various circuits for ALU, data path and control units.

List of Experiments:

1. Computer Anatomy- Memory, Ports, Motherboard and add-on cards.
2. Dismantling and assembling PC.
3. Introduction to 8085 kit.
4. Addition of two 8 bit numbers, sum 8 bit.
5. Subtraction of two 8 bit numbers.
6. Find 1's complement of 8-bit number.
7. Find 2's complement of 8-bit number.
8. Shift an 8-bit no. by one bit.
9. Find Largest of two 8 bit numbers.
10. Find Largest among an array of ten numbers (8 bit).
11. Sum of series of 8 bit numbers.
12. Addition and subtraction of two 16 bit numbers, sum 16 bit.
13. Implement of Booth's algorithm for arithmetic operations.
14. Find 1's and 2's complement of 16-bit number.
15. Implement simple programs using I/O based interface.

Third Year

BCS602: SOFTWARE ENGINEERING
Credits: 3

L T P
3 0 0

Course Description: The course aims to equip the students with different basic principles of software engineering and their application on software projects.

This course includes software development life cycle, development models and agile software development, requirement analysis & design, software project management and software quality assurance as well as testing approaches.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Differentiate Traditional and Agile Software Development approaches.

CO2: Prepare SRS (Software Requirement Specification) document and Software Design for a given problem.

CO3: Use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project with different applications.

CO4: Apply various software testing techniques.

CO5: Recognize how to ensure the quality of software product, different quality standards and software quality metrics.

Course Content

UNIT I

Software Engineering: The software problem, Evolution of Software Engineering, Principles of software engineering, Software Development vs. Software Engineering.

Software Process: Software Process, Selection of appropriate process model, Software Process Models- Waterfall, Spiral, Prototyping, Agile Methodology- such as Scrum and XP.

UNIT II

Advanced Requirement Analysis & Design: Analysis Principles, SRS, Requirement Elicitation Techniques- FAST and QFD, Design Principles, Design Concepts, Data Design, Architectural Design- Architectural Styles, Procedural Design

UNIT III

Software Project Management: The Management Spectrum, Software Project Planning and its characteristics, Types of metrics, Effort Estimation- FP, LOC, FP vs. LOC, Schedule & Cost

Estimation Models- Activity Networks- PERT/CPM, COCOMO-I, COCOMO-II, Risk Assessment-Probability Matrix, Risk Management

UNIT IV

Software Testing: Testing Fundamentals- Error/Fault/Failure, Testing Principles, Test Cases, Testing Techniques-White Box & Black Box, Unit Testing, Integration Testing, System Testing, Verification and Validation Testing, Acceptance Testing

UNIT V

Software Quality Management: S/W Quality, Importance of S/W Quality, Quality Metrics, Quality Standards- ISO 9126, Change Control, Change Control Process.

Advanced S/W Engineering: CASE Tools, Reverse Engineering, Re-engineering, Web Engineering

Recommended Books / Suggested Readings:

1. R.S. Pressman, Software Engineering: A Practitioner's Approach (6th ed.), McGraw- Hill, 2006

2. P. Jalote, An Integrated Approach to Software Engineering (3rd ed.), Narosa Publishing House, 2005

3. Ian Sommerville, Software engineering, Pearson education.

BCS503: FORMAL LANGUAGE & AUTOMATA THEORY

Credits: 3

L T P
3 0 0

Course Description: The course aims to equip the students with understanding of equivalence of languages accepted by Push down Automata and languages generated by context free grammars

The course introduces the student to develop a formal notation for strings, languages and machines, to design finite automata to accept a set of strings of a language, to prove that a given language is regular and apply the closure properties of languages, to design context free grammars to generate strings from a context free language and convert them into normal forms

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Write a formal notation for strings, languages and machines.

CO2: Design finite automata to accept a set of strings of a language.

CO3: Determine whether the given language is regular or not for a given language.

Co4: Execute the Query optimization algorithms for a given language.

CO5: Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars.

CO6: Write the hierarchy of formal languages, grammars and machines.

Course Content

UNIT I

Introduction: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

UNIT II

Regular languages and finite automata: Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata.

UNIT III

Context-free languages and pushdown automata: Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.

UNIT IV

Context-sensitive languages: Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG. Turing machines: The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable

(recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.

UNIT V

Undecidability: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages.

Recommended Books / Suggested Readings:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.

2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer

3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing

4. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

BCS504: WEB TECHNOLOGIES

Credits: 3

L T P
3 0 0

Course Description: The course aims to make student aware with the basic of web development.

The need for Internet-based apps is growing by the day in this digital age. To immerse learners in the Internet-driven environment and prepare them to design diverse web-based applications. The course includes knowledge of HTML, CSS, XML, AJAX & real time query processing.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: List the various HTML tags and use them to develop the user-friendly web pages.

CO2: Create interactive web pages to improve the user experience using client-side scripting with JavaScript.

CO3: Apply advanced asynchronous web communication mechanisms like AJAX and jQuery for building highly interactive webpages.

CO4: Use server-side scripting with PHP to generate the web pages dynamically using the database connectivity.

Course Content

UNIT I

HTML: Introduction to HTML, formatting text, Lists, adding graphics to HTML page, creating tables, linking documents, frames, DHTML and Style sheets, working with images, maps and forms.

Introduction to CSS: Introduction to CSS, Block and Inline Elements, Inline Styles, using internal CSS, using external CSS, How CSS rules cascade, inheritance, why use external style sheets?

UNIT II

Javascript: Introduction, programming constructs: variables, operators, statements and expressions, conditional checking, functions and dialog boxes, JavaScript DOM, handling events and working with objects, creating and processing forms, using hidden fields and cookies, introduction to Cookies, working with links and images, Introduction to jQuery, jQuery effects, jQuery get, set contents and Atrributes.

UNIT III

XML: XML syntax rules, XML elements, XML attributes, creating an XML document, using element, declaration and examination, using XML in an HTML document, XML DTD displaying XML with CSS.

UNIT IV

AJAX: Introduction, HTTP request, XMHttpRequest, AJAX Server Script, AJAX Database.

UNIT V

PHP and Overview of Node.js and React JS: Introduction, syntax, statements, operators, Loop string functions, sessions, E-mail, Variables arrays in php with attributes Date & Time, Image uploading file handling in php, PHP and MySQL, PHP and AJAX, introduction to node. js with mongo DB. React JS

Recommended Books / Suggested Readings:

1. HTML in 24 hours by SAMS publications
2. Programming PHP By Kevin Tatroe, Peter MacIntyre, RasmusLerdorf
3. Learning XML By Erik T. Ray
4. Head First Ajax By Rebecca Riordan
5. Head First JavaScript By Michael Morrison Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharam, Galgotia publications Pvt. Ltd
6. Beginning HTML, XHTML, CSS, and JavaScript By Jon Duckett
7. Php: The Complete Reference By Steven Holzner
8. Professional AJAX by Nicholas C Zakas

BCS604: COMPUTER GRAPHICS

Credits: 3

L T P
3 0 0

Course Description: : The course aims to equip the students with mastering the principles of the art and science of computer graphics

The course introduces the student to become proficient in the design and programming of interactive computer graphics systems and to understand in detail, the operation of a graphics pipeline and each of its components.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Identify and recognize the basic terminologies and concepts of Computer Graphics.

CO2: Understanding Elementary 3D graphics.

CO3: Evaluate various Algorithms of 2D Transformations on different type of objects.

CO4: Illustrate concepts of windowing and clipping and filling polygons.

CO5: Compare different color models, lighting, shading models for creating computer graphics applications.

Course Content

UNIT I

Introduction: Computer Graphics and its applications, Elements of a Graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Input devices.

UNIT II

Graphics Primitives: Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers.

UNIT III

Two-dimensional Geometric Transformations: Basic Transformations-Translation, Rotation and Scaling, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Reflection and Shearing transformations.

UNIT IV

Clipping: viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang- bersky, NLN), polygon clipping, text clippng.

UNIT V

Elementary 3D Graphics: Plane projections and its types, Vanishing points, Specification of a 3D view. Visibility: Image and object precision, Hidden edge/surface removal or visible edge/surface determination techniques; z buffer algorithms, Depth sort algorithm, Scan line algorithm and Floating horizon technique. Advance Topics: Introduction of Rendering, Ray

tracing, Antialiasing, Fractals, Gourard and Phong shading, Color Models: Properties of Light, Intuitive Color Concepts, RGB Color Model, CMY Color Model, HLS and HSV Color Models, Conversion between RGB and CMY color Models, Conversion between HSV and RGB color models, Color Selection and Applications.

Recommended Books / Suggested Readings:

1. Donald Hearn and M.Pauline Baker, "Computer Graphics", Second Edition, PHI/Pearson Education

2. Zhigandxiang, Roy Plastock, Schaum's outlines, "Computer Graphics Second Edition", Tata Mc-Grawhill edition

3. C, Foley, VanDam, Feiner and Hughes, "Computer Graphics Principles & Practice", Second Edition, Pearson

Elective:

1.CRYPTOGRAPHY

2.BLOCKCHAIN AND CRYPTOCURRENCIES

3.BIOMETRIC AND FACE RECOGNITION SYSTEM

BTCY501: CRYPTOGRAPHY

Credits: 3

L T P
3 0 0

Course Description: To highlight the features of different technologies involved in Network Security and learn various crypto systems.

This course includes Security trends, mathematics of asymmetric and symmetric cryptography and message authentication and integrity.

Course Outcomes:

Student will be able to

Co1: Understand basic cryptographic algorithms, message and web authentication and security issues.

CO2: Apply the different cryptographic operations of public key cryptography symmetric cryptographic algorithms

CO3: Apply the various authentication schemes to simulate different applications.

CO4: Identify information system requirements for both of them such as client and server.

CO5: Understand the current legal issues towards information security.

Course Content

UNIT I

INTRODUCTION:

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transpositiontechniques, steganography).- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II

MATHEMATICS OF SYMMETRIC CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation–Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution, Triple DES.

UNIT III

MATHEMATICS OF ASYMMETRIC CRYPTOGRAPHY: Primes – Primality Testing – Factorization –Euler's totient function, Fermat's and Euler's Theorem-Chinese Remainder

Theorem–Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT IV

MESSAGE AUTHENTICATION AND INTEGRITY: Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509, Email Security: Pretty Good Privacy (PGP) and S/MIME, IP security , Web security

UNIT V

THREATS & ATTACKS: Buffer overflow, DoS, DDoS, Birthday Attack, Intrusion Detection and Prevention, SQL Injections- Phishing/ Pharming Attacks – Computer Virus

UNIT VI

CASE STUDIES ON CRYPTOGRAPHY AND SECURITY: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections

Recommended Books / Suggested Readings:

1. Cryptography and Network Security : William Stallings, Pearson Education,4'" Edition
2. Cryptography and Network Security: C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India, 1"
3. Douglas R. Stinson, Cryptography: Theory and Practice, Chapman and Hall
4. J. Katz and Y. Lindell, Introduction to Modern Cryptography, CRC press
5. Cryptography and Network Security : Forouzan Mukhopadhyay, MC Graw Hill, 2"" Edition
6. Information Security, Principles and Practice: Mark Stamp, Wiley India.
7. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
8. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

BTCY502: BLOCKCHAIN AND CRYPTOCURRENCIES
Credits: 3

L T P
3 0 0

Course Description: Decentralized blockchain-based systems, such as Bitcoin and Ethereum, are successful beyond all expectations. Although still in their infancy, they promise to revolutionize how we think of financial, information, and other infrastructures. This course covers the technical aspects of public distributed ledgers, blockchain systems, cryptocurrencies, and smart contracts. Students will learn how these systems are built, how to interact with them, how to design and build secure distributed applications.

Course Outcomes (CO):

1. Understand design principles of Bitcoin and Ethereum.
2. List and describe differences between proof-of-work and proof-of-stake consensus.
3. Interact with a blockchain system by sending and reading transactions.
4. Design, build, and deploy a distributed application.
5. Evaluate security, privacy, and efficiency of a given blockchain system.

Course Content

UNIT I

Basics: Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

UNIT II

Blockchain: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

UNIT III

Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

UNIT IV

Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin

Cryptocurrency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

Recommended Books / Suggested Readings:

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System

3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.

4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

5. Bellaj Badr, Richard Horrocks, Xun (Brian) Wu, "Blockchain By Example: A developer's guide to creating decentralized applications using Bitcoin, Ethereum, and Hyperledger", Packt Publishing Limited, 2018.

BTCY501: BIOMETRIC AND FACE RECOGNITION SYSTEM

L T P
3 0 0

Credits: 3

Course Objective: To provide students with understanding of biometrics, biometric equipment and standards applied to security.

This course includes introduction to biometrics, fingerprint, face recognition, behavioral biometric technologies & feature extraction.

Course Outcomes (CO):

CO1: Demonstrate knowledge of the basic physical and biological science and engineering principles underlying biometric systems.

CO2: Analyze the key biometric standards and process.

Co3: Identify the sociological and acceptance issues associated with the design and implementation of biometric systems.

Co4: Analyze and design basic biometric system applications.

CO5: Design of biometric recognition for the organization and develop simple applications for privacy

UNIT I

INTRODUCTION TO BIOMETRICS: Introduction and back ground – biometric technologies – passive biometrics – active biometrics - Biometric systems – Enrollment – templates – algorithm – verification – Biometric applications – biometric characteristics- Authentication technologies –Need for strong authentication

- Protecting privacy and biometrics and policy – Biometric applications – biometric characteristics

UNIT II

FINGERPRINT: History of fingerprint pattern recognition - General description of fingerprints - Finger print feature processing techniques - fingerprint sensors using RF imaging techniques – fingerprint quality assessment – computer enhancement and modeling of fingerprint images – fingerprint enhancement – Feature extraction – fingerprint classification – fingerprint matching

Unit III

FACE RECOGNITION: Introduction, components, Facial Scan Technologies, Face Detection, Face Recognition, Representation and Classification, Kernel- based Methods and 3D Models, Learning the Face Spare, Facial Scan Strengths and Weaknesses, Methods for assessing progress in Face Recognition.

UNIT IV

BEHAVIORAL BIOMETRIC TECHNOLOGIES & FEATURE EXTRACTION: Technical description –

characteristics – strengths – weaknesses –deployment – Hand scan – Technical description–characteristics – strengths – weaknesses deployment – DNA biometrics. Handprint Biometrics – DNA Biometrics, Signature and handwriting technology – Technical description –classification – keyboard / keystroke dynamics – Voice –data acquisition – feature extraction – characteristics – strengths –weaknesses– deployment.

UNIT V

MULTI BIOMETRICS & CASE STUDY: Multi biometrics and multi factor biometrics – two–factor authentication with passwords – tickets and tokens – executive decision – implementation plan.
Case study: Biometrics for banking security – Biometric for Education – implementation of multi biometrics system.

References Books:

1. Samir Nanavathi, Michel Thieme, and Raj Nanavathi: "Biometrics –Identity verification in a network", 1st Edition, Wiley Eastern, 2002.
2. John Chirillo and Scott Blaul: "Implementing Biometric Security", 1st Edition, Wiley Eastern Publication, 2005. 3. James wayman,Anil k.Jain,Arun A.Ross,Karthik Nandakumar, —Introduction to Biometrics, Springer, 2011.
4. Khalid saeed with Marcin Adamski, Tapalina Bhattasali, Mohammed K. Nammous, Piotr panasiuk, mariusz Rybnik and soharab H.Sgaikh, —New Directions in Behavioral Biometrics, CRC Press 2017.
5. John Berger: "Biometrics for Network Security", 1st Edition, Prentice Hall, 2004. 6. Benjamin Muller, Security, Risk and the Biometric State: Governing Borders and Bodies, 1st Edition, Routledge, 2010.

BCS622: SOFTWARE ENGINEERING LABORATORY
Credits: 1

L T P
3 0 0

Course Description: The course aims to equip the students with -of-the-art knowledge on Software Engineering and UML in an interactive manner.
The course includes case studies to demonstrate the practical applications of different concepts and provide a scope to the students where they can solve small, real life problems.
Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
CO1: Discuss and Analyses how to develop software requirements specifications for a given problem.
CO2: Describe basic concept of UML, design, implementation of test cases.
CO3: Develop various structure and behavior UML diagrams.
Co4: Build DFD models for different application development.

List of Experiments:
1. Identifying the Requirements from Problem Statements
2. Estimation of Project Metrics
3. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios
4. E-R Modeling from the Problem Statements
5. Identifying Domain Classes from the Problem Statements
6. State chart and Activity Modeling
7. Modeling UML Class Diagrams and Sequence diagrams
8. Modeling Data Flow Diagrams
9. Estimation of Test Coverage Metrics and Structural Complexity
10. Designing Test Suites

BCS 525: WEB TECHNOLOGIES LABORTARY

Credits: 1

LTP
300

Course Description: The course aims to equip the students with understanding and learn to implementation of HTML and to make student understand the basics of scripting using Java Script

The course enables the student to learn about XML, AJAX & real time query processing

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Infer the structure of HTML elements in a webpage.

CO2: Build Webpages using HTML and CSS

CO3: Utilize JavaScript to add functionality to webpages

CO4: Implement different Ajax & JQuery functionalities in Web development.

List of experiments:

Students should be made to perform experiments learnt on the concepts of Computer Graphics covering the following list. They may perform more practical's as required to understand the subject.

1. Create web page in HTML to display the usage of formatting tags and lists

2. Create web page in HTML to display the usage of tables and frames

3. Show how to use graphics and links using HTML & CSS

4. Show the usage of image map and linking

5. Create alert, prompt and dialog box using JavaScript

6. Create a form using HTML and CSS. With the help of Javascript add all types of form validations to it

7. Display the usage of Cookies using Javascript

8. Create an XML document

9. Create a form using AJAX

10. Create a formusing HTML, CSS, XML, AJAX and php and store & retrieve its data using MySQL

11. Create your own module in node.js and Program of jQuery selectors.

ELECTIVE -I LABORTARY

BTCY511: CRYPTOGRAPHY LABORATORY

Credits: 1

LTP
002

Course Description: The course aims to equip the students with the practical exposure on basic security attacks, encryption algorithms, authentication techniques. Apart from security algorithms, firewall configuration is also introduced.

This course includes deeper understanding of cryptography, its application to network security, threats / vulnerabilities to networks and counter measures.

Course Outcomes:

At the end of this course students will be able to:

CO1: Understand basic cryptographic algorithms, message and web authentication and security issues.

CO2: Identify basic security attacks and services

CO3: Use symmetric and asymmetric key algorithms for cryptography CO4. Use of Authentication functions

List of experiments:

1. Write a program that contains a string (char pointer) with a value Hello world. The program should XOR each character in this string with 0 and displays the result.

2. Write a program that contains a string (char pointer) with a value Hello world. The program should AND, OR and XOR each character in this string with 127 and display the result.

3. Write a program to perform encryption and decryption using the following algorithms

a. Ceaser cipher

b. Substitution cipher

c. Hill Cipher

d. Feistel Cipher

4. Write a program to implement the DES algorithm logic.

5. Write a program to implement the AES algorithm logic

6. Write a program to implement the Blowfish algorithm logic.

7. Write a program to implement Pure Transposition Cipher.

8. Write the RC4 logic in Java Using Java cryptography; encrypt the text Hello world using Blowfish. Create your own key using Java key tool.

9. Write a program to implement RSA algorithm.

10. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.

11. Implement the SIGNATURE SCHEME - Digital Signature Standard.

12. Calculate the message digest of a text using the SHA-1 algorithm.

13. Calculate the message digest of a text using the MD5 algorithm.

14. Write a program to Implement Hash Function

BTCY512: BIOMETRIC AND FACE RECOGNITION SYSTEM LABORATORY

L T P
0 0 2

Credits: 1

Course Description: To understand the concepts of Biometrics, to enable design of biometric system.

Course Outcomes (CO):

After the completion of the course the students will be able to

CO1: Apply biometric matching for identification.

Co2: Identify algorithms for finger biometric technology.

CO3: Apply facial biometrics for identification.

CO4: Implement iris biometric, voice biometric, physiological biometrics etc. for identification.

List of experiments:

1. Apply picture handling strategies to advanced symbolism utilizing MATLAB;

2. Express the protection, approach, and lawful issues related with the utilization of biometrics;

3. Portray methods for unique mark, facial, and voice acknowledgment;

4. Portray methods for Iris - feature extraction and iris code matching

5. Portray the procedures of biometric enlistment, ID, what's more, confirmation;

6. Utilize business biometric frameworks for enlistment, distinguishing proof, furthermore, confirmation;

7. Utilize MATLAB to create code that will utilize unique mark, iris, or potentially facial symbolism for recognizable proof or check.

8. Implement spectral subtraction for speech enhancement

9. Implement a speaker recognition system using MEL frequency cepstral coefficients

10. Implement a face recognition system based on Linear Discriminant Analysis

11. Implement a face recognition system using Gabor filters to extract features

12. Employ morphological operators and enhancement methods to the fingerprint images

13. Implement a center point detection algorithm for fingerprint recognition

BTCY513: BLOCKCHAIN AND CRYPOCURRENCIES LABORATORY

L T P
0 0 2

Credits: 1

Course Description: The course provides an insight of blockchain technology and concepts. The course focus on to gain the knowledge about the practical use of blockchain applications.

Course Outcomes:

1. Understand the concepts of blockchain technology.

2. Design and Implement Blockchain Applications.

3. Evaluation and Analysis of Blockchain Systems.

List of experiments:

1. Run a bitcoin client.

2. Synchronize the blockchain

3. Set up a Regtest environment

4. Build a payment request uris

5. Prepare your build system and Building Bitcoin Core.

6. Write Hello World smart contract in a higher programming language (Solidity).

7. Solidity example using arrays and functions.

8. Create a Maven project using Web3j.

9. Construct and deploy your contract (Use deploy method)

10. Implement an ICO on Ethereum.

11. Install IPFS locally on our machine, initialize your node, view the nodes in network and add files and directories

12. Install Swarm and run any test file.

BCS624: COMPUTER GRAPHICS LABORATRY
Credits: 1

LTP
002

Course Description: The course aims to equip the students with understanding and learn to master the principles of the art and science of computer graphics.

The course enables the student to become proficient in the design and programming of interactive and multimedia systems and to understand in detail, the operation of a graphics pipeline and each of its components

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Apply the various predefined functions for drawing various geometric shapes.

CO2: Implement various graphics algorithms for drawing and filling of geometric objects.

Co3: Analyze various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.

CO4: Compare strengths and weakness of various graphics algorithms.

List of experiments:

Students should be made to perform experiments learnt on the concepts of Computer Graphics covering the following list. They may perform more practical's as required to understand the subject.

1. Write a program to plot a point (pixel) on the screen

2. Write a program to draw a straight line using DDA Algorithm

3. Write a program to draw a straight line using Bresenham's Algorithm

4. Write a program to implement mid-point circle generating Algorithm

5. Write a program to implement ellipse generating Algorithm

6. Write a program to translate an object with translation parameters in X and Y directions

7. Write a program to scale an object with scaling factors along X and Y directions

8. Write a program to rotate an object with a certain angle about origin

9. Write a program to perform the rotation of an object with certain angle about an arbitrary point

10. Write a program to perform composite transformations of an object

11. Write a program to perform the reflection of an object about major

12. Write a program to clip line segments against windows using Cohen Sutherland Algorithm

13. Write a program to perform the polygon clipping against windows using Sutherland Hodgeman technique

BCS651: ADVANCE JAVA PROGRAMMING
Credits: 3

LTP
300

Course Description: The course aims to equip the students with basic knowledge of advanced concepts of JAVA.

The course includes JDBC, Servlets, Server-side scripting (JSP) and to understand the idea of network programming.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Use graphical user interface and Event handling in java.

CO2: Develop programs using the Java Collection API.

CO3: Use advanced technology in Java such as network programming, and Remote method Invocation.

Course Content

UNIT I

Collection Framework: List Interface, Set Interface, Stored Set Interface. Array List Class, Linked List Class, Hash Set Class, Linked Hash Set Class, Accessing a Collection via an iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms Interfaces- Dictionary, Hashtable, Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

Managing I/O Files: Concept of Streams, Stream Classes, Byte Stream Classes, Input Stream Classes, Output Stream Classes, Character Stream Classes, Reader Stream Classes, Writer Stream Classes, Using Streams, Reading and Writing Files.

UNIT II

JDBC Connectivity: Types of Drivers, Connectivity Model, JDBC/ODBC Bridge Communicating with Database.

Graphics programming: 2D Graphics Concepts, The Viewport Class, Working with Images, Event Model, 3D Graphics, Uses of class java.awt.Graphics, Custom Painting, Drawing Lines, Drawing Rectangles. Drawing Ellipses and Circles, Drawing Arcs, Drawing Polygons

UNIT III

Introduction to Servlets: Need for Servlets, Introduction to Servlets, Servlet Package, Life Cycle of a Servlet, Http Servlet Request, Http Servlet Response, Deploying Servlets and Servlet Contexts, accessing a Servlet Using an HTML Page.

Introduction to JSP: Need for JSP, JSP Request Response Class; Connectivity JSP Pages to Data Base.

UNIT IV

Network Programming: Socket Fundamentals, TCP/IP and UDP Sockets in Java.

Java Remote Method Invocation (RMI): About Serialization, RMI concept, Server side and client side.

UNIT V

Working with Frameworks: Introduction to frameworks, Spring configuration, Aspect Oriented Programming and DAO, Data Access, Spring Web, Integrating Struts 2 and JSF with Spring, Spring Security.

Recommended Books / Suggested Readings:

1. Naughton Patrick, SchildHerbertz, (2011), "The Complete Reference –Java", TMH Publication, 7th ed.
2. Naughton Patric, Morrision Michel, (2006), "Java Hand Book", Osborne/McGraw-Hill, 5th ed.
3. Balaguruswami E, (2001), "Programming with Java", TMH, 3rd ed.
4. Decker &Hirshfied, (2000), "Programming Java", Vikas Publication 2nd ed.
5. Ivan N Bayross, "Web Enabled Commercial Application Development Using Java 2"

BCS601: COMPILER DESIGN

Credits: 3

L T P
3 0 0

Course Description: The course aims to equip the students with different stages in the process of compilation.

The course includes different methods of lexical analysis, top-down and bottom-up parsers, identify synthesized and inherited attributes, develop syntax directed translation schemes, develop algorithms to generate code for a target machine.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Discuss how the design of a compiler requires most of the knowledge acquired during their study.

CO2: Design top-down and bottom-up parsers for a given parser specification

CO3: Apply the ideas, the techniques, and the knowledge acquired for the purpose of other language processor design.

CO4: Develop algorithms to generate code for a target machine

Course Content

UNIT I

Introduction: Phases of compilation and overview.

Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).

UNIT II

Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) gram- mars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottomup parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)

UNIT III

Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree. Symbol Table: Its structure, symbol, attributes and management.

UNIT IV

Runtime Environment: Procedure activation, parameter passing, value return, memory allocation, and scope.

Intermediate Code Generation: Translation of different language features, different types of intermediate forms.

UNIT V

Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc. Architecture dependent codeimprovement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code

generation

Advanced topics: Type systems, data abstraction, compilation of Object-Oriented features and non-imperative programming languages.

Recommended Books / Suggested Readings:

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, "Compilers-Principles, Techniques & Tools", Pearson Education

2. Robin Hunter, "Essence of Compilers", Pearson Education

3. Steven S. Muchnick, Advanced Compiler Design & Implementation, Morgan Kaufmann Publishers

BCS603: DESIGN AND ANALYSIS OF ALGORITHMS

L T P
3 0 0

Credits: 3

Course Description: The course aims to equip the students with analyzing the asymptotic performance of algorithms.

The course includes to write rigorous correctness proofs for algorithms, demonstrate a familiarity with major algorithms and data structures, apply important algorithmic design paradigms and methods of analysis and to synthesize efficient algorithms in common engineering design situations

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

Co1: Analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms

CO2: Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms

CO3: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation

CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming

CO5: Develop the dynamic programming algorithms, and analyze it to determine its computational complexity

CO6: Model engineering problem for a given model using graph and write the corresponding algorithm to solve the problems.

Course Content

UNIT I

Introduction: Characteristics of algoritm.

Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT II

Fundamental Algorithmic Strategies: Brute-Force, Greedy,Dynamic Programming, Branchand- Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

UNIT III

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First

Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT IV

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

UNIT V

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP
– P SPACE

Recommended Books / Suggested Readings:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill

2. Fundamentals of Algorithms – E. Horowitz et al

3. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson

4. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley

5. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA

BTCY601: ENTERPRISE SECURITY MANAGEMENT AND DEPLOYMENT

L T P
3 0 0

Credits: 3

Course Description: The course aims to equip the students with basic understanding of Enterprise Security Management and deployment models.

The course includes models of enterprise security management and deployment models, Security Policy Administrative and Cyber Threats.

Course Outcomes (CO):

CO1: Understand the models used in Enterprise Security Management and deployment.

Co2: Design security architectures that assures secure isolation of physical and logical infrastructures.

CO3: Analyze the industry security standards, regulatory mandates, audit policies and compliance requirements for Cloud based infrastructures.

CO4: Describe the cyber threats and mobile security concepts.

Course Content

UNIT I

Introduction to Enterprise Security Management – Basic Concepts and Terminology – Concepts and Models of Enterprise Security Management and deployment models.

Firewall Platforms and Architecture – Firewalls and its types, Zero Trust security approaches and public cloud security, configuration of firewall initial access, interfaces, security zones, routing, firewall certificate management policies

Unit II

Security Policy Administrative: Introduction, Network Address Translation (NAT), Security policies to identify known and unknown application software, Differentiate, configure, and deploy filtering technologies such as antivirus, anti-spyware, and file blocking.

Construct and deploy URL profiles for attachment to NGFW security policies.

Unit III

Cyber Threats: Unknown malware, zero-day exploits, and advanced persistent threats. Configure and deploy zones, agents, and security policies.

Unit IV

Mobile Security: Mobile device protection

Implement and configure Application Command Center (ACC) log forwarding and report monitoring. Apply and monitor active/passive and active/active security device high availability

Text Books

1. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, T. Mather,

S. Kumaraswamy, S. Latif, O'Reilly Series, 2009.

2. The Google file system. In Proceedings of the nineteenth ACM symposium on Operating systems principles (SOSP '03). ACM, New York, NY, USA, 29-43.

3. MapReduce: simplified data processing on large clusters. Commun. ACM 51, 1, 107- 113, 2008.

4. Controlling data in the cloud: outsourcing computation without outsourcing control. In Proceedings of the 2009 ACM workshop on Cloud computing security (CCSW '09). ACM, New York, NY, USA, 85-90, 2009.

ELECTIVE- II

1.DISTRIBUTED DATABASE SECURITY

2.CYBER LAW AND SECURITY AUDITING

3.DIGITAL WATERMARKING AND STEGANOGRAPHY

L T P
3 0 0

BTCY602: DISTRIBUTED DATABASE SECURITY

Credits: 3

Course Description: The course aims to equip the students with different models involved in database security and their applications in real time world to protect the database and information associated with them.

The course includes technologies for database security, security for database systems and security for distributed databases.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Identify the security issues and solve them using appropriate security models.

CO2: Implement security mechanisms in a database system and provide a secured information flow.

CO3: Apply User roles and privileges for a secure database design.

CO4: Identify and discover security attacks through statistical inference and discovery methods.

CO5: Develop new generation DBMS through protection models.

Course Content

UNIT I

TECHNOLOGIES FOR DATABASE SECURITY: Data Management Technologies-Security Problems in Databases- Relational and Entity Relationship Data Models-Architectural Issues-Database Design-Database Administration- System Functions-Query Processing-Transaction, Storage and Metadata Management-Database Integrity-Fault Tolerance Distributed Databases-Client/Server Databases-Data Warehousing and Data Mining-Object Technology-Object Technology Model-Secure Multimedia Data Management Systems

Unit II

SECURITY FOR DATABASE SYSTEMS: Security Policies-Access Control Policies- Authorization Policies-Role based Access Control Administration Policies-Identification and Authentication-Auditing a Database-Policy enforcement and Related Issues-SQL Extensions for Security-Query Modification-Historical Developments in Security for Database Systems-Design Principles.

Unit III

SECURITY FOR DISTRIBUTED DATABASES: Discretionary Security-Distributed Access Control-Auditing a Distributed Databases-SQL for Distributed Database Security-Security Impact-

Multi level Security for Distributed Database Systems Architectures-Distributed Data with Centralized Control and Distributed Control-Secure Heterogeneous and Federated Database Systems- Architectures-Secure Client/Server Database Management-Migrating Legacy Databases and Applications.

Unit IV

CASE STUDY: Database Watermarking – Basic Watermarking Process - Discrete Data, Multimedia, and Relational Data – Attacks on Watermarking - Single Bit Watermarking, Multi bit Watermarking.

Recommended Books / Suggested Readings:

1. Hassan A. Afyouni, " Database Security and Auditing" , India Edition, CENGAGE Learning, 2009.

2. Castano ," Database Security" , Second edition, Pearson Education, 2002.

3. Alfred basta, melissa zgola, " Database security", CENGAGE learning, 2014.

4. Michael Gertz and Sushil Jajodia, " Handbook of Database Security: Applications and Trends", Springer, 2010.

5. Osama S. Faragallah, El-Sayed M. El-Rabaie, Fathi E. Abd El-Samie, Ahmed I. Sallam, and Hala S. ElSayed, Multilevel Security for Relational Databases", ISBN 978-1-4822- 0539-8. CRC Press, 2014.

BTCY603: CYBER LAW AND SECURITY AUDITING

Credits: 3

L T P
3 0 0

Pre requisites: None

Course Description: The course aims to equip the students with how the law has responded to the challenges of information technologies, and the extent to which legal issues have shaped the development of information society policy.

The course includes Indian Law and Cybercrime, Legal developments and Auditing for Security.

Course Outcomes (CO):

CO1: Understand key terms and concepts in cyber law, intellectual property and cyber-crimes, trademarks and domain theft.

CO2: Determine computer technologies, digital evidence collection, and evidentiary reporting in forensic acquisition.

CO3: Secure both clean and corrupted systems, protecting personal data, securing simple computer networks, and safe Internet usage.

CO4: Incorporate approaches for incident analysis and response.

Course Content

UNIT I

Cyber Security: Introduction-Cyber Security and its Problem-Intervention Strategies: Redundancy, Diversity and Autarchy. Introduction to the Legal Perspectives of Cybercrimes and Cyber security, Cybercrime and the Legal Landscape around the World, Why Do We Need Cyber laws.

UNIT II

Indian Law and Cybercrime: The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students: Indian Scenario.

UNIT III

Legal developments: Private ordering solutions, Regulation and Jurisdiction for global Cyber security, Copyright source of risks, Pirates, Internet Infringement, Fair Use, postings, criminal liability, First Amendments, Data Losing Ethics, Legal Developments, Cyber security in Society, Security in cyber laws case studies, General law and Cyber Law-a Swift Analysis.

UNIT IV

Auditing for Security: Introduction, Basic Terms Related to Audits, Security audits, The Need for Security Audits in Organization, Organizational Roles and Responsibilities for Security Audit, Auditors responsibility in Security Audits, Types of Security Audits.

UNIT V

Case Study: Approaches to Audits, Technology based Audits Vulnerability Scanning and Penetration Testing, Resistance to Security Audits, Phase in security audit, Security audit Engagement Costs and other aspects, Budgeting for security audits, Selecting external Security Consultants, Key Success factors for security audits.

Suggested Books:

1. Godbole," Information Systems Security", Wiley
2. Merkov, Breithaupt," Information Security", Pearson Education
3. Yadav, "Foundations of Information Technology", New Age, Delhi
4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill
5. Sood,"Cyber Laws Simplified", McGraw Hill
6. Furnell, "Computer Insecurity", Springer 7. IT Act 2000.
7. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006
8. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verla.

BTCY604: SECURITY OF E-BASED SYSTEMS

Credits: 3

L T P
3 0 0

Course Description:

The course aims to equip the students with the basic security principles, as well as the issues, policy and standards particular to e- based applications.

The course includes technology, concepts, issues and principles for the design and implementation of secure e-based system.

Course Outcomes (CO):

1. Describe security features needed for an e- based system.
2. Identify and assess different types of security breaches and possible solutions for a robust e-based system
3. Describe the inner-workings of payment protocols, file transfer protocols, and related algorithms
4. Demonstrate the ability to select and design among available security solutions based on different domains of e-based system

Course Content

UNIT I

E-Based System, E-Commerce Security Evolution Of Commerce -Payment Modes And Methods - Distributed Computing Environ- ment Cloud Security- Mobile Commerce M Vs. E-Commerce- Web Commerce Security Requirements - E-Commerce Security -Risk Driven Security- Scalable Security Securing The Transactions.

Security Model for E-Commerce/MCommerce Architectural Framework - Cryptography Access Control- System Hardening Authentication - Authorization - Non-Repudiation Privacy Layered Security Architecture

UNIT II

Electronic and Online Payments Electronic Payments: Overview, SET Protocol, Payment Gateway, Certificates, Digital Token, Smart Cards, Credit Cards, Magnetic Strip Cards, EChecks, Credit/ Debit Card EPS, Dash. Online Payments: Mobile Payments, Online Banking, Emerging Financial Instruments - Appli- cation in Business, ECommerce Laws, Forms of Agreement, Government Policies and Agenda, Secured Online Shopping and Payment - Threats and Attacks Certification and Accreditation Process for Web Commerce Applications

UNIT III

E-Healthcare Security Introduction - Nature and Trends Significance and Challenges Frameworks and Approaches Securing E-Healthcare - Information Breaches of Privacy and Confidentiality in E- Healthcare Utilisation Challenge - Legal Protection Challenge

UNIT IV

Privacy And Confidentiality Anonymization and Pseudo-Anonymization Secure E-Healthcare Information Systems Elements Security and Privacy Provisions Electronic Personal Health Care Records Clinical Decision Support Systems

E-Governance Security Introduction - Secure and Interoperable e-Government Services- Trust Models Dos Attacks on EGovernment Services- Certificate Management -Interoperability- Privacy Enabled Identity Management- E-Government Architecture- Anonymous and Accurate EPolling- Secure Multiparty/Multi Candidate Electronic Elections

UNIT V

E-Learning Security Introduction Security Attacks in E-Learning Modeling Security Services Real E- Learning Scenarios Secure Learning Management Systems Security in Collaborative Learning, Mobile Learning, Massive Open Online Courses (MOOC) - Trustworthiness for Secure Collaborative Learning Model Factors And Rules - Time Factor and Trustworthiness Sequences Knowledge Management for E-Learning Data - Trustworthiness-Based Security for P2P E-Assessment Security in EAssessment, P2P EAssessment Case Study

Suggested Books:

1. H. Nahariand R. L. Krutz, Web Commerce Security: Design and Development. Indianapolis: Wiley, John Sons, 2011. (ISBN No. : 978-0-470-62446-3)

2. C. A. Shoniregun, K. Dube, and F. Mtenzi, Electronic Healthcare Information Security. New York: Seacaucs, New Jersey, U.S.A.; Springer-Verlag New York, 2010. (ISBN No. : 978-0-387-84817-4)

3. A. Mitrakas, P. Hengeveld, and D. Polemi, Eds., Secure e-Government Web Services. United States: IGI Global, United States, 2006. (ISBN No. : 978-1-59-904138-4)

4. M. Jorge, S. Caballe, and F. Xhafa, Intelligent Data Analysis for e-Learning: Enhancing Security and Trustworthiness in Online Learning Systems. United States: Morgan Kaufmann Publishers In, 2016. (ISBN No. : 978-0-12-804535-0)

ELECTIVE-III
1.ETHICAL HACKING
2.MOBILE SECURITY
3.MALWARE ANALYSIS
BCS645: ETHICAL HACKING
Credits: 3

L T P
3 0 0

Course Description: The course aims to equip the students with the the variety of security assaults, it is necessary to analyze how fresh attacks are generated, and knowing these attacks is critical in order to avoid or detect such attacks.

The course includes the idea and techniques of identifying vulnerabilities by devising various attacks and then developing the proper security policy, which includes actions to detect or prevent assaults and so mitigate harm.

Course Outcomes:

Upon successful completion of this course students should be able to:

1. Understand the basics of the ethical hacking

2. Perform the foot printing and scanning.

3. Demonstrate the techniques for system hacking.

4. Detect and prevent the security attacks in different environments.

5. Analyze Intrusion Detection, Policy Creation, Social Engineering, ddos Attacks, Buffer Overflows and Virus Creation.

Course Content

UNIT — I

Ethical hacking, Foot Printing: information gathering methodology, Hacking Tools, Scanning- Definition, Types of Scanning, Objectives of Scanning, Scanning Methodology, Counter measures; Enumeration- NetBios Null Sessions, Hacking tools - Enumerating User Accounts, Active Directory Enumeration and Countermeasures; System Hacking- Administrator password guessing, Password Cracking Algorithm, Automated Password Cracking, Types of Password Attacks, Hacking tools.

UNIT — II

Trojans and Backdoors: Overt and Covert Channels, Indications of a Trojan Attack, Reverse Engineering Trojans, Backdoor Countermeasures; Sniffers- Working of Sniffer, Passive Sniffing, Active Sniffing, Hacking tools, Sniffing Countermeasures; Denial of Service- Goal of DoS, Impact and Modes of Attack, DoS Attack Classification, Countermeasures for Reflected DoS, Tools for Detecting DDoS Attacks.

UNIT — III

Session Hijacking: Spoofing vs Hijacking, Steps in Session Hijacking, Types of Session Hijacking,Hacking Tools, Protection against Session Hijacking, IP Security; Hacking Web Servers- Popular Web Servers and Common Security Threats, Apache Vulnerability, Attack against IIS Console, Hacking Tools, Countermeasures, Increasing Web Server Security; Web Application Vulnerabilities-Web Application Hacking, Anatomy of an Attack, Web Application Threats, Carnivore, Google Hacking, Countermeasures.

UNIT — IV

Web Based Password Cracking Techniques: Authentication mechanisms, Password Guessing, Cookies, Password Crackers Available, Hacking Tools, Countermeasures; SQL Injection-Attacking SQL Servers, SQL Server Resolution Service (SSRS), Osql-L Probing, SQL Server Talks, Preventive Measures; Hacking Wireless Networks – Rouge Access Points, Scanning Tools, Sniffing Tools, Securing Wireless Networks.

UNIT — V

Linux Hacking : Linux Vulnerabilities, Scanning Tools, Scanning Tools, Linux Security Tools, Advanced Intrusion Detection System, Linux Security Auditing Tool; Evading Firewalls, Intrusion Detection Systems, Intrusion Detection Tools, Penetration Testing – Penetration Test vs Vulnerability Test, Reliance on Checklists and Templates, Phases of Penetration Testing, Risk Analysis, Active Reconnaissance.

Suggested Books:

1. Manish Kumar; The Secret of Hacking; Third Edition; Publisher Leo Impact Security Services.
2. Ankit Fadia; An Unofficial Guide To Ethical Hacking 2nd Edition ; Macmillan India;2006
3. Eric Cole; Hackers Beware: The Ultimate Guide To Network Security; Publisher Sams
4. Nitesh Dhanjani, Billy Rios, Brett Brett; Hacking: The Next Generation, Publisher Shroff/o'reilly (2009)
5. Shon Harris, Allen Harper, Chris Eagle, Jonathan Ness; Gray Hat Hacking: The Ethical
6. Hacker's Handbook, Publisher: Mcgraw-hill/osborne Media (Dec 2007)

BCS841: MOBILE SECURITY

Credits: 3

L T P
3 0 0

Course Description: The course aims to equip the students with knowledge about security in mobile application and devices
The course includes the basic security concepts, security techniques, distributed systems security, various jamming attacks, threats and vulnerabilities and cipher technologies.

Course Outcomes (CO):
Upon successful completion of the course, the students should be able to:
Co1: Understand the security requirement for mobile and its application
CO2: Identify the various security standards for mobile applications
CO3: Apply the security technique for mobile
CO4: Demonstrate the various security techniques in distributed and mobile application
Course Content

UNIT I

Basic Security Concepts: Introduction to wireless networks -802.11 WEP and WPA – Key management in sensor Networks- Wireless jamming attacks – Device fingerprinting and Wireless pairing – Attack Detection

UNIT II

Mobile Security Scenario: Mobile Health Security – Vehicle Network Security – RFID hacking and authentication – Smartphone system security – Smart grid security

UNIT III

Security Techniques: Overview: Security - Threats, Vulnerabilities, Attacks, Integrity, Confidentiality, Policy and relevant definitions -Authentication –Cryptography – Symmetric Key Cryptography, Asymmetric key Cryptography, Key management, Digital signatures

UNIT IV

Distributed Systems Security: Cipher techniques, Protection systems, Example protocols

UNIT V

Wireless and Mobile System Security: Strategies, Routing security, Different schemes for MANET

Suggested Books:

1. 802.11 Wireless Networks: The Definitive Guide", by Matthew Gast, O'reillyMideia; 2nd Edition; October 2011.
2. "Hacking Exposed Wireless", by Johnny Cache, Joshua Wright, and Vincent Liu, McGraw-Hill Osborne Media; 2nd Edition; July 2010.
3. Wi-Foo: The Secrets of Wireless Hacking" by Andrew Vladimirov, Konstantin V. Gavrillenko, and Andrei A. ikhailovsky, Addision-Wesley Professional; 1st Edition, July 2004.

BTCY605: MALWARE ANALYSIS

Credits: 3

L T P
3 0 0

Course Description:

The course aims to equip the students with how to utilize various tools and strategies to do basic static analysis in order to identify, detect, and eradicate malware threats. To learn about live malware attack monitoring and analysis, as well as live network traffic analysis.

The course includes detection, analysis, understanding, controlling, and eradication of malware

Course Outcomes (CLO):

CO1: Analyze the modern malware samples using both static and dynamic analysis techniques.

CO2: Understand the executable formats, Windows internals and API s, and malware analysis techniques.

CO3: Extract investigative leads from host and network-based indicators associated with a malicious program.

CO4: Apply techniques and concepts to unpack, extract, decrypt, or bypass new anti-analysis techniques in future malware samples.

CO5: Describe the industry standard tools including ProcMon, CFF Explorer, ProcExplore, BinText, FileAlyzer, OllyDbg etc

Course Content

UNIT — I

INTRODUCTION TO MALWARE ANALYSIS: Malware taxonomy - Malware threats - Malware analysis methodologies - Legal considerations - Identifying and protecting against malware - Malware hiding places - Collecting malware from live system - Identifying malware in dead system Malware Analysis Environment : Virtual machine - Real systems - Malware analysis tools ProcMon, CFF Explorer, ProcExplore, BinText, FileAlyzer, OllyDbg

UNIT — II

STATIC ANALYSIS: Detailed file analysis -Database of file hashes. Identifying file compile date Identifying packing/ obfuscation methods - Strings analysis - File signature analysis - Local and online malware scanning -Identifying file dependencies.

DYNAMIC ANALYSIS: System base lining - Host integrity - Monitor - Installation monitor - Process monitor - File monitor - Registry analysis/ monitoring - Network traffic monitoring/ analysis - Port monitor - DNS monitoring/ resolution -Simulating internet services

UNIT — III

CODE ANALYSIS: Reverse engineering malicious code - Identifying malware passwords - Bypassing authentication - Assembly level computing Standard x86 instructions, Introduction to IDA, Olly Dbg, Advanced malware analysis Virus, Trojan. Parsing Basic analysis of an APK

UNIT — IV

MALICIOUS DOCUMENT ANALYSIS: PDF and Microsoft Office document structures - PDF and office document vulnerabilities - Malware extraction and analysis tools - Analysis of malicious documents

MALWARE CHALLENGES: Virtual environment - Live internet connection - Real, fake, and virtual services -Anti-debug and anti-forensic malware

UNIT — V

MOBILE MALWARE ANALYSIS: Need for mobile application penetration testing, testing methodology Android and iOS Vulnerabilities - Exploit Prevention - Handheld Exploitation-Android Root Spreading and Distribution Android Debugging.

Suggested Books:

1. M. Sikorski and A. Honig, Practical Malware Analysis: The Hands-on Guide to Dissecting Malicious Software. San Francisco: No Starch Press San Francisco, CA, 2012. (ISBN No.: 978- 1-59-327290-6)

2. M. H. Ligh, S. Adair, and B. Hartstein, Cookbook and DVD: Tools and Techniques for Fighting Malicious Code. Indianapolis, IN: Wiley, John Sons, 2010. (ISBN No. : 978-0-470-61303-0).

3. C. Eagle, The IDAPro Book: The Unofficial Guide to the worlds most popular Disassembler , 2nd Ed. San Francisco: No Starch Press San Francisco, CA, 2011. (ISBN No. : 978-1-59327-289-0)

BCS621: COMPILER DESIGN LABORATORY
Credits: 1

LTP
002

Course Description: The course aims to equip the students with basic compiler functioning. The course includes different methods of lexical analysis, design top-down and bottom-up parsers, develop syntax directed translation schemes and develop algorithms to generate code for a target machine

Course Outcomes (CLO):

Upon successful completion of the course, the students should be able to:

CO1: Develop lexical analyser for a given grammar specification

CO2: Design top-down and bottom-up parsers for a given parser specification

CO3: Develop syntax directed translation schemes

CO4: Apply algorithms to generate code for a target machine

List of Experiments:

1. C Program to Design Lexical Analyzer

2. Understanding the LEX/FLEX tool. Implementation of Lexical Analyzer using LEX/FLEX Tool.

3. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)

3. Implementation of Predictive Parser in C language.

4. Understanding the YACC tool.

5. Generate YACC specification for a few syntactic categories.

a. Program to recognize a valid arithmetic expression that uses operator +, −, * and /.

b. Program to recognize a valid variable which starts with a letter followed by any number of letters or digits.

c. Implementation of Calculator using LEX/FLEX and YACC

6. Convert the BNF rules into YACC form and write code to generate Abstract Syntax Tree.

7. Implement type checking.

8. Implement control flow analysis and Data flow Analysis.

9. Implement any one storage allocation strategies (Heap, Stack, Static)

10. Construction of DAG

11. Implement the back end of the compiler which takes the three-address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.

12. A Program to Generate Machine Code.

13. Implementation of Simple Code Optimization Techniques.

14. Design of a mini compiler for simple programs.

BCS623: DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY
Credits: 1

LTP
002

Course Description: The course aims to equip the students with the implementation of various algorithms.

The course includes solving problems using divide and conquer strategy, backtracking strategy and greedy and dynamic programming techniques.

Course Outcomes (CLO):

Upon successful completion of the course, the students should be able to:

CO1: Design algorithms using divide and conquer, greedy and dynamic programming.

CO2: Use the design techniques such as dynamic programming, greedy algorithm for more complex problems.

CO3: Analyze the performance of merge sort algorithms using divide and conquer technique.

CO4: Apply the dynamic programming technique to solve real world problems such as knapsack and TSP.

List of Experiments:

1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

2. Using OpenMP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

3. Obtain the Topological ordering of vertices in a given digraph.

4. Compute the transitive closure of a given directed graph using Warshall's algorithm.

5. Implement 0/1 Knapsack problem using Dynamic Programming.

6. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

7. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.

8. Print all the nodes reachable from a given starting node in a digraph using BFS method.

9. Check whether a given graph is connected or not using DFS method.

10. Find a subset of a given set S = {sl, s2, ,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S={1, 2, 5, 6, 8} and d = 9 there are two solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

11. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.

12. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.

13. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using OpenMP and determine the speed-up achieved.

14. Implement N Queen's problem using Back Tracking.

ELECTIVE -III LABORATORY
BTCY616: ETHICAL HACKING LABORATORY
Credits: 1

L T P
0 0 2

Course Description:

The course aims that the students practices of finding the vulnerabilities through forming the different attacks and then defining the appropriate security policy including the action to detect or prevent the attacks and thus reduce the damages. This course includes security, importance of data gathering, foot printing and system hacking.

Course Outcomes (CLO):

Upon successful completion of the course, the students should be able to:

CO1: Develop the foot printing and scanning

CO2: Demonstrate the techniques for system hacking

CO3: Determine the signature of different attacks and prevent them

CO4: Identify and prevent the security attacks in different environments.

List of Experiments:

1. List the tools for Ethical Hacking.

2. Implement Footprinting and Reconnaissance using tools 3d Traceroute, Alchemy Eye, DNS Tools and Network Solution Whois.

3. Implement Network Scanning using tools Advanced Port Scanner, Colasoft Ping Tool, Hide Your IP Address, Nessus and Nmap.

4. Implement Enumeration using tools Default Password List, Default Password List, OpUtil Network Monitoring Tool and OpUtil Network Monitoring Tool.

5. Implement system hacking using tools Actual spy, Alchemy Remote Executor, Armor Tool and FSecureBlackLight.

6. Implement Trojan and Backdoors using tools Absolute Startup Manager, Absolute Startup Manager, Netwirx Services Monitor and StartEd Lite.

7. Implement Viruses and Worms using tools Anubis Analyzing UnknownBinaries, Filterbit, Sunbelt CWSandbox and ThreatExpert.

8. Implement sniffers using tools Colasoft Capsa Network Analyzer, EffeTech HTTP Sniffer, Packet Sniffer and PRTG Network Monitor.

9. Write a research paper in which Ethical Hacking tools are used to address any problem definition in cyber security.

BTCY617: MALWARE ANALYSIS LABORATORY
Credits: 2

LTP
002

Course Objectives: The course aims to equip the Students with a specialist understanding of the nature of malware, its capabilities, and how it is combated through detection and classification. This course includes techniques and concepts to unpack, extract, decrypt, or bypass new ant analysis techniques in future malware samples.

Course Outcomes (CLO):

Upon successful completion of the course, the students should be able to:

CO1: Define what the underlying scientific and logical limitations on society's ability are to combat malware.

CO2: Apply the tools and methodologies used to perform static on unknown executables.

CO3: Describe the executable formats, Windows internals and API, and analysis techniques.

CO4: Apply techniques and concepts to unpack, extract, decrypt, or bypass new ant analysis techniques in future malware samples.

List of Experiments:

1. Sandboxing malware and gathering information from runtime analysis

2. Basic malware analysis finding file compilation date, imports/ exports, suspicious strings , run- time effect, procmon filter, hist -based signatures revealing files, registry keys, processes, services, network based signatures revealing URLs, packet contents, intention, checksum, and evidence

3. Advanced static malware analysis finding address of main, code constructs, suspicious strings, imported functions, their tasks, intention of the malware, impact of the malware via hexcode

4. Basic analysis of Windows programs for imports, msdn based purposes, changes, suspicious strings, persistence mechanism, COM interface, COM functions, host-based signature, checksum, VirusTotal Report for that malware.

5. Advacned analysis of Windows programs for processes, interactive remote shell, uploaded file, address of the subroutine, return value, Windows APIs, functionalities of the malware

6. Malware behaviour analysis finding the source of malware, how it reached the system, persistence mechanism, multiple instances replication mechanism, hiding strategies, API calls for key logging, constants involved, post-infection actions of the malware, mutex, SendMessage API structure, what is done with the collected data

7. Anti-disassembly and anti-debugging technique used in the binary by patching the PE, set a breakpoint in the malicious subroutine and let the program execute until the breakpoint

8. Packing and unpacking malware finding the packers name, indicator, unpacking script, removing the nagging screen, resolving any PE header corruption, fixing the import table

9. Disassembling Portable Executable (PE32) File Format following all imports, exports, functions, main address, malicious string locations, x86 assembly language

10. Reversing basics: branches, loops, switches, differences between code and data, cross-references,imports & exports, searching, defining arrays, structures , and ,functions, standard library functions and FLIRT, IDA scripts and plugins

11. Malware self - defense, compression, and obfuscation techniques packing, unpacking, identifying malicious code section, recognizing and defeating data encryption and encoding techniques etc

12. Analyzing malicious Microsoft Office and Adobe PDF documents to locate potentially malicious embedded code such as shellcode, VBA macros or JavaScript, extract suspicious code from the file, disassemble and/ or debug shellcode, understand all the steps in the infection chain

13. Minor Project to design Malware Detection System

BTCY617: MALWARE ANALYSIS LABORATORY

Credits: 2

L T P
0 0 2

Course Description:

Wireshark is the world's de-facto network packet sniffer which can be used for protocol analysis, network troubleshooting, finding delays and latency in the network and many other things. It is an open source cross-platform packet capture and analysis tool, with versions for Windows and Linux operating systems.

Nmap is a tool used for determining the hosts that are running and what services the hosts are running. Nmap can be a valuable diagnostic tool for network administrators while they can be also a potent reconnaissance tool for the Black-hat community (Hackers, Crackers, Script Kiddies, etc).

Course Outcomes (CLO):

CO1: Strengthens the analytical capability of the students using Wireshark
CO2: Determining open ports and services running in an host
CO3: Determine the Operating System running on a host
CO4: Alter the source IP of the scan

List of Experiments:
WireShark Experiments

Working with various methods for Taping into the wire.
Demonstrate the steps for installing Wireshark, the packet-sniffing tool for performing Network analysis.
Explore the working with captured packets.
Implement advanced Wireshark features.
Analysis of security packet analysis.
Implementing Operating System Fingerprinting.
Creating Troubleshooting profiles
Selecting a Capture Interface and creating the first pcap file.
Using Capture filters, Filtering Low ttl value packets and Creating Filter Expression buttons
Find, Mark, Save interested Packets
Navigate through menus and status bar
Finding a Text String in a Trace File and Configuring global preferences
Merging Multiple Trace Files, Creating Display Filters, Create a Coloring Rule to Detect specific traffic
Ring Buffer capture and working with File Sets
Analze Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP)

Analze IPV4 Structure and Filter on a Range of IPv4 Addresses
Understanding Columns and time value evaluation
Follow a TCP Stream and Reconstructing a TCP stream
Unsecured username and password recovery from trace
Build and Save Filters Based on Packets
Implement Round Trip Time – TCP 3 way handshake Analysis, The double headed ICMP packet Analysis
Filtering TCP Flag parameters, IP Flag parameters, DNS Flag parameters, Filtering Latency Issues
Enabling TCP Conversation Timestamps and Sequence and Analysis
DNS Errors and Error Codes Filtering and Analysis
Using the frame.time_delta Filter, nTroubleshooting with Time column
Understanding Packet Loss and Recovery process
Locating Low Buffer problems, Zero window condition and Windows update process
Creating IO Graphs, IP fragmentation packet analysis
Out of order segments and duplicate acknowledgements filtering
Retransmissions, Fast Retransmissions and Spurious Retransmissions
Filtering HTTP and DNS Errors, Filter on HTTP server status codes
Extract and save single subnet conversation
Change dissector behaviour -measuring http response time
Exporting an HTTP object – reconstructing browsed images
IP fragmentation packet analysis

Nmap Experiments:
Scan a System with Hostname and IP Address
Scan using "-v" option
Scan Multiple Hosts
Scan a whole Subnet

Fourth Year

BCS701: ARTIFICIAL INTELLIGENCE

Credits: 3

LTP
300

Course Description: The course aims to equip the students with various Artificial Intelligence Techniques and knowledge representation methods.

The course includes knowledge acquisition, manipulation, various AI algorithms, Expert system and Natural Language Processing.

Course Outcomes (CLO):

Upon successful completion of the course, the students should be able to:

CO1: Understand the basic concepts and techniques of Artificial Intelligence.

CO2: Apply AI algorithms for solving practical problems.

CO3: Describe human intelligence and AI.

CO4: Select appropriately from a range of techniques when implementing intelligent systems.

Course Content

UNIT I

Introduction and Applications: History of AI from Alan Turing and developments in AI, AI techniques, Criteria for success. Problem Solving Concepts and Methods

UNIT II

Problem Characteristics, Breadth -first Search and Depth-First Search methods, Heuristic Search Techniques - Hill Climbing, Best first Search, A*, Problem reduction, Ao*, Constraint satisfaction and means-ends analysis techniques

UNIT III

Information and Knowledge, Knowledge Acquisition and Manipulation, Issues in knowledge representation, Knowledge Representation Methods, Propositional Logic and First Order Predicate Logic, Resolution Principle, Horn's Clauses, Semantic networks, Partitioned Semantic Nets, Frames, Scripts and Conceptual Dependencies, Gameplaying: Minimax Search Procedure, Adding Alpha-Beta Cutoffs

UNIT IV

Definition and Applications, Characteristics of Expert Systems, Architecture of a typical expert system, Expert system Shells, Building an Expert System, Knowledge Acquisition, Case studies of Expert Systems like MYCIN. Specific Application of AI

UNIT V

Complexity of the problem, Syntactic processing, Semantic Analysis, Pragmatic processing, Introduction to Perception and Action.

Machine Learning: Clustering and Learning Basic Clustering Techniques, Standard k-Means

(Lloyd) Algorithm, Generalized Clustering, Overpartitioning, Merging, Modifications to the k-MeansAlgorithm, k-Means Wrappers, Rough kMeans, Fuzzy k-Means, k-Harmonic Means Algorithm, Hybrid Clustering Algorithms; Estimation using Incomplete Data, Two classes, Multiple classes, Least squares for classification, Fisher's linear discriminant, Relation to least squares, Fisher's discriminant for multiple classes

Recommended Books / Suggested Readings:

1. Rich Elaine and Knight Kevin,1991: Artificial Intelligence, second edition; Tata-McGraw Hill Company, New Delhi

2. Russel, Sturat & Norviig, Peter, 2007: Artificial Intelligence; a modern Approach published by Person Education (Singapore)Pvt. Ltd.

3. George F Luger; William A. Stubblefield, 2009: Artificial Intelligence; Structures and Strategies for Complex problem solving, Second edition

4. Bala guruswami, 1994: Artifical Intelligence & Technology

5. Bharti&Chaitany, 2005: Natural Language Processing, PHI. 8. Patterson, Dan W., 1995.: Introduction to Artificial Intelligence and Expert Systems, Prentice-Hall of India Pvt.Ltd., New Delhi.

BCS942: COMPUTER VISION
Credits: 3

L T P
3 0 0

Course Description:

The course aims to equip the students with fundamental problems of computer vision.

The course includes computer vision fundamentals, model fitting, Model reconstruction and Object recognition and shape representation

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Understand the fundamental concepts in computer vision

CO2: Develop and evaluate solutions to problems in computer vision.

CO3: Demonstrate awareness of the current key research issues in computer vision.

CO4: Analyze and design a range of algorithms for image processing and computer vision.

Course Content

UNIT I

Introduction: overview of computer vision, related areas, and applications; overview of software tools; overview of course objectives.; introduction to OpenCV. Image formation and representation: imaging geometry, radiometry, digitization, cameras and projections, rigid and affine transformations. Filtering: convolution, smoothing, differencing, and scale space. Feature detection: edge detection, corner detection, line and curve detection, active contours, SIFT and HOG descriptors, shape context descriptors.

UNIT II

Model fitting: Hough transform, line fitting, ellipse and conic sections fitting, algebraic and Euclidean distance measures. Camera calibration: camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration; camera parameters from projection matrices; orthographic, weak perspective, affine, and perspective camera models. Epipolar geometry: introduction to projective geometry; epipolar constraints; the essential and fundamental matrices; estimation of the essential/fundamental matrix.

UNIT III

Model reconstruction: reconstruction by triangulation; Euclidean reconstruction; affine and projective reconstruction. Motion analysis: the motion field of rigid objects; motion parallax; optical flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; regularization and robust estimation; motion segmentation through Emotion tracking: statistical filtering; iterated estimation; observability and linear systems; the Kalman filter; the extended Kalman filter

UNIT IV

Object recognition and shape representation: alignment, appearance-based methods,

invariants, image eigenspaces, data-based techniques. Final presentation: students present selected topics and develop software implementation of related techniques based on the review of relevant literature. The workshould be summarized in a concluding report which should include simulation results. A list of possible topics will be advertised prior to the project selection due date.

Reference Books:

1. Computer Vision: Algorithms and Applications, R. Szeliski, Springer, 2011.
2. Computer Vision: A Modern Approach, D. Forsyth and J. Ponce, Prentice Hall, 2nd ed., 2011.
3. Introductory techniques for 3D computer vision, E. Trucco and A. Verri, Prentice Hall, 1998.

BTCY711: VULNERABILITY ASSESSMENT AND PENETRATION TESTING

L T P
3 0 0

Credits: 3

Course Description:

The course aims to equip the students with basic knowledge of Kali Linux, penetration testing and IT security techniques that lies under the cyber security. This course includes tools used in Kali Linux, and Information Gathering and Detecting Vulnerabilities.

Course Outcomes (CLO):

Upon successful completion of the course, the students should be able to:

CO1: Discuss the penetration testing standards.

CO2: Identify Vulnerability Assessment Tools for System.

CO3: Classify the basic structure of Exploits and Client-Side Attack and privileges escalation.

CO4: Apply a mature understanding of various types of penetration testing.

Course Content

UNIT I

Introduction to Kali Linux: Installing kali Linux, Configure Network Connection, Update kali Linux. Penetration Testing: standard, Open Web Application Security Project (OWASP), Licensee Penetration Testing (LPT), Classification, White Box and Black Box, Penetration Testing Vs Vulnerability Assessment

Advance Penetration Methodology: Target Framework and Scope, Gathering client requirements, Test plan checklist, Profiling test boundaries, Advance penetration testing with Kali Linux.

UNIT-II

Information Gathering and Detecting Vulnerabilities: Open Source Intelligence Gathering – Port Scanning - Open Vas, Nessus Policies - Web Application Scanning Manual Analysis- Traffic Capturing, Google hacking, enumerating users, groups and shares, DNS Information Gathering, Whois Information Gathering, Route and Network information Gathering, All-in-one information gathering. Scanning Target: Advance Network Scanning, Port Scanning, Stealth Port scanning techniques, UDP port Scanning, Packet crafting using Hping3, Nmap Scanning and Plug-ins, CTF, Active and Passive Banners.

UNIT-III

Target Exploitation: Setting up metaslpoit, Exploitation with Metasploit, working with Meterpreter Session, VNC Exploitation, Stealing password Hash, Adding custom Modules to Metasploit, Using Immunity Debugger, Writing Exploit for real world applications.

Privileges Escalation: Breaking Password hashes, Cracking telnet and ssh password, Cracking FTP password, Protocol tunneling, Proxy, Installing persistent Backdoor.

UNIT-IV

Advance Sniffing: ARP Poisoning, DHCP Starvation, Mac flooding, DNS Poisoning: redirecting user to fake website, Sniffing credentials from secured websites, SYN Attack, Application request Flood Attack, Service request Flood, Permanent denial of service attack.

Testing: Web Penetration Testing, Wireless Penetration Testing, Exploits and client-Side attack, Social Engineering Toolkit, Firewall Testing.

Reference Books:

1. Kali Linux Wireless Penetration Testing: Beginner's Guide: Learn to penetrate Wi-Fi and wireless networks to secure your system from vulnerabilities Kindle Edition by Vivek Ramachandran, Cameron Buchanan
2. Basic Security Testing with Kali Linux 2 Paperback – 24 March 2016 by Daniel W. Dieterle
3. Kali Linux Network Scanning Cookbook Paperback – 21 August 2014 by Justin Hutchens

ELECTIVE-IV
1.CYBER CRIME INVESTIGATIONS AND DIGITAL FORENSICS
2.SYSTEM AND NETWORK SECURITY
3.SOCIAL MEDIA SECURITY

BCS742: CYBER CRIME INVESTIGATIONS AND DIGITAL FORENSICS
Credits: 3

L T P
3 0 0

Course Description: The course aims to help the students to learn the overview of cybercrime and to learn the issues of cybercrime.

The course introduces the students and enables to know to learn the various methods to investigate cybercrime, to learn about digital forensics and to understand the laws and acts behind.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Understand the basic terminology of cybercrimes.

CO2: Apply a number of different computer forensic tools to a given scenario.

CO3: Analyze and validate digital evidence data.

CO4: Analyze acquisition methods for digital evidence related to system security.

CO5: Identify the various laws and acts of Digital Forensics.

Course Content

UNIT I

Introduction: Introduction and Overview of Cyber Crime - Nature and Scope of Cyber Crime - Types of Cyber Crime: Social Engineering - Categories of Cyber Crime - Property Cyber Crime

UNIT-II

Information Gathering and Detecting Vulnerabilities: Cyber Crime Issues: Unauthorized Access to Computers - Computer Intrusions - White Collar Crimes - Viruses and Malicious Code - Internet Hacking and Cracking - Virus Attacks – Software Piracy - Intellectual Property - Mail Bombs - Exploitation - Stalking and Obscenity in Internet - Digital laws and legislation - Law Enforcement Roles and Responses

UNIT-III

Investigation: Introduction to Cyber Crime Investigation -Investigation Tools – Discovery - Digital Evidence Collection - Evidence Preservation - E-Mail Investigation – Tracking - IP Tracking - E-Mail Recovery - Hands on Case Studies - Encryption and Decryption Methods - Search and Seizure of Computers - Recovering Deleted Evidences - Fake Mailer (Mail Spoof),

Email Headers Forensics, End to End Encryptions, Password Cracking, Fake Mailer (Mail Spoof), Email Headers Forensics, End to End Encryptions

UNIT IV

Digital Forensics: 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.

UNIT V

Laws and Acts: Laws and Ethics - Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies

Recommended Books / Suggested Readings:

1. Nelson Phillips and EnfingerSteuart, —Computer Forensics and Investigations‖, Cengage Learning, New Delhi, 2009.
2. Kevin Mandia, Chris Prosise, Matt Pepe, —Incident Response and Computer Forensics, Tata McGraw-Hill, New Delhi, 2006
3. Robert M Slade, ‖ Software Forensics‖, Tata McGraw - Hill, New Delhi, 2005
4. Bernadette H Schell, Clemens Martin, —Cybercrime‖, ABC – CLIO Inc, California, 20043.

BTCY703: SYSTEM AND NETWORK SECURITY

Credits: 3

L T P
3 0 0

Prerequisites

Computer Networks, Network Security

Course Description: The course aims are to provide knowledge on different types of Intrusions occur at various Network levels, and level of security provisions required when the systems are used at different networks in LAN, WAN.

The course introduces the students and enables to know to learn the LAN, Cellular Network and Internet Security.

Course Outcomes (CO):

CO1: Develop Concept of Security needed in Communication of data through computers and networks along with Various Possible Attacks.

CO2: Describe the level of security required for a system in Intranet, Internet, cellular networks.

CO3: Identify security issues related to computer security.

CO4: Determine the attack mechanisms, and methods against computer and information systems

Course Content

UNIT I

Detecting System Intrusions: Monitoring Key Files in the System ,Zero Day attacks ,Full packet capture devices ,Data correlation ,SEIM, Network-Based Detection of System Intrusions

Preventing System Intrusions: Symptoms of Intrusions, Security policies , Risk Analysis ,Controlling user Access, Intrusion Prevention capabilities

UNIT-II

Guarding Against Network Intrusions: Traditional Reconnaissance and Attacks, Malicious Software , Defense in Depth, Preventive Measures , Intrusion Monitoring and Detection, Reactive Measures, Network- Based Intrusion Protection

Internet Security: Internet Protocol Architecture, Internet Threat Model, Defending against Attacks on the Internet, Internet Security Checklist

UNIT-III

Intranet Security: Smart phones and Tablets in the Intranet, Security Considerations Plugging the Gaps: NAC and Access Control, Measuring Risk: Audits,

Guardian at the Gate: Authentication, and Encryption, Wireless Network Security , Shielding the Wire: Network Protection

Weakest Link in Security: User Training, Documenting the Network: Change Management

UNIT IV

Local Area Network Security Identify Network Threats, Establish Network Access Controls, Risk Assessment, Listing Network Resources, Threats, Security Policies, The Incident-Handling Process, Secure Design Through Network, Access Controls , IDS Defined NIDS: Scope and Limitations, Firewalls , Dynamic NAT Configuration Packet Filtering: IP Filtering Routers, Application Layer Firewalls: Proxy Servers

UNIT V

Cellular Network Security: The State of the Art of Cellular Network Security, Cellular Network Attack Taxonomy, Cellular Network Vulnerability Analysis RFID Security RFID challenges, RFID protections.

Text Books

1. Network and System Security ,John R Vacca , 2nd edition , Syngress publications

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BTCY704: SOCIAL MEDIA SECURITY

Credits: 3

L T P
3 0 0

Course Description: The course aims are to provide knowledge on the risks while using social media. The course introduces the students and enables to know the privacy and security issues on online social media.

Course Outcomes:

CO1: Understand the various privacy and security concerns (spam, phishing, fraud nodes, identity theft) on Online Social Media.

CO2: Identify the risks while using social media.

CO3: Analyze how to secure different web browsers.

CO4: Interpret how an e-mail works does; learn threats involved using an email communication, safety measures while using e-mail.

Course Content

UNIT I

Introduction to Social Media, Understanding Social Media, Different Types and Classifications, The Value of Social Media, Cutting Edge Versus Bleeding Edge, The Problems That Come With Social Media, Is Security Really an Issue? Taking the Good with the Bad

UNIT-II

Dark side Cyber crime, Social Engineering, Hacked accounts, cyberstalking, cyberbullying, predators, phishing, hackers

UNIT-III

Being bold versus being overlooked, Good social media campaigns, Bad social media campaigns, Sometimes it's better to be overlooked, Social media hoaxes, The human factor, Content management, Promotion of social media

UNIT IV

Risks of Social media Introduction Public embarrassment, Once it's out there, it's out there False information, Information leakage, Retention and archiving, Loss of data and equipment

UNIT V

Policies and Privacy, Blocking users controlling app privacy, Location awareness, Security Fake accounts passwords, privacy and information sharing

Text Books:

1. Interdisciplinary Impact Analysis of Privacy in Social Networks,Recognizing Your Digital Friends, Encryption for Peer-to-Peer Social NetworksCrowdsourcing and Ethics ,Authors: Altshuler Y, Elovici Y, Cremers A.B, Aharony N, Pentland A. (Eds.) .

2.Social media security https://www.sciencedirect.com/science/article/pii/B97815974998660000

ELECTIVE-V

1.INTRUSION DETECTION SYSTEM

2.CYBERSPACE OPERATIONS AND DESIGN

3.COMPUTER SECURITY & AUDIT ASSURANCE

BCS747: INTRUSION DETECTION SYSTEM
Credits: 3

L T P
3 0 0

Course Description:

The course aims to equip the students with intrusion detection and prevention basics and approaches.

The course includes taxonomy of anomaly detection system, architecture and justification of intrusion detection, applications and tools for intrusion detection, legal issues and organizations standards.

Course Outcomes (CLO):

Upon successful completion of the course, the students should be able to:

CO1: Describe the intrusion detection and prevention basics and approaches.

CO2: Explain the taxonomy of anomaly detection system

CO3: Remember the architecture and justification of intrusion detection.

CO4: Apply the intrusion detection applications.

CO5: Explain the legal issues and organizations standards

CO6: Apply the intrusion detection applications.

Course Content

UNIT I

Introduction: Understanding Intrusion Detection – Intrusion detection and prevention basics – IDS and IPS analysis schemes, Attacks, Detection approaches –Misuse detection – Anomaly detection – specification based detection – Hybrid detection.

UNIT II

Theoretical Foundations of Detection: Taxonomy of anomaly detection system – Fuzzy logic – Bayes theory – Artificial Neural networks – Support vector machine – Evolutionary computation – Association rules – Clustering.

UNIT III

Theoretical Foundations of Detection: Taxonomy of anomaly detection system – Fuzzy logic – Bayes theory – Artificial Neural networks – Support vector machine – Evolutionary computation – Association rules – Clustering.

UNIT IV

Applications and Tools: Tool Selection and Acquisition Process - Bro Intrusion Detection – Prelude Intrusion Detection - Cisco Security IDS - Snorts Intrusion Detection – NFR security

UNIT V

Legal Issues and Organizations Standards: Law Enforcement / Criminal Prosecutions – Standard of Due Care – Evidentiary Issues, Organizations and Standardization

Recommended Books / Suggested Readings:

1. Ali A.Ghorbani, Wei Lu, MahbodTavallaee, ―Network Intrusion Detection and Prevention: Concepts and Techniques‖, Springer, 2010.

2. Carl Enrolf, Eugene Schultz, Jim Mellander, ―Intrusion detection and Prevention‖, McGraw Hill, 2004.

3. Paul E. Proctor, ―The Practical Intrusion Detection Handbook ―, Prentice Hall, 2001.

4. AnkitFadia and MnuZacharia, ―Intrusion Alert‖, Vikas Publishing House Pvt., Ltd, 2007

5. Earl Carter, Jonathan Hogue, ―Intrusion Prevention Fundamentals‖, Pearson Education, 2006.

BTCY705: CYBERSPACE OPERATIONS AND DESIGN
Credits: 3

L T P
3 0 0

Course Objectives:

This course provides a basic understanding of full-spectrum cyberspace operations, the complexities of the cyberspace environment, as well as planning, organizing, and integrating cyberspace operations. The course will consist of presentations and exercises that will teach students how to develop a cyber- operations design and bring it to fruition. This course includes concept of operations and real cyber capabilities, provides students with the understanding, tools, and processes needed to conduct malware analysis with real-world malicious code samples to dissect

Course Outcomes (CO):

After attending this course students will have the knowledge of following topics

CO1: Understand the Cyberspace Environment and Design

CO2: Prepare and plan an effective offensive and defensive strategy, as well as evaluate covert protocols.

CO3: Identify the tools, and processes needed to conduct malware analysis with real-world malicious code samples to dissect.

CO4: Build Cyber Warriors and Warrior Corps

Course Content

UNIT I

Understanding the Cyberspace Environment and Design- Cyberspace environment and its characteristics, Developing a design approach, Planning for cyberspace operation

UNIT II

Cyberspace Operational Approaches- Foundational approaches that utilize cyberspace capabilities to support organizational missions, The pros and cons of the different approaches

UNIT III

Cyberspace Operations- Network Operations (NETOPS), Defensive Cyberspace Operations (DCO), Offensive Cyberspace Operations (OCO), Defense and Diversity of Depth network design, Operational methodologies to conduct cyberspace operations

UNIT IV

Cyberspace Integration- Design a cyberspace operation and integrate it with a Joint Operations plan, Practice the presented methodologies in a practical application exercise.
Building Cyber Warriors and Warrior Corps- The warrior and warrior corps concept as applied to cyber organizations, The challenges of training and developing a cyber-workforce from senior leadership to the technical workforce

UNIT V

Designing Cyber Related Commands- Mission statements, Essential tasks, Organizational structures, Tables of organizations
Training and Readiness for Cyber Related Commands- Mission Essential Tasks (METs), Developing the cyber workforce, Plan your own training programs within your organization.

Text books and References:

1. Paulo Shakarian et al. "Introduction of Cyber Warfare: A Multidisciplinary Approach," syngress, Elsevier 2013.
2. Jeffery carr et al, "Inside Cyber Warfare: Mapping the Cyber Underworld," O'Reilly Publication December 2012.
3. Jason Andress et al. "Cyber Warfare: Techniques, Tactics and Tools for Security Practitioners" Syngress, Elsevier 2013.
R. A. Clarke, Robert Knake "Cyber War: The Next Threat to National Security and What to Do About It" Haper Collins Publisher 2010.

BTCY706: COMPUTER SECURITY & AUDIT ASSURANCE
Credits: 3

L T P
3 0 0

Course Description:

This course provides the fundamental concepts and techniques in computer and network security, and latest trend of computer attack and defense.

This course includes overview of information security and auditing, and to expose students to the latest trend of computer attack and defense

Course Outcomes (CLO):

1. Describe fundamental concepts of information security and systems auditing

2. Analyze the latest trend of computer security threats and defense

3. Identify security weaknesses in information systems, and rectify them with appropriate security mechanisms

4. Explain the security controls in the aspects of physical, logical and operational security control

Course Content

UNIT I

System Audit and Assurance – Characteristics of Assurance services , Types of Assurances services,Certified Information system auditor , Benefits of Audits for Organization, COBIT

UNIT II

Internal Control and Information system Audit - Internal Control, Detective control, Corrective Control ,Computer Assisted Audit Tools and Techniques

UNIT III

Conducting Audit – Standard practices, policies, Audit planning, Risk Assessment, Information gathering techniques, Vulnerabilities, System security testing, conducting Audits for Banks

UNIT IV

Network Security and Control , Internet Banking Risks and Control , Operating System Risks and Control , Operational Control Overview

UNIT V

Business Continuity and Disaster Recovery Planning Control – Databackup/storage, Developing appropriate Disaster recovering strategy, Business Impact analysis

Text books and References:

1. Information System Audit and Assurance, D. P. Dube, Ved Prakash Gulati; Tata McGrawHill Education, 01-Jan2005

2. Auditing IT Infrastructures for Compliance, Martin Weiss, Michael G. Solomon; Jones & Bartlett Publishers, 10Jul-2015

BCS712: ARTIFICIAL INTELLIGENCE LABORATORY
Credits: 1

L T P
0 0 2

Course Description:

The course aims to equip the students with the basic concepts of how to use various AI techniques. This course includes various techniques and algorithms of AI used in general problem solving, optimization problems, constraint satisfaction problems, and game programming.

Course Outcomes (CO):

Upon completion of this course, the students will be able to

CO1: Explain artificial intelligence, its characteristics and its application areas.

Co2: Formulate real-world problems as state space problems, optimization problems or constraint satisfaction problems.

CO3: Select and apply appropriate algorithms and AI techniques to solve complex problems.

CO4: Design and develop an expert system by using appropriate tools and techniques.

List of Experiments:

1. Defining AI; Turing's test; Weak vs. Strong AI.

2. Applications of AI; Agent based approach

3. State space search: DFS, BFS, IDS algorithms

4. Informed search: A* algorithm

5. Optimization problems & Local search algorithms

6. Genetic algorithms

7. Constraint satisfaction problems

8. Expert systems

9. Game playing (adversarial search)

10. Introduction to machine learning

BCS932: COMPUTER VISION LABORATORY

Credits: 1

L T P
0 0 2

Course Description:

This lab equips learner with knowledge in how computers see and interpret the world as humans do; core concepts of Computer Vision and human vision capabilities; key application areas of Computer Vision and Digital Image Processing; Machine Learning and AI basics; and more.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Implement basic knowledge, theories and methods in image processing and computer vision.

CO2: Identify, formulate and solve problems in image processing and computer vision.

CO3: Analyze, evaluate and examine existing practical computer vision systems.

List of Experiments:

1. Windows and Plots
2. Program to change the Brightness of Image
3. To Flip the image around the vertical andhorizontal line
4. Display the color components of the image Red Green Blue Components of Image
5. To find the negative of an image
6. Calculate the Histogram of a given image
7. Histogram Equalization of an image.
8. Program for Image Filtering (low pass filter)1) Average filter2) Weighted Average filter3) Median filter High pass filters using1) Sobel operator2) Laplacian operator
9. Edge detection with gradient andconvolution of an Image
10. Program to find threshold of grayscale image.
11. Program to find threshold of RGB image.
12. Program to estimate and subtract thebackground of an image.
13. Program to convert color image to gray and HSV
14. Mini Project.

LABORATOTY

Credits: 1

L T P
0 0 2

Course Objectives:

The course aims that the Students will gain practical experience with designing and implementing concepts of Kali Linux. In this course students will be able to:

1. Build a test lab using Oracle VirtualBox, Kali Linux, and two vulnerable applications: DVWA and InsecureBank.
2. Classify Windows environments to identify an attack surface.
3. Create persistent access to an exploited machine and maintain a stable backdoor.
4. Demonstrate a variety of industry standard penetration testing tools within the Kali Linux distribution

Course Outcoes (CLO):

Upon successful completion of the course, the students should be able to:

CO1: Interpret of the penetration testing standards.

CO2: Build Vulnerability Assessment Tools for System.

CO3: Discuss the basic structure of Exploits and Client-Side Attack and privileges escalation.

CO4: Apply a mature understanding of various types of penetration testing.

List of Experiments:

1. Download and Configure Kali Linux
2. Set up of Kali Linux in a Virtual machine and setup with DNS info and collection of local network.
3. Scan the network for Windows XP and Windows 7 Target machines in local network and virtual network
4. Identify the open ports and firewall rules setup.
5. Use password guessing tools to guess a password. Use password strengthening tools to strengthen the password. Try guessing the password and tabulate the enhanced difficulty due to length of password and addition of special characters
6. Extract password hashes from Windows XP/ NT machine. Use a password extraction tool, using word list, single crack or external mode to recover the password. Increase the complexity of the password and determine the point at which the cracking tool fails
7. Experiments on SQL injections.
8. Analysis of WEP flaws.
9. Experiments on Wireless DoS Attacks.
10. Buffer Overflow Prevention
11. Prevention against Cross Site Scripting Attacks.
12. Experiments on Metasploit Framework.
13. Experiments on CTF.
14. Cross Site Scripting.
15. Cross Site Request Forgery.

BSOP401: MATLAB FOR ENGINEERS
Credits: 3

L T P
3 0 0

Pre-Requisites: N.A

Course Description:

The main description of this course is to provide a foundation in programming for engineering problem solving using the MATLAB software package. Students will develop the skills analyze and break down an engineering program and solve it algorithmically using MATLAB. Students will understand various programming constructs and how they can be used to solve a computational problem.

This course includes MATLAB fundamentals, Graphics in MATLAB and MATLAB in neural networks.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.

CO2: Apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.

Co3: Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Course Contents:

UNIT I

MATLAB: An Overview, Brief history of MATLAB, About MATLAB, Installation of MATLAB, Help browser, Arranging the desktop, Basic functions of Matlab, Mostly used symbols in MATLAB, debugging in Matlab; Building MATLAB expressions: MATLAB datatype, command handling, MATLAB basics.

UNIT II

MATLAB Vector and Matrix: Scalar and vector, elementary features in a vector array, matrices, eigen values and eigen vectors, matrix operations, matrix operators, creating matrix arrangement, indexing array value, other operations, mathematical operations on array, array types

UNIT III

Graphics in MATLAB: 2D plots, parametric plots, contour lines and implicit plots, field plots, multiple graphics display function, 3D plots, multivariate data, data analysis.

UNIT IV

MATLAB programming introduction to M-files,MATLAB editors, M files, scripts, functions, MATLAB error and correction, MATLAB debugger; Digital Image Processing with MATLAB (Image Processing).

UNIT V

MATLAB in neural networks: About neural networks, Human and artificial neuron, Architecture ofneural networks (feed-forward, feedback, network layers), The McCuulloch-Pitts Model of Neuron, The Perceptron, Transfer function, neural network toolbox, Actual model, applications of neural network.

Text Books:

1. MATLAB® Programming for Engineers:Stephen J. Chapman, Thomson Corporation, 4th Edition

BSOP403: DIGITAL MARKETING
Credits: 3

L T P
3 0 0

Pre-Requisites: N.A

Course Description:

The main objective of this course is to educate students in the area of Digital Marketing. Digital Marketing and Social Media have transformed marketing and business practice across the globe. This course provides an understanding of the ever evolving digital landscape and examines the strategic role of digital marketing processes and tools in designing the overall Marketing strategyand the Digital Marketing Plan. It explores the challenges of Interactive media, the online market place, and the creative challenges of communicating and retention strategies of customers through these media, the main search engines and the future trends in digital marketing.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Analyse the confluence of marketing, operations, and human resources in real-time delivery.

CO2: Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities.

CO3: Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks.

CO4: Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked.

CO5: Interpret the traditional marketing mix within the context of a changing and extended range of digital strategies and tactics.

Course Contents:

UNIT I

Introduction to Digital Marketing: The new digital world - trends that are driving shifts fromtraditional marketing practices to digital marketing practices, the modern digital consumer and new consumer's digital journey. Marketing strategies for the digital world-latest practices.

UNIT II

Social Media Marketing -Introduction to Blogging, Create a blog post for your project. Include headline, imagery, links and post, Content Planning and writing. Introduction to Face book, Twitter, Google +, LinkedIn, YouTube, Instagram and Pinterest; their channel advertising and campaigns

UNIT III

Acquiring & Engaging Users through Digital Channels: Understanding the relationship between content and branding and its impact on sales, search engine marketing, mobile marketing, video marketing, and social-media marketing. Marketing gamification, Online campaign management; using marketing analytic tools to segment, target and position; overview of search engine optimization (SEO).

UNIT IV

Designing Organization for Digital Success: Digital transformation, digital leadership principles, online P.R. and reputation management. ROI of digital strategies, how digital marketing is adding value to business, and evaluating cost effectiveness of digital strategies

UNIT V

Digital Innovation and Trends: The contemporary digital revolution, digital transformation framework; security and privatization issues with digital marketing Understanding trends in digital marketing – Indian and global context, online communities and co-creation,

Text books:

1. MoutsyMaiti: Internet Mareting, Oxford University Press India

2. Vandana, Ahuja; Digital Marketing, Oxford University Press India (November, 2015).

3. Eric Greenberg, and Kates, Alexander; Strategic Digital Marketing: Top Digital Experts Share the Formula for Tangible Returns on Your Marketing Investment; McGraw-Hill Professional (October, 2013).

4. Ryan, Damian; Understanding Digital Marketing: marketing strategies for engaging the digital generation; Kogan Page (3rd Edition, 2014).

5. Tracy L. Tuten& Michael R. Solomon: Social Media Marketing (Sage Publication)

BSOP402: CONTENT MANAGEMENT SYSTEM

Credits: 3

LTP
300

Pre-Requisites: N.A

Course Description:

The course aims to equip the students to use the thousands of themes and plugins already out there to design own custom websites by using WordPress.

The course includes CMS and Joomla fundamentals and WordPress.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Appraise the role of content management technologies to organise and present web content.

CO2: Create and deploy websites using content management systems, including creating and editing content, creating custom templates or themes, and performing site management;

CO3: Examine installation and maintenance considerations for modern websites;

CO4: Extend the functionality of content management systems with Web programming.

Course Contents:

UNIT I

Introducing Content Management Systems: Grading and attendance policies, Purchasing and configuring a domain name and web hosting, Exploring CMS terminology, including open source, PHP, MySQL, server-side, client-side, static HTML website, how CMS web pages are generated, and so forth., Website strategy and planning, site mapping, content planning

UNIT II

Introduction to Joomla: Installing Joomla, Exploring the Admin Interface, Content creation using the CAM model, Content customization: images, video, audio, tags, formats, etc., Adding and displaying menus, Linking menus to articles and other features, Extending Joomla, Finding and adding Joomla extensions, Must have extensions for any Joomla site.Adding and setting up 2 "big" extensions (choose blog, calendar, image gallery, Paypal-based shopping cart, or portfolio. Other extensions on approval)

UNIT III

Introduction to WordPress: WordPress.org vs. WordPress.com: Installing WordPress, Exploring the admin interface, Content creation: Posts vs. pages, Content customization: images, video, audio, tags, formats, etc. Extending WordPress As with Joomla, WordPress has the ability to extend, by adding functionality to the CMS via plug-ins and widgets. Learn about working with plug-ins and widgets, including identifying a good plug-in or widget, installing, and configuring them.

Unit -IV

Plugins:Install WordPress Plugins -Installing plugin for SEO on WordPress website - Increasing Speed of WordPress websites -Security of WordPress websites -Contact Form for WordPress websites -Setup Contact us page for WordPress websites -Creating Post and Basics of One

Page Optimization (SEO).

Unit-V

Page Creation:Creating Page Settings, Domain, Choosing the right domain name, Registering your domain, Choosing your hosting services -Comparing various service providers, Choosing your hosting provider, Pointing your domain to hosting provider, Setting up your Web server, Installing your WordPress to your Web server, Transferring Content to Web server

Reference Books:

1. CMS eBook v1.indb (mizoram.gov.in)

2. Web Content Management SYSTEMS, FEATURES, AND BEST PRACTICES. Deane Barker - PDF Free Download (adoc.pub)

BCS543: DOT NET TECHNOLOGIES
Credits: 3

L T P
3 0 0

Course Description: The course aims to equip the students to understand the .NET technologies for C# programming, web development and to enable them to design and construct dynamic and responsive apps for the web. Explain to students the benefits of using.NET technologies and their features. This course includes basics of C#, application development on .NET, web-based application development on .NET, and CLR and .NET framework.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Describe the concept of .Net Framework and C# language fundamentals.

CO2: Develop the console and GUI applications using .Net technology.

CO3: Implement various controls for Creating a web Application.

CO4: Use .NET framework, tools for developing applications.

Course Contents:

UNIT I

INTRODUCTION TO C#: Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

UNIT II

OBJECT ORIENTED ASPECTS OF C#: Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

UNIT III

APPLICATION DEVELOPMENT ON .NET: Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.

UNIT IV

WEB BASED APPLICATION DEVELOPMENT ON .NET: Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

UNIT V

CLR AND .NET FRAMEWORK: Assemblies, Versoning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security.

Recommended Books / Suggested Readings:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.

2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

3. Andrew Troelsen , "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.

Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O"Reilly, 2010.