CURRICULUM FRAMEWORK AND SYLLABUS

FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

Degree Program

FOR THE STUDENTS ADMITTED FROM THE

ACADEMIC YEAR 2020-2021 ONWARDS

FACULTY OF COMPUTATIONAL SCIENCES

GNA UNIVERSITY
SRI HARGOBINDGARH, PHAGWARA – HOSHIARPUR ROAD, PHAGWARA-144401, PUNJAB
INDIA

ORDINANCE

FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

(THIS ORDINANCE HAS BEEN APPROVED IN THE MEETING OF BOARD OF MANAGEMENT HELD ON DATED 05th August 2020)

APPLICABLE W.E.F. ACADEMIC SESSION 2020-2021

SRI HARGOBINDGARH, PHAGWARA – HOSHIARPUR ROAD, PHAGWARA 144401

PUNJAB

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ORDINANCE FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SHORT TITLE AND COMMENCEMENT

I. This ordinance shall be called the ordinance for the B.Sc. (IT) of GNA University, Phagwara.

II. This ordinance shall come into force with effect from academic session 2020-21.

1. **Name of Program: Bachelor of Science (Information Technology).**
2. **Name of Faculty: Faculty of Computational Science.**
3. **Vision of the department:** To Produce highly qualified computer and IT professionals in the field of Computer Science accepting globally for catering the need of the IT industry as well as society.
4. **Mission of the department:**
   - **M1:** To prepare students with technical aspects of computer science, which they are ready to take the new real-world challenges.
   - **M2:** Establish an industry-academia relationship to enhance the technical skills of students to work prominently in industrial environments.
   - **M3:** Provide exposure to students of state-of-the-art tools and technology in the field of computer science.
   - **M4:** Each Faculty member motivates students to become problem-solving individuals, programmer, web developer, Database administrator, Cybersecurity consultant, IT consultant and many more.
5. **Program Educational Outcomes (PEO):**
   - **PEO1:** Effectively communicating computing concepts and solutions to bridge the gap between computing industry experts and business leaders to create and initiate innovation.
   - **PEO2:** Effectively utilizing their knowledge of computing principles and mathematical theory to develop sustainable solutions to current and future computing problems.
   - **PEO3:** Exhibiting their computing expertise within the computing community through corporate leadership, entrepreneurship, and/or advanced graduate study.
   - **PEO4:** Developing and implementing solution-based systems and/or processes that address issues and/or improve existing systems within in a computing-based industry.

- **PEO5:** Effectively communicate in written and oral forms in such a way as to demonstrate their ability to present information clearly, logically, and critically.
- **PEO6:** Using appropriate system design notations and apply system design engineering process in order to design, plan, and implement software systems.
- **PEO7:** Efficiently demonstrate a depth of knowledge appropriate to graduate study and/or lifelong learning in that area. Students should be able to read for understanding materials in that area beyond those assigned in coursework.
- **PEO8:** Apply mathematical and computing theoretical concepts in solution of common computing applications, such as computing the order of an algorithm.

6. Program Specific Outcomes:

- **PSO1**: Understand the basic concepts of computer programming fundamentals, OOP concepts, Databases, Computer system architecture, web applications and, hardware related applications.
- **PSO2:** Understand Identify the fundamental concepts in mobile application development.
- **PSO3** Demonstrate understanding of various programming paradigms in the field of Information Technology.
- **PSO4** Formulate software development terminology into real life systems.
- **PSO5** Develop proficiency in the practice of computing.

7. Program Outcome (PO):

- **PO1: Domain Expertise:** Apply knowledge of computing and mathematics appropriate to the discipline.
- **PO2: Computing Skills and Ethics:** Analyze a problem and identify and define the computing requirements appropriate to its solution.
- **PO3: Lifelong Learning:** Work as teams to build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
- **PO4: Modern Tool Usage:** Use current techniques, skills, and tools necessary for computing practices.
- **PO5: Social Contribution:** Follow professional software engineering practice by applying contextual knowledge to assess societal and legal issues.
- **PO6: Ethics:** Recognize the social and ethical responsibilities of a professional working in the discipline.

8. General Regulation for Faculty of Computational Science:

- The University may introduce programs under Faculty of Computational Science which are specified under the UGC Act 1956. The Governing Body may approve the introduction, suspending or phasing out a program on the recommendation of the Academic Council either on its own or on the initiative of faculty.
- The admissions to a Faculty of Computational Science programs shall be generally governed by the rules of the UGC/AICTE or any other 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.
- The minimum entry qualification for admission to the students of Faculty of Computational Science 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 Computational Science shall be the Senior Secondary School Certificate (10+2) examination. While deciding the admission procedure, the University may lay down compulsory subjects in qualifying examination for admission for various programs in the admission policy.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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 to the Council in its next meeting.

9. General Regulations for the B.Sc. (IT) Programs:

- **Short Title and Commencement:** These regulations shall be called regulations for the UG programs in Faculty of Computational Science of the University and shall come into force on such a date as the Academic Council may approve.
- **Duration:** The duration of the UG programs leading to degrees of B.Sc. (IT) shall be minimum three years and each year will comprise of two semesters. However, the duration may be extended up-to five 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.
- **Starting or Phasing out of Program:** The University may offer such Undergraduate programs in Computational Science leading to award the degree in Bachelor of Science (Information Technology), as per nomenclature laid by the UGC 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.
- **Admissions:** Admission to B.Sc. (IT) program 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, or direct entry into II year through lateral entry scheme etc. shall be defined in the admission policy.
- **Eligibility for Admission:** All those candidates who have the 10+2 or equivalent examination in any stream with 50% (45 % for SC/ST/OBC) marks in aggregate from any recognized board/ Council.

OR

B.SC.(IT) (Lateral Entry): It is a Under Graduate (UG) Programme of 2 years duration (4 semesters) Eligibility: All those candidates who have passed Matriculation examination and have also passed 3 Year Diploma in any Trade from Punjab State Board of Technical Education & Industrial Training, Chandigarh or such Examination from any other recognized State Board of Technical Education, or Sant Longowal Institute of Engineering & Technology, Longowal.

OR

10+2 with 1-year Diploma in Computer Application / IT (or equivalent) from a recognized

University with Mathematics as course at 10+2 or DIT / DCA level.

- **Semester System:** The B.Sc. (IT) 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.
- **Semester Duration:** A semester will be of approximately 18-20 weeks duration. Of these, 90 days will be available for actual instructions including Mid Semester Exam.

10. Curriculum: The 3 years curriculum has been divided into six semesters and shall include lectures/ tutorials/ laboratory work/project work/ viva/ seminars/presentations/ Industry Training/ assignments/Industry Visits. The curriculum will also include other curricular, co-curricular and extra-curricular activities as may be prescribed by the university from time to time.

11. 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.

12. Courses:

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

II. **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/skill is called an Elective Course.

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

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

Note: A core course offered 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**"

III. **Foundation Course:** The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation. "Compulsory Foundation" courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines.

IV. **Ability Enhancement Courses (AEC):** The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement; i. Environmental Science and ii. English/MIL Communication. These are mandatory for all disciplines. SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

i. Ability Enhancement Compulsory Courses (AECC): Environmental Science, English Communication/MIL Communication.

ii. Skill Enhancement Courses (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

13. Medium of Instructions:

11.1 The medium of instructions and examination will be English.

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

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

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

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

15.2 Dean of Faculty may give a further relaxation of attendance up to 5% 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.

15.3 Further, relaxation up to 10% may be given by the Vice Chancellor to make a student eligible under special circumstances only.

15.4 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.

15.5 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 to be counted as absence. However, such absence shall not exceed four weeks per semester of the total period of instructions. Such facility should not be availed twice during the course of study

16. 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 laboratory contact hours in a week.

A letter grade, corresponding to specified number of grade points, is awarded in each course for which a student is registered. On obtaining a pass 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.

Earned Credits (EC): The credits assigned to a course in which a student has obtained 'D' (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.

Contact Hours per Week	Credit Assigned
1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
2 Hours Practical (Lab) per week	1 credit

17. Program Structure:

As per GNA UNIVERSITY **Course Structure B.Sc. (IT)**

Course	*Credits	
	Theory+ Practical (A)	Theory + Tutorial (B)
==========		
I. Core Course		
(12 Papers Course Practical / Tutorials*)		
11 Courses from each of the 4 credits	11 X 4= 44	2 X 4= 8 9 X 3=27 9 X 1 =9
1 Courses from each of the 3 credits	1 X 3 =3	1 X3 =3
8 Practical from each of the 2 credits		8 X 2=16
1 Practical from each of the 1 credit	8 X 2 =16	
	1 X1 =1	1 X 2=2
II. Elective Course **(6 Papers)**	6X4=24	6X5=30

Elective Course Practical / Tutorials* **(6 Practical's / 6Tutorials*)**	6X2=12	6X1=6
II. Generic Elective Courses **(3 Papers of 3 credits**)	3X3=9	3X3=9
III. Ability Enhancement Compulsory Courses (AECC)		
(2 Papers of 4 credit each)	2X4=8	2 X4 =8
(2 Papers of 2 credit each)	2X2=4	2 X 2=4
(Environmental Science, English/MIL Communication)		
(3 Skill Enhancement Courses (SEC)		
(4 Papers of 2 credit each)	4 X 3 = 12	4 X 3 =12
Minor Project	1 X 1= 2	1 X 1 =2
Major Project	1 X 3 =3	1 X 3 =3
Industrial Training	1 X 2=2	1X 1=2
Total credit	**140 (A)**	**140 (B)**

18. Industrial Training:

- Industrial training is a core course, to be done typically during the summer vacations. A student should undergo industrial training for 4-6 weeks, starting after year 2, preferably in an industry, R & D institutions or in an academic institution is of repute permitted. Training of 4th semester shall be graded and essential part of the degree requirement in 5th semester.
- It is the responsibility of the Corporate Relations Department (CRD) to arrange for training for all the students. In the beginning of each academic session, Corporate Relations Department will prepare a program wise list of potential training organizations. These organizations will be approached by the Corporate Relations Department with a request to provide training seats. Consolidated lists of training offers will be made available to the eligible students in the beginning of even semester of the session. If a student is interested in making his/her own arrangement for the training seat, he/she will need to have the training organization approved by routing the application to the Dean of Faculty of Computational Science for approval.
- The students will be required to get their training activity and results reviewed by organization in which they have attended the training. Each Faculty shall nominate training coordinator from amongst the faculty members. The faculty will scrutinize the training report and the

certificate issued by the corporate and will award a satisfactory/unsatisfactory grade, which must be sent to the controller of examination office within one month of commencement of next semester. In case the training is considered to be unsatisfactory, an Unsatisfactory' grade will be awarded and the student shall have to undergo fresh industrial training in part or full duration as decided by the Dean of Faculty of Computational Science. The industrial training, submission of training report and obtaining satisfactory grade is mandatory requirement for award of B.Sc. (IT) degree.

19. **Minor Project:** A project shall be a multifaceted assignment that serves as a culminating academic and intellectual experience for students, typically during the 5th semester at the University. The project may take a wide variety of forms, but they shall be semester-long investigative projects that culminate in a final product, presentation, or performance.

20. **Major Project:** A major project shall be a multifaceted assignment that serves as a culminating academic and intellectual experience for students, typically during their final year at the University. Major projects may take a wide variety of forms, but they shall be Semester long investigative projects that culminate in a final product, presentation, or performance. In projects under the guidance of a faculty member, a final year student is required to do some innovative work with application of knowledge earned while undergoing various courses and labs in the earlier years. The student is expected to do literature survey and carry out development and/or experimentation. Through the project work the student must exhibit both the analytical and practical skills. The student will have to do his/her project under the guidance of the faculty member from the same department unless specifically permitted by the Head of the Department for alternate arrangements.

21. **Examination/Evaluation System:** The evaluation system of the University shall be oriented to encourage the academic qualities. The University follows two components to evaluate student's performance:

    21.1 Internal Assessment: It includes components such as Attendance, Mid-Semester Examination, Assignments, Online MCQ Quiz carrying a weightage of 40%. This is applicable to all theory courses.

    21.2 Laboratory 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 weightage 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-voce/Seminar/Practical as may be decided.

21.3 Laboratory Internal Assessment: It includes components Lab performance, Internal viva-voce, Attendance, Lab Practical File/Report Submission carrying a weightage of 60%. The internal marks of special courses like Project, summer industry training, and six-months industry training has been predefined.

21.4 External Assessment:

a) **End Semester Examination:** These examinations shall be conducted by Controller of Examination. The examination dates and schedule shall be released by the University.

b) End Semester Examination, carrying a weightage of 60%.

c) The external marks of special courses like Project, summer industry training, and six-months industry training has been predefined.

d) External Lab Assessment which includes components (Demonstration/Written Practical Examination, External Lab Viva-Voce) carrying a weightage of 40 %.

e) 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 the overall percentage in the concerned subject remains less than 40%, then a student has to repeat End Semester Examination in that subject.

21.5 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.

21.6 Make Up 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.

21.7 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.

21.8 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.

21.9 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.

22. Supplementary Examination:

22.1 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 pervious semester.

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

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

23. 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

23.1 Description of Grades:

Incomplete		I	-
Withdrawal		W	-
Grade Awaited		GA	-
S-Satisfactory, US-Unsatisfactory Minor Project		**S/US**	-

A. D Grade: The D grades 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 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 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 make up Examination etc. based on which the grade is to be decided along with other components of the evaluation during the semester 24 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 student falling below the laid down attendance requirement. Students having X grade shall be required to re-register for the course, when offered next.

23.2 Cumulative Grade Point Average (CGPA), it is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by 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 decimal places.

NB: The CGPA can be converted to percentage by using the given formula:

CGPA x 10 = %

e.g. 7.8 x 10 = 78%

23.3 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 that semester.

24. 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 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.

25. **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.
26. **Program qualifying criteria:** For qualifying the Program every student is required to earn prescribed credits **(i.e. 140).** 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.
27. **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.
28. **Conditions for Award of a Degree:**

a) Earning a minimum credit as specified in the curriculum of respective program. In case of lateral entry students (direct entry into second year) the minimum credits shall be equivalent to total credits for the program less the credits of first year. This excludes the credits required to be obtained by the student of lateral entry, who is advised to take some equivalence courses.

b) 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.

c) Successfully completing the Internship studies.

d) 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.

Bachelor of Science (Information Technology) Semester I (First year)

Sr. No.	Category	Code	Subject	Teaching Scheme			Credits	Hours	Examination Scheme		TOTAL
				L	T	P			Internal	External	
1.	Core Course-1	BIT101	Computer Fundamentals & Office Automation	4	0	0	4	4	40	60	100
2.	Core Course-1	BIT121	Computer Fundamentals & Office Automation Lab	0	0	4	2	4	30	20	50
3.	Core Course-2	BIT102	Programming in C	3	1	0	4	4	40	60	100
4.	Core Course-2	BIT122	Programming in C Lab	0	0	4	2	4	30	20	50
5.	Core Course-3	BIT103	Basic Mathematics	3	1	0	4	4	40	60	100
6.	Ability Enhanced compulsory Courses-1	COM***	AECC-1	4	0	0	4	4	40	60	100
7.	Generic Elective-1	BIT***	GE-1	3	0	0	3	3	40	60	100
		Total		**17**	**2**	**8**	**23**	**27**	**260**	**340**	**600**

Bachelor of Science (Information Technology) Semester II (First year)

Sr. No.	Category	Code	Subject	Teaching Scheme			Credits	Hours	Examination Scheme		TOTAL
				L	T	P			Internal	External	
1.	Core Course-4	BIT201	Operating System	3	1	0	4	4	40	60	100
2.	Core Course-4	BIT221	Operating System Lab	0	0	4	2	4	30	20	50
3.	Core Course-5	BIT202	Object Oriented Programming using C++	3	1	0	4	4	40	60	100
4.	Core Course-5	BIT222	Object oriented Programming using C++ Lab	0	0	4	2	4	30	20	50
5.	Core Course-6	BIT203	Discrete Mathematics	3	1	0	4	4	40	60	100
6.	Ability Enhanced compulsory Courses-2	COM***	AECC-2	4	0	0	4	4	40	60	100
7.	Generic Elective-2	BIT***	GE2	3	0	0	3	3	40	60	100
9.	Ability Enhanced compulsory Courses-3	ENS***	AECC-3	2	0	0	2	2	40	60	100
		Total		**18**	**3**	**8**	**25**	**29**	**300**	**400**	**700**

Bachelor of Science (Information Technology) Semester III (Second year)								
				Teaching Scheme	**Credits**	**Hours**	**Examination Scheme**	

Sr. No.	Category	Code	Subject	L	T	P			Internal	External	TOTAL
1.	Core Course-7	BIT301	Data Structures	3	1	0	4	4	40	60	100
2.	Core Course-7	BIT321	Data Structures Lab	0	0	4	2	4	30	20	50
3.	Core Course-8	BIT302	Computer System Architecture	3	0	0	3	3	40	60	100
4.	Core Course-8	BIT322	Computer System Architecture Lab	0	0	2	1	2	30	20	50
5.	Discipline Specific Elective-1	BIT***	DSE-1	3	1	0	4	4	40	60	100
6.	Discipline Specific Elective-1	BIT***	DSE-1 Lab	0	0	4	2	4	30	20	50
7.	Skill Enhancement Course -1	BIT***	SEC-1	2	0	0	2	2	40	60	100
8.	Skill Enhancement Course -1	BIT***	SEC-1 Lab	0	0	2	1	2	30	20	50
9.	Generic Elective-3	BIT***	GE-3	3	0	0	3	3	40	60	100
		Total		**14**	**2**	**12**	**22**	**28**	**320**	**380**	**700**

Sr. No.	Category	Code	Subject	Teaching Scheme			Credits	Hours	Examination Scheme		TOTAL
				L	T	P			Internal	External	
1.	Core Course-9	BIT401	Software Engineering	4	0	0	4	4	40	60	100
2.	Core Course-10	BIT402	Computer Networks	3	1	0	4	4	40	60	100
3.	Core Course-10	BIT422	Computer Networks Lab	0	0	4	2	4	30	20	50
4.	Core Course-11	BIT403	Database Management System	3	1	0	4	4	40	60	100
5.	Core Course-11	BIT423	Database Management System Lab	0	0	4	2	4	30	20	50
6.	Skill Enhancement Course -2	BIT***	SEC-2	2	0	0	2	2	40	60	100
7.	Skill Enhancement Course -2	BIT***	SEC-2 Lab	0	0	2	1	2	30	20	50
8.	Skill Enhancement Course -3	BIT***	SEC-3	2	0	0	2	2	40	60	100
9.	Skill Enhancement Course -3	BIT***	SEC-3 Lab	0	0	2	1	2	30	20	50
10.	Ability Enhanced compulsory Courses-4	GWE101	AECC-4	2	0	0	2	2	40	60	100
		Total		**15**	**3**	**12**	**24**	**30**	**360**	**440**	**800**

Note: -The students will take 4-6 weeks summer training in Industry after semester 4th and evaluate in 5th semester.

Bachelor of Science (Information Technology) Semester V (Third year)

Sr No.		Code	Subject	Teaching Scheme			Credits	Hours	Examination Scheme		TOTAL
				L	T	P			Internal	External	
1.	Core Course-12	BIT501	Python Programming	3	1	0	4	4	40	60	100
2.	Core Course-12	BIT521	Python Programming Lab	0	0	4	2	4	40	60	100
3.	Discipline Specific Elective-2	BIT***	DSE-2	3	1	0	4	4	40	60	100
4.	Discipline Specific Elective-2	BIT***	DSE-2 Lab	0	0	4	2	4	30	20	50
5.	Discipline Specific Elective-3	BIT***	DSE-3	3	1	0	4	4	40	60	100
6.	Discipline Specific Elective-3	BIT***	DSE-3 Lab	0	0	4	2	4	30	20	50
7.	Project	BIT550	Minor Project	0	0	4	2	4	40	60	100
8.	Industrial Training	BIT560	Industrial Training	-	-	-	2	-	-		100
		Total		**9**	**3**	**16**	**22**	**28**	**260**	**340**	**700**

Bachelor of Science (Information Technology) Semester VI (Third year)

Sr. No.		Code	Subject	Teaching Scheme			Credits	Hours	Examination Scheme		TOTAL
				L	T	P			Internal	External	
1.	Skill Enhancement Course -4	BIT***	SEC-4	2	0	0	2	2	40	60	100
2.	Skill Enhancement Course -4	BIT***	SEC-4 Lab	0	0	2	1	2	40	60	100
3.	Discipline Specific Elective-4	BIT***	DSE-4	3	1	0	4	4	40	60	100
4.	Discipline Specific Elective-4	BIT***	DSE-4 Lab	0	0	4	2	4	30	20	50
5.	Discipline Specific Elective-5	BIT***	DSE-5	3	1	0	4	4	40	60	100
6.	Discipline Specific Elective-5	BIT***	DSE-5 Lab	0	0	4	2	4	30	20	50
7.	Discipline Specific Elective-6	BIT***	DSE-6	3	1	0	4	4	40	60	100
8.	Discipline Specific Elective-6	BIT***	DSE-6 Lab	0	0	4	2	4	30	20	50
9.	Project	BIT650	Major Project	0	0	6	3	6	40	60	100
		Total		**11**	**3**	**18**	**24**	**34**	**330**	**420**	**750**

Course Structure

Bachelor of Science in Information Technology B.Sc. (IT)

Core Courses

Sr. No.	Category Type	Course Code	Course Name
1	Core-1	BIT101	Computer Fundamentals & Office Automation
2	Core-2	BIT102	Programming in C

3	Core-3	BIT103	Basic Mathematics
4	Core-4	BIT201	Operating System
5	Core-5	BIT202	Object Oriented Programming using C++
6	Core-6	BIT203	Discrete Mathematics
7	Core-7	BIT301	Data Structures
8	Core-8	BIT302	Computer System Architecture
10	Core-9	BIT401	Software Engineering
11	Core-10	BIT402	Computer Networks
12	Core-11	BIT403	Database Management System
13	Core-12	BIT501	Python Programming

Core Courses ((Laboratory)

Sr. No.	**Category Type**	**Course Code**	**Course Name**
1	Core-1	BIT121	Computer Fundamentals & Office Automation Lab
2	Core-2	BIT122	Programming in C Lab
3	Core-4	BIT221	Operating System Lab
4	Core-5	BIT222	Object Oriented Programming using C++ Lab
5	Core-7	BIT321	Data Structures Lab
6	Core-8	BIT322	Computer System Architecture Lab
7	Core-10	BIT422	Computer Networks Lab
8	Core-11	BIT423	Database Management System Lab
9	Core-12	BIT521	Python Programming Lab
10.	Project (Core)	BIT550	Minor Project
11.	Project (Core)	BIT650	Major Project

A) Generic Elective (GE)

Sr. No.	Category Type	Course Code	Course Name
1.	GE1-A	BBA101	Fundamentals of Management & Organizational Behavior
2.	GE1-B	BSM104	Production and Operation Management
3.	GE2-A	BIT204	Numerical Techniques
4.	GE2-B	BIT205	Digital Marketing
5.	GE3-A	BCM301	Human Resource Management
6.	GE3-B	BIT307	Multimedia Technology

B) Ability Enhanced Compulsory Courses (AECC)

Sr. No.	Category Type	Course Code	Course Name
1	AECC1	COM101	English Communication
2	AECC2	COM201	Business Communication
3	AECC3	ENS001	Environmental Studies
4	AECC4	GWE101	Gender Equality and Women Empowerment

C) Skill Enhanced Course (SEC)

Sr. No.	Category Type	Course Code	Course Name
1	SEC1-A	BIT305	Web Technologies
2	SEC1-B	BIT306	Linux and Shell Programming
3	SEC2-A	BIT404	ASP.NET
4	SEC2-B	BIT405	Advanced Web Development

5	SEC3-A	BIT406	Latex
6	SEC3-B	BIT407	MATLAB Programming
7	SEC4-A	BIT601	Software Testing
8	SEC4-B	BIT602	Android Programming

D) Skill Enhanced Course (SEC) Laboratory

Sr. No.	Category Type	Course Code	Course Name
1	SEC1-A	BIT325	Web Technologies Lab
2	SEC1-B	BIT326	Linux and Shell Programming Lab
3	SEC2-A	BIT424	ASP.NET Lab
4	SEC2-B	BIT425	Advanced Web Development Lab
5	SEC3-A	BIT426	Latex Lab
6	SEC3-B	BIT427	MATLAB Programming Lab
7	SEC4-A	BIT621	Software Testing Lab
8	SEC4-B	BIT622	Android Programming Lab

E) Discipline Specific Elective (DSE)

Sr. No.	Category Type	Course Code	Course Name
1	DSE1-A	BIT303	Java Programming
2	DSE1-B	BIT304	C# Programming
3	DSE2-A	BIT502	Principles of Information Security
4	DSE2-B	BIT503	Cloud Computing
5	DSE3-A	BIT504	Algorithm Design Techniques
6	DSE3-B	BIT505	Relational Database Management System

7	DSE4-A	BIT603	Data Mining and Warehousing
8	DSE4-B	BIT604	Big Data Analytics
9	DSE5-A	BIT605	Ethical Hacking
10	DSE5-B	BIT606	Advance Java Programming
11	DSE6-A	BIT607	Artificial Intelligence
12	DSE6-B	BIT608	Data Sciences

F) Discipline Specific Elective (DSE) Laboratory

Sr. No.	Category Type	Course Code	Course Name
1	DSE1-A	BIT323	Java Programming Lab
2	DSE1-B	BIT324	C# Programming Lab
3	DSE2-A	BIT523	Principles of Information Security Lab
4	DSE2-B	BIT524	Cloud Computing Lab
5	DSE3-A	BIT525	Algorithm Design Techniques Lab

6	DSE3-B	BIT526	Relational Database Management System Lab
7	DSE4-A	BIT623	Data Mining and Warehousing Lab
8	DSE4-B	BIT624	Big Data Analytics Lab
9	DSE5-A	BIT625	Ethical Hacking Lab
10	DSE5-B	BIT626	Advance Java Programming Lab
11	DSE6-A	BIT627	Artificial Intelligence Lab
12	DSE6-B	BIT628	Data Sciences Lab

Guidelines for the Evaluation of the Course

1. Evaluation of the Theory subject will be done under Mark System.
2. The Evaluation of theory subject will be done in two stages:
   a. Continuous Internal Assessments (The teacher who is teaching a subject will award internal marks).
   b. External evaluation (SET-A Question Paper is set by the subject teacher and SET-B is set by external examiner appointed by university).
   c. Marks secured for the theory subject will be awarded to students, combining the internal and external Marks.
3. Continuous Internal Assessments (CIA) and External Evaluation details are follows:

S.No.	Components	Marks
CIA1	Mid Semester Examination	20
CIA2	Assignments	5
CIA3	Multiple-choice questions (Online Quiz Assessment)	10
CIA4	Attendance	5
Total Marks		40

S.No.	Components	Marks
ESE	End Semester Examination	60

Total Marks =100

4. Lab Continuous Internal Assessment and Lab External Evaluation are follows:

S.No.	Components	Marks
CIA1	Teacher's Assessment	10
CIA2	Practical File/Report	10
CIA3	Internal Lab viva-voce	5
CIA4	Attendance	5
Total Marks		30

S.No.	Components	Marks
External1	Demonstration/Written Practical Examination	10
External2	External Lab viva-voce	10
Total Marks		20

Total Marks =50

5. **End Semester Examination (Question Paper Pattern):**
The Examiner will be required to set NINE questions in all. Question Number 1 will be mandatory (10 short-answer type questions), covering the entire syllabus. In addition to the compulsory question, the examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. A Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

SYLLABUS

GNA UNIVERSITY
Inspiring Innovation....

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)
(Applicable for 2020-2021 onwards)

FACULTY OF COMPUTATIONAL SCIENCES
GNA UNIVERSITY
SRI HARGOBINDGARH, PHAGWARA – HOSHIARPUR ROAD, PHAGWARA-144401, PUNJAB
INDIA

BIT101: **Computer Fundamentals & Office Automation**
Credits: 4
LTP 400

Course Description: The course aims to equip the students with various Office Automation Tools such as Word processor, Spread sheet program & Presentation program.

The course includes Crafting professional word documents; excel spread sheets, power point presentations using the Microsoft suite of office tools.

Course Outcomes (CLO):

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

CO1: Use various Office Automation Tools like Word processor, Spread sheet software & Presentation software.

CO2: Learn the fundamental of processing unit and operating system.

CO3: Various peripheral devices like Input and Output devices of Computer systems, online storage devices.

CO4: Perform documentation, accounting operations, presentation skills.

Course Content

UNIT I

Introduction to Computers: Introduction, Characteristics of Computers, Block diagram of computer. Types of computers and features, Minicomputers, Micro Computers, Mainframe Computers, Super Computers. Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages). Data Organization, Drives, Files, Directories. Types of Memory (Primary and Secondary) RAM, ROM, PROM, EPROM, Secondary Storage Devices (FD, CD, HD, Pen drive) I/O Devices (Scanners, Plotters, LCD, Plasma Display)Number Systems: Introduction to Binary, Octal, Hexadecimal system Conversion, Simple Addition, Subtraction, Multiplication.

UNIT II

Algorithm: Definition, Characteristics, Advantages and disadvantages, Examples. Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples. Operating System and Services in O.S., Types of O.S.DOS: History, Files and Directories, Internal and External Commands, Batch Files.

UNIT III

Word Processing: Typing, Editing, Proofing & Reviewing, Formatting Text & Paragraphs, Automatic Formatting and Styles, Working with Tables, Graphics and Frames, Mail Merge, Automating Your Work & printing Documents.

Excel Spreadsheet: Working & Editing in Workbooks, Creating Formats & Links, formatting a Worksheet& creating graphic objects, Creating Charts (Graphs), formatting and analyzing data, Organizing Data in a List (Data Management), Sharing & Importing Data, Printing.

UNIT IV

PowerPoint Presentations: Getting started in PowerPoint, creating a presentation, Creating & editing slides, previewing a slide show, Adding picture & graph, adding sound & video, adding auto shape, Animating objects.

Spreadsheets and Database packages: Purpose, usage, command, MS-Excel, Creation of files in MS-Access, Switching between applications.

Recommended Books / Suggested Readings:

1. "Computers Today", D. H. Sanders, Fourth Edition, McGraw Hill, 1988.
2. Fundamental of Computers – By V. Rajaraman B.P.B. Publications.
3. "Fundamental of Computers – By P.K. Sinha.
4. MS-Office 2000(For Windows) – By Steve Sagman.
5. "Information Technology Inside and Outside", David Cyganski, John A. Orr, Paperback Edition, Pearson Education 2002.

GNA UNIVERSITY

BIT121: Computer Fundamentals & Office Automation Lab

Credits: 2
LTP 004

Course Description: The course aims to equip the students with various Office Automation Tools such as Word processor, Spread sheet program & Presentation program.

The course includes Crafting professional word documents; excel spread sheets, power point presentations using the Microsoft suite of office tools.

Course Outcomes (CLO):

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

CO1: Recognize when to use each of the Microsoft Office programs to create professional business documents and professional presentation.

CO2: Use Microsoft Office programs to create personal and/or business documents following current professional and/or industry standards.

CO3: Use the mail merge facility.
CO4: Use MS Excel for preparing a worksheet.

List of Practical:

1. Demonstration of various parts of a Computer System.
2. Starting the Windows, starting a program, running a program, running multiple programs and switching between windows, customizing the Task bar, recycle bin, restoring the deleted files.
3. Creating and removing folders, Making the taskbar wider, arranging icons on the Desktop, Displaying and hiding the taskbar clock, controlling the size of start menu options, Creating Shortcuts.
4. Expanding and collapsing a folder, Recognizing File types using icons, running a program from explorer, renaming a file or folder, Sorting a folder
5. MS Word Basic, Formatting and Miscellaneous Operations using MS Word, Using the special features of word.
6. Printing envelopes and mail merge.
7. To print envelopes with from addresses and to addresses.
8. To use mail merge facility for sending a circular letter to many persons.
9. To use mail merge facility for printing mailing labels.
10. Preparing a Govt. Order / Official Letter / Business Letter / Circular Letter.
11. Covering formatting commands - font size and styles - bold, underline, upper case, lower, case, superscript, subscript, indenting paragraphs, spacing between lines and characters, tab settings etc.
12. Preparing a newsletter: To prepare a newsletter with borders, two columns text, header and footer and inserting a graphic image and page layout.
13. Create an advertisement for your university.
14. Prepare a resume.
15. MS Excel Basics, Using MS Excel, performing various calculations and analyzing data availing, Formulas and Functions, Preparing Charts, Pivot table.
16. Using formulas and functions:
17. To prepare a Worksheet showing the monthly sales of a company in different branch offices (Showing Total Sales, Average Sales).
18. Prepare a Statement for preparing Result of 10 students in 5 subjects (using formula to get Distinction, I Class, II Class and Fail under Result column against each student).
19. MS Presentation Basics, creating a new Presentation based on a template: using Auto content wizard, design template and Plain blank presentation.
20. Creating a Presentation with Slide Transition: Automatic and Manual with different effects.
21. Creating a Presentation applying Custom Animation effects: Applying multiple effects to the same
22. object and changing to a different effect and removing effects.
23. Creating and Printing handouts.

BIT102: Programming in C
Credits: 4
LTP 310

Course Description: The course aims to equip the students with the ability to generate programs in C programming.

The course includes Algorithm development, Unformatted & formatted I/O function in C, branching statements, Decision making & branching.

Course Outcomes (CLO):

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

CO1: Write, compile and debug programs in C language.
CO2: Design programs involving decision structures, loops and functions.
CO3: Understand the dynamics of memory using pointers and Structures.
CO4: Use different data structures and create/update basic data files.

Course Content

UNIT I

Programming Process: Problem definition, Algorithm development, Flowchart, Coding, Compilation and debugging.

Overview of C: History of C, Importance of C, Structure of a C Program. Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant.

Data input/output. Input/output: Unformatted & formatted I/O function in C, Input functions viz. scanf (), getch (), getche(), getchar(), gets(), output functions viz. printf(), putch(), putchar(), puts().

UNIT II

Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associatively.

Control statements: branching statements (if, if else, switch), loop statements (for, while and do-while), jump statements (break, continue, goto), nested control structures.

Decision making & branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement.

Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement**.**

UNIT III

Arrays: One-dimensional and two-dimensional arrays Declaration, initialization, reading values into an array, displaying array contents.

Functions: Definition, prototype, passing parameters, recursion.

Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.

Strings: input/output of strings, string handling functions (strlen, strcpy, strcmp, strcat & strrev), and table of strings.

UNIT IV

Structures and unions: using structures and unions, comparison of structure with arrays and union.

Pointers: pointer data type, pointer declaration, initialization, accessing values using pointers, pointers and arrays.

File handling: Definition of Files, Opening modes of files, Standard function-(fopen ( ), fclose ( ), feof ( ), fseek ( ), rewind ( )).

Recommended Books / Suggested Readings:

1. E. Balagurusamy, “Programming in C”, Tata McGraw Hill.
2. Kernighan and Ritchie, “The C Programming Language”, PHI.
3. Byron Gotfried, “Programming in C”.
4. Kamathane, “Programming in C”, Oxford University Press.

BIT122: Programming in C Lab
Credits: 2
LTP: 004

Course Description: The course aims to equip the students with the ability to generate programs in C programming.

The course includes Algorithm development, Unformatted & formatted I/O function in C, branching statements, Decision making & branching.

Course Outcomes (CLO):

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

CO1: Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.

CO2: Acquire knowledge about the basic concept of writing a program in C programming language.

CO3: Understand the role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.

CO4: Understand the role of Functions involving the idea of modularity.

List of Practical:

1. Simple C programs using variables, keywords and simple operations

2. Programs based on operators (arithmetic, relational, increment, decrement, conditional, logical).
3. Write a C program to find the sum of individual digits of a positive integer.
4. Programs based on looping (while do while, for), nested loops-based programs.
5. Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
6. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a C program to calculate the following Sum: Sum=1-x2/2! +x4/4! -x6/6! +x8/8! -x10/10!
8. Write a C program to find the roots of a quadratic equation.
9. Write a C program to generate Pascal's triangle.
10. Write a C program to construct a pyramid of numbers.
11. Branching statement programs using 'C'
12. Programs based on arrays (single, two dimensional).
13. Write a C program that uses functions to perform the following: i) Addition of Two Matrices ii) Multiplication of Two Matrices.
14. Programs on user defined functions (call by value, call by reference).
15. String/Character based exercises manipulation on strings
16. Write a C program to determine if the given string is a palindrome or not.
17. Programs based on pointers (arithmetic operation, arrays with pointers)
18. Programs on structure and union.
19. Programs on file handling.

BIT103: Basic Mathematics
Credits: 4
LTP 310

Course Description: The course aims to equip the students with formulation and analysis of mathematical problems.

The course includes Mathematical Logic, Complex Numbers, Probability, Set theory.

Course Outcomes (CLO)

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

CO1: Use mathematical knowledge to analyze and solve problems.

CO2: Formulate problems in the language of sets and perform set operations.

CO3: Evaluate the development of Mathematical Logic in terms of its relation to the foundations of mathematics.

CO4: Analyze a problem and identify and define the computing requirements appropriate to its solution.

Course Content

UNIT I

Set theory: Sets and their representations; The empty set; finite and infinite sets; equal and equivalent sets; subsets; power set; universal set; Venn diagrams; complement of a set operation on sets; applications of sets.

Mathematical Logic: Basic Logical connections; Conjunction; Disjunction; Negation; Negation of Compound Statements; Truth tables. Tautologies; Logical Equivalence.

UNIT II

Complex Numbers: Complex Numbers; Conjugate of a complex number; properties of a complex Number; geometrical representation of complex number; De Moivere's theorem.

UNIT III

Matrices and Determinants: Definition of a matrix; Operations on matrices; Square Matrix and its inverse; determinants; properties of determinants; the inverse of a matrix; solution of equations using matrices and determinants; solving equations using determinants.

UNIT IV

Probability: Concept of probability; sample space and events; three approaches of probability; conditional probability and independence of events; baye's theorem.

Recommended Books / Suggested Readings:

1. Satinder Bal Gupta, C.P. Gandhi, Discrete Structures, University Science Press.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", McGraw Hill, 2002.
3. Seymour Lipschutz, M. Lipson, "Discrete Mathematics" Tata Mc Graw Hill, 2005.

COM101: **English Communication**

Credits: 4

LTP 400

Course Objectives:

1. To make students capable of using English language in context.
2. To enhance effective reading and writing skills.

Course Outcomes:

1. The students will develop a minute practical knowledge about English grammar and its usage
2. The students will develop an understanding of the importance of free expression**.**

Contents:

UNIT I

Reading Skills: Comprehension of Unseen Passage [Reading articles] (Intermediate) Summary Paraphrasing, Translation and Precis Writing.

UNIT II

English Grammar and Usage: Parts of speech, common errors in writing (based on Parts of Speech) Tenses, Change of Voice, Transformation of Sentences.

UNIT III

Basic Writing Skills and Writing Practices: Paragraph/essay writing, short life story writing, Notice (General like trip, change of name, function) making notes and Letter writing.

UNIT IV

Vocabulary Enhancement: Synonym, Antonym, Idioms and Phrasal verbs

Reference Book:

1. *Practical English Usage.* Michael Swan OUP. 1995

Suggested Readings:

1. *On Writing Well. William* Zinsser. Harper Resource Book. 2001

2. *Communication Skills*. Sanjay Kumar and Pushp Lata.Oxford University Press. 2006
3. *Exercises in Spoken English.* CIEFL, Hyderabad. Oxford University Press

Internet Links:

1. https://www.englishgrammar101.com/
2. http://learnenglish.britishcouncil.org/en/english-grammar
3. http://www.englishgrammarsecrets.com/
4. http://www.myenglishpages.com/
5. http://www.english-for-students.com/Homonyms-B.html

BBA 101: Fundamentals of Management & Organizational Behavior

Credit : 3

LTP 300

Course Description:

To develop an understanding of key Organizational Behavior concepts and how they apply to the world of work.

Course outcomes:

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

CO1: Understand key Organizational Behavior concepts and able to apply them the world of work.
CO2: Understand individual and group behavior at workplace.
CO3: Bring effectiveness & efficiency by making different plans & Strategies.
CO4: Face the live situations and problems that they generally face in the industry.

Course contents:

UNIT 1

Introduction: Definition, nature, scope, importance, Functions of management and manager, Managerial roles and skills. Contributions of F. W. Taylor, Henry Fayol, Mary Parker Follet, Peter, F. Drucker, Abraham Maslow.

UNIT 2

Overview of Planning: Types of Plans & The planning process; Decision making: Process, Types and Techniques. Control: Function, Process and types of Control; Principles of organizing: Common organizational structures; Delegation & Decentralization: Factors affecting the extent of decentralization.

UNIT 3

Importance of organizational Behavior, Perception and Attribution: Concept, Nature, Process, Personality: Personality: Learning: Concept and Theories of Learning, reinforcement, Motivation: Concepts and their application.

UNIT 4

Groups and Teams: Definition, Difference between Groups and teams; Stages of Group Development, Group Cohesiveness, Types of teams, Analysis of Interpersonal Relationship: Transactional Analysis, Johari Window Organizational Power and Politics, Nature of organizational politics

Readings:

3. Kaul Vijay Kumar, Business Organization & Management - Text and Cases, Pearson.
4. Kaul, Vijay Kumar, Management- Text & Cases, Vikas Publication.
5. Kavita Singh: Organisational Behaviour, Vikas Publication.
6. Koontz & Heinz Weihrich: Essential of Management, McGraw Hill.

BBA103: Production and Operations Management
Credit : 3
LTP 300

Course Description: The course aims to equip the students with the concepts underlying effective operation and control of manufacturing and service businesses. Approaches to production control, inventory policy, facilities planning, methods improvement and technological assessment are studied.
The course includes Introduction to Operations and Supply Management, Forecasting, Process Design, Capacity Planning and Inventory Control.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand Manufacturing/Operations/Service Functions & their applications to an organization.
CO2: Learn the techniques for implementation of planning and control.
Co3: Apply various contemporary techniques to layout design.
Co4: Learn about the problem-solving tools of operations management.

Course contents:

UNIT 1

Introduction to Production & Operations Management: Definition, need, responsibilities, key decisions of OM, goods vs. services. Operations as a key functional area in an organisation. Operation Strategies- Definition, relevance, strategy formulation process, order qualifying and order winning attribute. Maintenance Management: Need of maintenance management, equipment life cycle.

UNIT 2

Forecasting-Definition, types, qualitative (grass roots, market research and Delphi method) and quantitative approach (simple moving average method, weighted moving average and single exponential smoothing method), forecast error. Scheduling: Operation scheduling, goals of short-term scheduling, job sequencing.

UNIT 3

Process Selection: Definition, Characteristics that influence the choice of alternative processes (volume and variety), type of processes- job shop, batch, mass and continuous, computer integrated manufacturing (CIM).

UNIT 4

Layout Decision: Layout planning – Benefits of good layout, importance, different types of layouts (Process, Product, Group technology and Fixed position layout). Assembly line balancing by using LOT rule.

Suggested Readings:

1. Mahadevan B, Operations Management Theory & Practice, Pearson Education
2. Heizer Jay and Render Barry , Production & Operations Management, Pearson Education
3. Chase R B, Aquilano N J , Jacobs F R and Agarwal N, Production & Operations Management Manufacturing and Services, Tata McGraw Hill
4. S.P. Gupta, Statistical methods, Sultan Chand & Sons .

BIT201: Operating System
Credits: 4
LTP 310

Course Description: The course aims to equip the students with the structure and operations of an Operating System.

The course includes Process Management, Disk Management, Process communications.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Analyze the structure of OS and basic architectural components involved in OS design.
CO2: Familiar with the concepts of Process Management, Process communications.
CO3: Understand the concepts of Memory Management techniques, Virtual Memory and page replacement algorithms
CO4: Understand the concepts of Storage Management, Disk Management and disk scheduling.

Course Content

UNIT I

Introduction: Basic OS functions, resource abstraction, types of operating systems–multiprogramming systems, batch systems, time sharing systems; operating systems for personal computers & workstations, process control & real time systems.

Operating System Organization: Processor and user modes, kernels, system calls and system programs.

UNIT II

Process Management: System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms; concurrent and processes, critical section, semaphores, methods for inter-process communication; deadlocks.

UNIT III

Memory Management: Physical and virtual address space; memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory.

File and I/O Management: Directory structure, file operations, files allocation methods, device management.

UNIT IV

Advanced Topics: Introduction to Distributed Operating system, Characteristics, architecture, Issues, Communication & Synchronization; Introduction Multiprocessor Operating system, Architecture, Structure, Synchronization & Scheduling; Introduction to Real-Time Operating System, Characteristics, and Structure & Scheduling.

Recommended Books / Suggested Readings:

1. Operating System Principles by Abraham Silberschatz and Peter Baer Galvin, Seventh Edition, Published by Wiley-India.
2. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
3. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
4. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
6. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

BIT221: Operating System Lab

Credits: 2

LTP 004

Course Description: The course aims to equip the students with the structure and operations of an Operating System.

The course includes Process Management, Disk Management, Process communications.

Course Outcomes (CLO):

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

CO1: Understand and implement basic services and functionalities of the operating system using system calls.

CO2: Use modern operating system calls and synchronization libraries in software/ hardware interfaces

CO3: Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.

CO4: Implement memory management schemes and page replacement schemes.

List of Practical:

1. Installation of windows OS.
2. Dual boot installation of Operating systems.
3. Write C program to implement FCFS scheduling algorithm.
4. Write C program to implement Round Robin scheduling algorithm.
5. Write C program to implement SJF scheduling algorithm.
6. Write C program to implement non-preemptive priority-based scheduling algorithm.
7. Write C program to implement preemptive priority-based scheduling algorithm.
8. Write C program to implement SRJF scheduling algorithm.
9. Write C program to calculate sum of n numbers using thread library.
10. Write C program to implement first-fit, best-fit and worst-fit allocation strategies.
11. Write C programs to simulate the following File organization techniques: a) Single level directory b) Two level c) Hierarchical.
12. Write C programs to simulate the following File allocation methods: a) Contiguous b) Linked c) Indexed.
13. Write C programs to simulate the following page replacement algorithms: a) FIFO b) LRU c) LFU.
14. Shell Programming: Basic Shell Commands.

BIT202: Object Oriented Programming using C++

Credits: 4

LTP 310

Course Description: The course aims to equip the students with the ability to understand and implement features of OOP.

The course includes Classes & Objects, Inheritance, Abstraction, Polymorphism, Exception Handling.

Course Outcomes (CLO):

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

CO1: Develop applications using Object Oriented Programming Concepts.

CO2: Demonstrate the differences between traditional imperative design and object-oriented Design.

CO3: Explain class structures as fundamental, modular building blocks.

CO4: Understand the role of inheritance, polymorphism, and generic structures in building reusable code.

Course Content

UNIT I

Object Oriented Concepts: Introduction to Objects and Object-Oriented Programming, Encapsulation (Information Hiding), Access Modifiers: Controlling access to a class, method, or variable (public, protected, private, package), Other Modifiers, Polymorphism: Overloading, Inheritance, Overriding, Abstract Classes, Reusability.

UNIT II

Class Declaration: Data Members, Member Functions, Private and Public Members, Data Hiding and Encapsulation, Array within a class.

Class Function Definition: Member Function definition inside the class and outside the class, Friend Function, Inline Function, Static Members & Functions, Scope Resolution Operator, Private and Public Member Functions, Nesting of Member Functions. Creating Objects, accessing class data members, accessing member functions, Arrays of Objects, Objects as function arguments: Pass by value, Pass by reference, Pointers to Objects.

UNIT III

Constructors and Destructors: Declaration and Definition, Default Constructors, Parameterized Constructors, Constructor Overloading, Copy Constructors. Destructors: Definition and use.

Memory Management: New, Delete, garbage collection.

Inheritance: Extending Classes Concept of inheritance, Base class, Derived class, defining derived classes, Single inheritance: Privately derived, publicly derived; Making a protected member inheritable, Access Control to private and protected members by member functions of a derived class, Multilevel inheritance, Nesting of classes. Function Overloading & Operator Overloading Binary & Unary.

UNIT IV

Polymorphism: Definition, early Binding, Polymorphism with pointers, Virtual Functions, late binding, pure virtual functions.

Operator Overloading: Introduction, Fundamentals of Operator Overloading, Restrictions on Operators Overloading, Operator Functions as Class Members vs. as Friend Functions, Overloading, «, ».

Files: file stream, file pointer and manipulation, file open and close, sequential and random access.

Exception Handling: Principle of Exception handling, Exception handling mechanism, Multiple catch, Nested try, re throwing the Exception.

Recommended Books / Suggested Readings:

1. Object Oriented Programming with C++, E. Balagurusamy, Fourth Edition, Tata Mc-Graw Hill
2. Object Oriented Programming in Turbo C++, Robert Lafore, Fourth Edition Galgotia Publications.
3. The C++ Programming Language, Bjarna Stroustrup, Third Edition, Addison-Wesley Publishing Company.
4. Object Oriented Programming Using C++, Salaria, R. S, Fourth Edition, Khanna Book Publishing.

BIT222: Object Oriented Programming using C++ Lab

Credits: 2

LTP 004

Course Description: The course aims to equip the students with the ability to understand and implement features of OOP.

The course includes Classes & Objects, Inheritance, Abstraction, Polymorphism, Exception Handling.

Course Outcomes (CLO):

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

CO1: Apply object-oriented programming features to program design and implementation

CO2: Demonstrate the ability to analyze, use, and create functions, classes, to overload operators.

CO3: Demonstrate the ability to understand and use inheritance and Pointers when creating or using classes and create templates

CO4: Demonstrate the ability to understand and use Exception handling and file handling mechanism.

List of Practical:

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+……
4. WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5…….
5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
6. Write a function to find whether a given no. is prime or not. Use the same to generate 7 the prime numbers less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.
9. WAP to perform following actions on an array entered by the user: i) Print the even-valued elements ii) Print the odd-valued elements iii) Calculate and print the sum and average of the elements of array iv) Print the maximum and minimum element of array v) Remove the duplicates from the array vi) Print the array in reverse order The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.
10. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
11. Write a program that swaps two numbers using pointers.
12. Write a program in which a function is passed address of two variables and then alter its contents.
13. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main () function.
14. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc () / calloc () functions or new operator.
15. Write a menu driven program to perform following operations on strings: a) Show address of each character in string b) Concatenate two strings without using strcat function. c) Concatenate two strings using strcat function. d) Compare two strings e) Calculate length of the string (use pointers) f) Convert all lowercase characters to uppercase g) Convert all

    uppercase characters to lowercase h) Calculate number of vowels i) Reverse the string
16. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array. 18. WAP to display Fibonacci series (i)using recursion, (ii) using iteration.

17. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration.
18. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
19. Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation): 8 a) Sum b) Difference c) Product d) Transpose
20. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
21. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
22. Create a class Box containing length, breath and height. Include following methods in it: a) Calculate surface Area b) Calculate Volume c) Increment, Overload ++ operator (both prefix & postfix) d) Decrement, Overload -- operator (both prefix & postfix) e) Overload operator == (to check equality of two boxes), as a friend function f) Overload Assignment operator g) Check if it is a Cube or cuboid Write a program which takes input from the user for length, breath and height to test the above class.
23. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
24. Write a program to retrieve the student information from file created in previous question and print it in following format: Roll No. Name Marks
25. Copy the contents of one text file to another file, after removing all whitespaces.
26. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
27. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.
28. WAP to show function Overloading and operator overloading.
29. WAP to create a class and access member function of a class.
30. Write a program to show Constructor and Destructor in a class.
31. Write a program to show the concept of inheritance in classes.
32. Write a program to implement file handling concepts.
33. Write a program to implement the exception handling.

BIT203: Discrete Mathematics
Credits: 4
LTP 310

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 (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand 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: Understand the challenges for theoretical Computer Science and its contribution to other sciences.
CO4: Understand the concepts recursive mathematical definitions, basics of counting, permutations, combinations.

Course Content

UNIT I

Set Theory: Definition of Sets, Venn Diagrams, complements, cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets).

UNIT II

Relation: Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation,
Function: Definition and types of function, composition of functions, recursively defined functions.

UNIT III

Propositional logic: Proposition and Compound Propositions, basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Duality law, Algebra of propositions, Conditional and Bi conditional Statements, Arguments, Logical Implication, Propositional Functions, Predicates and Quantifiers, Negation of Quantified Statements.

UNIT IV

Combinatorics: Mathematical induction, recursive mathematical definitions, basics of counting, permutations, combinations, inclusion-exclusion.

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

COM201: Business Communication

Credits: 4

LTP 400

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 (CLO):

CO1:The students will be able to develop effective reading and writing skills.

CO2: The students will learn vocabulary and technical jargons as used in business communication.

Course Contents:

UNIT I

Theory of Communication: Process of Communication, Verbal and Non-verbal communication, Modes of Communication, and Barriers to Communication.

UNIT II

Nature and Style of sensible Writing: Memorandum, Notices, Quotations/Tenders, Report Making, Minutes of Meeting, E-Mail, Press Note, Resume, Complaint Letter, Inquiry Letter, Cover Letter, Confirmation Letter, Resignation Letter, Permission Letter and Job Application.

UNIT III

Vocabulary Building: Words Often Confused and Words Often Misspelt, standard abbreviations, word formation, prefix, suffix, root words from foreign languages, punctuation , phrases and clauses

Unit IV

Grammar: Conditional Sentences, and Degrees of Comparison

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.*

ENS001: Environmental Studies

L T P
2 0 0

Unit 1: 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.

Unit 2: 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 3: 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.

Unit 4: Biodiversity and Conservation

- Levels of biological diversity :genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots
- 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 5: 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.

Unit 6: 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 7: Human Communities and the Environment

- Human population and growth: Impacts on environment, human health and welfares.
- Carbon footprint.
- Resettlement and rehabilitation of project affected persons, case studies.
- Disaster management: floods, earthquakes, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnios 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).

Unit 8: Field work

- Visit to an area to document environmental assets; river/forest/flora/fauna, etc.
- Visit to a local polluted site – Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge, etc.

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 environmental effects of dams(pp. 29-64). Zed Books.
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 of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
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 and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C.E. 1971. Biology and Water Pollution Control. WB Saunders.
19. Wilson, E.O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
20. World Commission on environment and Development. 1987. Our Common Future. Oxford University Press.
21. www.nacwc.nic.in
22. www.opcw.org

BIT204: Numerical Methods
Credits: 3
LTP 300

Course Description: This course is an introduction to the numerical analysis. This course is offered to the students of Mathematics as a fundamental course. The topics included in the course provide the students with broad understanding of applications of Algebra and develop critical thinking.

Course Outcomes:

Students will be able to:

CO1: Solve an algebraic or transcendental equation using an appropriate numerical method.

CO2: Approximate a function using an appropriate numerical method.

CO3: Evaluate a derivative at a value using an appropriate numerical method.

CO4: Solve a linear system of equations using an appropriate numerical method.

Course Contents

UNIT I

Solution of Algebraic & Transcendental Equations: - Bisection method, False position method, Newton Raphson method, Secant method, Gauss-Jacobi, Gauss-Siedel and SOR iterative methods.

UNIT II

Interpolation Method: Finite difference, forward, backward and central difference, Lagrange and Newton interpolation, central difference interpolation formulae, Interpolation with unevenly spaced points.

UNIT III

Numerical differentiation & Integration: Numerical differentiation, trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.

UNIT IV

Numerical Solution of Linear system of equations: Gauss elimination method, Gauss – Jordan Elimination method.

Numerical Solution of ordinary differential Equations: Euler's and modified Euler's method, Runge – Kutta method.

Recommended Books / Suggested Readings:

1. Conte, SD & Carl DB 1981, *Elementary Numerical Analysis, An Algorithmic Approach*, Tata McGraw Hill, New Delhi.

BIT205: Digital Marketing
Credits: 3
LTP 300

Course Description: The course aims to equip the students with knowledge of Internet Marketing topics including online advertising, search, social media, and online privacy.

Course Outcomes (CLO)

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

CO1: Develop understanding of the processes and techniques of digital marketing.
CO2: Assess the challenges and the opportunities of digital marketing.
CO3: Evaluate future trends in digital marketing.
CO4: Describe the different types of marketing in the Digital Marketing.

Course Content

UNIT I

Introduction to Digital Marketing: Difference between Traditional Marketing and Digital Marketing, Benefits of using Digital Media, Inbound and Outbound Marketing, Online marketing POEM: (Paid, Owned, and Earned Media), Components of Online Marketing (Email, Forum, Social network, Banner, Blog), Impact of Online Marketing, Basics of Affiliate Marketing, Viral Marketing, Influencer Marketing, Referral Marketing.

UNIT II

Search Marketing: Basics of Search Marketing, organic and paid search results, Overview of Google AdWords, keyword research and analysis, Search Engine Optimization techniques: on-page optimization and off-page optimization. Web Analytics: Digital measurement landscape, introduction to Google Analytics, interpreting the data in Google Analytics.

UNIT III

Social Media Marketing: Different social media channels, social media for various businesses: B2C and B2B, measuring social media ROI, Content Marketing: Storytelling in social media. Email Marketing: Basics of email marketing. Concept of A/B testing and its use in email marketing.

UNIT IV

Display and Mobile Marketing: Display Marketing: different kinds of display marketing, display marketing ecosystem, retargeting and dynamic retargeting. Mobile Marketing: different kinds of mobile marketing, the mobile market ecosystem.

Writing for Digital Marketing: Identify the readers, understand the needs of your users, understand the context of use, and understand the business objectives, Purpose of content, Accessible content, Case study for any one company that benefitted due to digital marketing.

Recommended Books / Suggested Readings:

1. Damian Ryan and Calvin Jones, "Understanding Digital Marketing".
2. Puneet Singh Bhatia, Fundamentals of Digital Marketing First Edition, Publication Pearson.
3. Venakataramana Rolla, "Digital Marketing Practice guide for SMB: SEO, SEM and SMM", CreateSpace Independent Publishing Platform, First edition.
4. Shivani Karwal, "Digital Marketing Handbook: A Guide to search Engine Optimization, Pay Per Click Marketing, Email Marketing and Content Marketing", CreateSpace Independent Publishing Platform, 1st edition.
5. Ian Dodson, "The art of Digital Marketing".
6. Simon Kingsnorth, "Digital Marketing Strategy".

BIT301: Data Structures
Credits: 4
LTP 310

Course Description: The course aims to equip the students with the knowledge of data structures and algorithms.

The course includes arrays, stacks & queues, recursion, linked lists, graphs, trees.

Course Outcomes (CLO):

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

CO1: Demonstrate familiarity with major algorithms and data structures.

CO2: Analyze performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.

CO3: Determine which algorithm or data structure to use in different scenarios and be familiar with writing recursive methods.

CO4: Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.

Course Content

UNIT I

Basic Concepts: Data objects and Structures, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis-time complexity and space complexity, Examples, Introduction to Linear and Non-Linear data structures.

Array: Array, using one dimensional array, implementing one dimensional array, two-dimensional array, multi-dimensional array.

UNIT II

Stacks and Queues: Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, recursion-tower of Hanoi, introduction and primitive operation on queues, D- queues and priority queues.

Recursion: Introduction, Recursion Properties, Applications of Recursion (Factorial, Addition of Two Number, Power of A Number, Fibonacci Series, Multiplication of Two Number, Tower of Hanoi.) Advantages and Disadvantages of Recursion.

UNIT III

Linked List: Linear list ADT-array representation and linked representation, Singly Linked Lists- Operations-Insertion, Deletion, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion.

Tree: definition, terminology, Binary trees-definition, Properties of Binary Trees, Binary Tree ADT, representation of Binary Trees-array and linked representations, Binary Tree traversals, Threaded binary trees.

UNIT IV

Graphs: Definitions, Terminology, Applications and more definitions, Properties, Graph Representations- Adjacency matrix, Adjacency lists, Graph Search methods - DFS and BFS, Complexity analysis.

Searching: Linear Search, Binary Search, Hashing.

Sorting: Insertion Sort, Selection Sort, Radix Sort, Quick sort, Heap Sort, Merge sort.

Recommended Books / Suggested Readings:

1. E.Horowiz and S.Sahani, " Fundamentals of Data structures", Galgotia Book source Pvt. Ltd.,
2. 2003.
3. R.S.Salaria, "Data Structures & Algorithms" Khanna Book Publishing Co. (P) Ltd., 2002.

4. Y.Langsam et. Al., “Data Structures using C and C++”, PHI, 1999.

BIT321: Data Structures Lab

Credits: 2

LTP 004

Course Description: The course aims to equip the students with the knowledge of data structures and algorithms.

The course includes arrays, stacks & queues, recursion, linked lists, graphs, trees.

Course Outcomes (CLO):

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

CO1: Demonstrate familiarity with major algorithms and data structures.

CO2: Analyze performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.

CO3: Determine which algorithm or data structure to use in different scenarios and be familiar with writing recursive methods.

CO4: Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.

List of Practical:

1. To delete an element from Kth position of Array.
2. To insert an element ITEM at Kth position of Array.
3. To insert an element Item in Sorted Array.
4. To implement the operation of Push, Pop and to know the status of stack.
5. An implement to check the status of stack.
6. To find factorial of a number using Recursion.
7. To find multiplication of two number using Recursion.
8. To simulation the game of Tower of Hanoi using recursion.
9. To implement the operation of insertion and deletion on Queue.
10. A menu driven program to implement the operation of addition, deletion, searching, traversing, reversion, sorting, counting number of nodes and at the end erasing the link list.
11. Implementation of stack using linked list.
12. Implementation of Queue using linked list.
13. To create binary search tree, traverse it and find number of leaves and total nodes in the Tree.
14. To arrange the list of number in a Sorted order using Merge Sort.
15. To arrange the list of number in the Sorted order using Quick sort.
16. To checks all the element of list is in sorted order or not.
17. To search an element using sequential or linear search. At the end display time required to search an element including number of comparisons.
18. Write a program in C to find the location of the first node containing ITEM and find the location of an edge in the graph G.
19. Write a program in C to insert new nodes to a graph G and delete a node from a graph G.

BIT302: Computer System Architecture
Credits: 3
LTP 300

Course Description: The course aims to equip the students with the structure, function and characteristics of computer systems.
The course includes logic gates, types of buses, flipflops, memory unit.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand the number System.
CO2: Know about the basic functioning of various parts of computer system from hardware point of view and interfacing of various peripheral devices used with the system.
CO3: Understand and appreciate Boolean algebraic expressions to digital design.
CO4: Understand the basic Computer Organization and Design.
CO5: Understand of realization of different combinational/sequential circuits.
CO6: Understand the functions of Flip-flops, CPU and Memories.

Course Content

UNIT I

Number systems: Decimal, Binary, Octal and Hexa-decimal number systems and their inter conversion, 1's & 2's complement, Binary Fixed-Point Representation, Arithmetic operations on Binary numbers, Overflow & underflow. Logic Gates, AND, OR, NOT gates and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra –Basic Operations and Boolean Law's, De morgan's.

UNIT II

Common Bus System: Introduction to Common Bus System, Types of Buses (Data Bus, Control Bus, Address Bus), 16-bit Common Bus System--Data Movement among registers using Bus.
Sum of Product & Product of Sum, K-Map, Combinational & Sequential circuits, Half Adder & Full Adder, Adder & Subtractor, Multiplexer, De-multiplexer, Encoder, Decoder.

UNIT III

Flip-flops: RS, D, JK & T Flip-flops, Registers, Shift Registers, Counters.
Basic Computer Organization and Design: Instruction codes, computer instruction, timing and control, execution and instruction, input-output and interrupt, design of computer.

UNIT IV

Central Processing Unit: General register organization, Stack organization, Instruction Formats, Addressing modes.
Memory: Main memory, Auxiliary memory, DMA-control signals for DMA transfers, Block diagram of DMA controller, DMA transfer in a microcomputer system.

Recommended Books / Suggested Readings:

1. Computer System Architecture-M. Mano, Pearson Education.
2. Computer Organization, Fifth edition-Carl Hamacher, McGraw-Hill.
3. Digital Design-M. M. Mano, Pearson Education Asia.
4. Computer Fundamentals-B. Ram, New Age International Publishers.
5. M.Moris Mano, Computer System Architecture, 2nd Edition Prentice Hall of India (1991).
6. Heuring and Jordan, Computer systems design and Architecture, Pearson Education (2003).
7. William Stallings, Computer Organization and Architecture, Pearson Education (2003).
8. Floyd, Digital Fundamentals, 8th Edition, Pearson Education (2003).

BIT322: Computer System Architecture Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with basic knowledge of different components of computer system.
The course includes motherboard, logic gates flip flops, Asynchronous and Synchronous Counters.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Know about the basic functioning of various parts of computer system from hardware point of view.
CO2: Describe and explain the operation of fundamental digital gates.
CO3: Analyze the operation of medium complexity standard combinational circuits like the encoder, decoder, and adder.
CO4: Analyze the operation of a flip-flop and examine relevant timing diagrams.
CO5: Analyze the operation of shift registers.

List of Practical:

1. To Study of peripherals, components of a Computer System.
2. Detailed Study of Motherboard.
3. Detailed Study of SMPS.
4. Detailed study of different types of processor of computer.
5. To study the function of basic logic gates and verify the truth table of AND, OR, NOT, X OR, NAND, NOR.
6. To study applications of AND, OR, NAND, X-OR gates for gating digital signals.
7. To develop the different Arithmetic Circuits: a) Half-Adder and Subtractor. b) Full-Adder and Subtractor.
8. To study the flip-flop circuit using Gates: a) R-S Flip Flop b) J-K Flip Flop c) Master Slave J-K Flip Flop d) D-Flip Flop.
9. To Study of Asynchronous and Synchronous Counters.

BIT303: Java Programming
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the Java Programming.
The course includes Decision Making & Branching, Looping, Classes and Objects, Arrays, Multithreaded Programming.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand of the principles and practice of object-oriented analysis and design in the construction of robust, maintainable programs, which satisfy their requirements.
CO2 Implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
CO3: Demonstrate the principles of object-oriented programming.
CO4: Demonstrate the ability to use simple data structures like arrays in a Java program.
CO5: Understand the concept of package, interface, multithreading and File handling in java.

Course Content

UNIT I

OOPs: Object oriented paradigm, Basic Concepts of OOP, Benefits of OOP, and Applications of OOP.
Overview of java language: Introduction, Challenges of Java, Java Features, Java Program Development, Java tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command line arguments.
Constants, Variables & Data Types: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Value to Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Value of Variables, Standard Default Values; Operators & Expressions.
Decision Making & Branching: Introduction, Decision making with if statement, Simple if statement, if. Else statement, Nesting of if. else statements, the else if ladder, the switch statement, the conditional operator.
Looping: Introduction, The While statement, the do-while statement, for statement, Jumps in loops.

UNIT II

Classes and Objects: Basic concepts of OOPS, Classes and Objects, Modifiers, Passing arguments, Constructors, Overloaded Constructors, Overloaded Operators, Static Class Members, Garbage Collection.
Arrays: One-dimensional arrays, Creating an array, Two dimensional arrays, Strings, Vectors, Wrapper classes.
Inheritance: Basics of inheritance, Inheriting and Overriding Superclass methods, Calling Superclass Constructor, Polymorphism, Abstract Classes, Final Class.
Strings: String class, string concatenation, Comparing strings, Substring, Difference between String and String Buffer class, String Tokenizer class.

UNIT III

Interface and Packages: Basics of interface, Multiple Interfaces, Multiple Inheritance Using Interface, Multilevel Interface, Packages: Create and Access Packages, Static Import and Package Class, Access Specifiers.
Exception Handling: Introduction, Try and Catch Blocks, Multiple Catch, Nested Try, Finally, Throw Statement, Built-In Exceptions.

UNIT IV

Multithreaded Programming: Introduction, Creating Threads, Extending the Threads, Stopping and Blocking a Thread, Lifecycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface.
Applets: Introduction, Applet Class, Applet Life Cycle, Graphics in Applet, Event-Handling.
File and I/O Streams: File Class, Streams, Byte Streams, Filtered Byte Streams, Random Access File Class, Character Streams**.**

Recommended Books / Suggested Readings:

1. Programming with Java A Primer, 5th Edition, E. Balagurusamy, TMH.
2. Java Programming for Core and Advanced Learners, Sagayaraja, Denis, Karthik, Gajalakshmi, Universities Press.
3. Java Fundamentals, A Comprehensive Introduction, H. Schildt, D. Skrien, TMH.
4. Java, The complete Reference, H. Schildt, 7th Edition, TMH.

BIT323 Programming Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the Java Programming.
The course includes Decision Making & Branching, Looping, Classes and Objects, Arrays, Multithreaded Programming.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Implement Core Java concepts.
CO2: Solve computational problems using various operators of Java.
CO3: Design solutions to complex by handling exceptions that may occur in the programs.
CO4: Solve complex and large problems using the concept of multithreading.
CO5: Implement interfaces and design packages.

List of Practical:

1. Write a Java program to compute area of 1) Circle2) rectangle 3) triangle 4) square.
2. Write a program to convert temperature from Fahrenheit to Celsius degree using Java.
3. Write a simple program in Java to print first fifty prime number.
4. Write a program in Java to print Fibonacci series in given series.
5. Write a Java program that prints current time in GMT.
6. Write a program in Java to demonstrate command line arguments.
7. Write a program in Java to create student information using array.
8. Program to remove the duplicate elements from an array.
9. Write a program in Java to demonstrate various operations on string functions.
10. Program to calculate area of Square and Rectangle using Method Overloading.
11. Program to calculate simple interest and compound interest using class.
12. Program to Encrypt and Decrypt the String using class.
13. Write a program in Java to implement default & parameterized constructor.
14. Write a program in Java to implement inheritance.
15. Write a program in Java to implement interface.
16. Write a program in Java to demonstrate wrapper classes
17. Write a program in Java to demonstrate abstract class.
18. Write a program in Java to implement user defined package.
19. Program to generate +ive Fibonacci and –ive Fibonacci series using Thread.
20. Program to implement Multiple Thread.
21. Applet Program to Displaying Digital Clock. (Ex: 09:15:45 AM)
22. Applet Program to Draw different shapes and fill with different color, receives input from user.
23. Applet Program to Draw our National Flag.
24. Applet Program to display different image with different styles of font.
25. Applet Program to Draw Bar Charts with different colors.
26. Applet Program to draw Building with attractive colors.
27. Write a program in Java to demonstrate text stream object that take input from user & write it into text file.

BIT304: C# Programming
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the C# Programming. The course includes # basics, Objects and Types, Inheritance.

Course Outcomes (CLO):

Upon successful completion of this course, students will be able to:

CO1: Describe the fundamentals concept of C#.
CO2: Develop simple programs in C#.
CO3: Use appropriate data sources in C# applications.
CO4: Describe the methods, arrays, Strings.

Course Contents

UNIT-I

Introducing C#: Evolution of C#, Characteristics of C#, Applications of C#, Overview of C#, Literals, Variables and Data Types. Operators and Expressions, Decision Making and Branching and Looping.

UNIT-II

Methods in C#: Declaring Methods, Main Method, Invoking Method, Nesting of Methods, Pass by Value, Pass by Reference.

Handling Arrays: One Dimensional Arrays, Two Dimensional Arrays, jagged arrays, assigning array references, Using the length property, Implicitly typed array.

Creating Strings: String Methods, Comparing Strings.

UNIT-III

Structures and Enumerations: Structures, structs with methods, Nested Structs Enumerations, Enumerator Initialization.

Classes and Objects: Basic Principles of OOP Defining a Class, Creating Objects.

Constructors: Overloaded Constructors, Copy Constructors, Destructors.

UNIT-IV

Inheritance and Polymorphism: Classical Inheritance-Containment Inheritance, defining a Subclass-Defining Subclass Constructor, Multilevel Inheritance, Overriding Methods, Defining an Interface-Implementing Interface, Overloaded Operators, Overloaded Unary Operator, Overloaded Binary Operator

Recommended Books / Suggested Readings:

1. E. Balagurusamy, PROGARAMMING IN C#, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Yashwant Kanetkar, Let Us C#, Tata McGraw-Hill Publishing Company Ltd, New Delhi.

BIT324: C# programming Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the C# Programming. The course includes # basics, Objects and Types, Inheritance.

Course Outcomes (CLO):

After completion of course, Students will be able to:

CO1: Understand use of C# basics, Objects and Types, Inheritance.
CO2: Develop simple programs in C#.
CO3: Use appropriate data sources in C# applications.
CO4: Develop, implement and creating Applications with C#.

List of Practical:

1. To Check whether a number is Palindrome or not.
2. Write a C# program to demonstrate a basic calculator using command line arguments.
3. To find the roots of Quadratic Equation.
4. C# Program to Display the ATM Transaction.
5. Write a C# program to show the machine details like machine name, Operating System, Version, Physical Memory and calculate the time since the Last Boot Up.
6. Write a Program in C# to demonstrate boxing and unboxing
7. To demonstrate Operator overloading.
8. To write a C# program using Branching and Looping statements.
9. To write a C# program using Arrays and Strings methods.
10. To multiply to matrices using Rectangular arrays.
11. To write a C# program using Structures and enumerations
12. To reverse a given string using C#.
13. To write a C# program using inheritance concepts.
14. To write a C# program using Polymorphism.
15. To write a C# program using interfaces.
16. To write a C# program by using operator overloading.
17. To write a C# program using delegates, events, errors and exceptions.
18. Use Try, Catch and Finally blocks to demonstrate error handling.
19. Demonstrate Use of Virtual and override key words in C# with a simple program.
20. C# Program to Demonstrate Tower of Hanoi
21. C# Program to Create a HangMan Game.
22. C# Program to Perform a Number Guessing Game.
23. C# Program to Prefix Game.
24. C# Program to Display the IP Address of the Machine.
25. C# Program to Illustrate how User Authentication is Done.
26. C# Program to Establish Client Server Relationship.

BIT305: Web Technologies
Credits: 2
LTP 200

Course Description: The course aims to equip the students with a comprehensive study of the Web Technologies.
The course includes HTML, CSS, JavaScript, and Ajax.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand, analyze and apply the role of languages like HTML, DHTML, CSS, XML, JavaScript, VBScript, PHP and protocols in the workings of the web and web applications.
CO2: Understand, analyze and create web pages using HTML, DHTML and Cascading Styles sheets.
CO3: Understand, analyze and build interactive web applications.
CO4: Understand, analyze and build web applications using PHP.
CO5: Understand, analyze and create XML documents and XML Schema.

Course Content

UNIT I

Introduction: History of the web, Growth of the Web, Protocols governing the web, Web project, Web Team, Team dynamics.
World Wide Web, Web browsers, Markup Languages, Style Sheet technologies, client side, server side, HTML Headings, Links, images, Lists, Tables, Forms, Frames.

UNIT II

HTML: Formatting Tags, Links, List, Tables, Frames, forms, Comments in HTML, DHTML.
Java Script: Introduction, Documents, Documents, forms, statements, functions, objects in Java Script, Events and Event Handling,
Arrays, FORMS, Buttons, Checkboxes, Text fields and Text areas.

UNIT III

Introduction to Web Development: Website Webpage, Static Website, Dynamic Website.
XML: Introduction, Display and XML Documents, Data Interchange with an XML document, Document types definitions, Parsers using XML, Client-side usage, Server-Side usage.

UNIT IV

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet, Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables ,CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.

Recommended Books / Suggested Readings:

1. Deitel, Deitel and Neito, INTERNET and WORLD WIDE WEB –How to program, Pearson Education Asia, 5thEdition , 2011.HTML & CSS: The Complete Reference, Thomas Powell, Fifth Edition.
2. Achyut S Godbole and Atul Kahate, “Web Technologies”, Second Edition, Tata McGraw Hill, 2012.
3. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, TataMcGraw Hill, 2013.
4. HTML A Beginner's Guide Wendy L. Willard, Fourth Edition
5. HTML, XHTML and CSS All-In-One for Dummies Andy Harris, Second Edition
6. JavaScript, A Beginner's Guide John Pollock, Third Edition
7. Professional JavaScript for Web Developers (Wrox Programmer) Nicholas C. Zakas, Second Edition

Websites:

1. www.w3schools.com
2. www.html.net
3. www.thesitewizard.com
4. www.learndreamweavertutorials.com

BIT325: Web Technologies Lab

Credits: 1

LTP 002

Course Description: The course aims to equip the students with a comprehensive study of the Web Technologies.

The course includes HTML, CSS, JavaScript, Ajax.

Course Outcomes (CLO):

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

CO1: Understand, analyze and apply the role of languages like HTML, DHTML, CSS, PHP.

CO2: Analyze a web page and identify its elements and attributes.

CO3: Create web pages using HTML, DHTML and Cascading Styles sheets.

CO4: Create dynamic web pages.

CO5: Build web applications using PHP.

List of Practical:

1. Preparation of Biodata using Forms in HTML.
2. Simple Calculation a) Inventory Calculation.
3. Input Validation a) Payroll maintenance.
4. Event Handling a) Changing the Background Color of the Window.
5. Develop a Dynamic Web page Using CSS properties and elements for a university website.
6. To generate the random numbers and display in a table format.
7. Generation of Fibonacci series.
8. Different Pascal triangle generation.
9. Function to determine the pair of integers whether the second integer is multiple of the first.
10. Quiz program.
11. Create a guessing number game.
12. HTML form validation.
13. Program to implement the concept of operator, arrays and functions.
14. Program to communicate between two web pages using PHP.
15. Program to create session and cookies.
16. Program for file manipulation in PHP.
17. Create a database with two tables in MYSQL and perform the basic query operations.
18. Demonstration of joining tables and usage of sub queries.
19. Working with string, numeric and date functions in MYSQL.
20. Develop an application for the demonstration of database connectivity to PHP with MySQL.
21. Develop a simple application for student academic performance.

Websites:

1. www.w3schools.com
2. www.html.net
3. www.thesitewizard.com
4. www.learndreamweavertutorials.com

BIT306: Linux and Shell Programming

Credits: 2
LTP 200

Course Description: The course aims to equip the students with a comprehensive study of the Linux and Shell Programming.
The course includes shell scripts, Linux systems, Graphical Desktop.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Operate with the Linux operating system.
CO2: Understanding the basic set of commands and utilities in Linux systems.
CO3: Learn to develop software for Linux systems.
CO4: Understand file systems and directories and operate them.

Course Content

UNIT-I

Introduction to Linux: History of Linux, Philosophy, Community, Terminology, Distributions, Linux kernel vs distribution. Why learns Linux? Importance of Linux in software ecosystem: web servers, supercomputers, mobile, and servers.

UNIT-II

Linux Structure: Linux Architecture, Filesystem basics, boot process, init scripts, run levels, shutdown process, Very basic introductions to Linux processes, Packaging methods: rpm/dev, Graphical Vs Command line.
File Operations: Filesystem, Filesystem architecture, File types, File attributes, Working with files.

UNIT-III

Graphical Desktop: Session Management, Basic Desktop Operations, Network Management, Installing and Updating Software, Text editors: gedit, vi, vim, emacs, Graphics editors, Multimedia applications.
Linux commands: system Linux commands: ls, cat, touch, mv, cp, bc, mkdir, chmod, date, time, cd and other file and directory related commands.

UNIT-IV

Basic Shell Scripting: Basic Shell Scripting Features and capabilities, Syntax, Constructs, modifying files, Sed, awk command, File manipulation utilities, dealing with large files and Text, String manipulation, Boolean expressions, File tests, Case, Debugging, Regular expressions.

Recommended Books / Suggested Readings:

1. Linux: The complete reference by Richard Petersen, Published by Tata McGraw-Hill Publication.
2. Official Ubuntu Book, 8th Edition, by Matthew Helmke &Elizabeth K. Joseph with Jose Antonio Rey and Philips Ballew, Prentice Hall.
3. Linux in a Nutshell: A Desktop Quick Reference, 6th Edition by Stephen Figgins, Arnold Robbins, Ellen Siever & Robert Love Published by O'Reilly Media.
4. Linux Administration: A Beginner's Guide by Steve Shah & Wale Soyinka, Published by McGraw-Hill Education.
5. Unix Shell Programming by Yashavant P. Kanetkar, Published by BPB Publishers.

BIT326: Linux and Shell Programming Lab
Credits: 1
LTP 002

Course Description: The course aims to equip the students with a comprehensive study of the Linux and Shell Programming.
The course includes shell scripts, Linux systems, Graphical Desktop.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Various basic commands, redirection and input/output of Linux based operating systems.
CO2: Understand the fundamental concepts of programming like loops, conditions, operators etc. specific to Shell Programming.
CO3: Develop shell scripts for various built-in commands of Linux.
CO4: Master the basics of Linux administration.

List of Practical:

1. Linux Installation: Install your choice of Linux distribution e.g. Ubuntu, Fedora, Debian.
2. Installing and Removing Software: Install gcc package. Verify that it runs, and then remove it.
3. Command line operations: a. Install any new package on your system. b. Remove the package installed. c. Find the passwd file in / using find command. d. Create a symbolic link to the file you found in last step. e. Create an empty file example.txt and move it in /tmp directory using relative pathname.
4. File Operations: a. Explore mounted filesystems on your system. b. What are different ways of exploring mounted filesystems on Linux. c. Archive and backup your home directory or work directory using tar, gzip commands. d. Use dd command to create files and explore different options to dd. e. Use diff command to create diff of two files. f. Use patch command to patch a file. And analyze the patch using diff command again.
5. Linux Editors: vim/emacsa. Create, modify, search, and navigate a file in editor. b. Learn all essential commands.
6. Linux Security: a. Use of pseudo to change user privileges to root. b. Identify all operations that require pseudo privileges. c. Create a new user and add it to pseudo configuration file. d. Set password for new user. e. Modify the expiration date for new user using password ageing. f. Delete newly added user.
7. Programs based on shell scripting.

BCM 301 : Human Resource Management
Credits: 3
LTP 300

Course Description: The course aims to equip the students with the techniques and principles to manage human resource of an organization and also focused on some contemporary issues in Hrm.
The course includes basics of Human resource management, Human resource functions, compensation management & health and safety, contemporary issues in HRM.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Gain knowledge of handling the human resources in organizations
CO2: Understand the significance of job analysis and training and development
CO3: Understand the importance of performance appraisal system and compensation management.

Course Contents:

UNIT 1

Introduction: Human Resource Management: Concept and Functions, Role, Status and competencies of HR Manager, HR Policies, Evolution of HRM, HRM vs HRD. Emerging Challenges of Human Resource Management; Workforce diversity; Empowerment; Downsizing; VRS; H R Information System

UNIT 2

Acquisition of Human Resource: Human Resource Planning- Quantitative and Qualitative dimensions; job analysis – job description and job specification; Recruitment – Concept and sources; Selection – Concept and process; test and interview; placement and induction

UNIT 3

Training and Development: Concept and Importance; Identifying Training and Development Needs; Designing Training Programs; Role-Specific and Competency-Based Training; Evaluating Training Effectiveness; Training Process Outsourcing; Management Development; Career Development.

UNIT 4

Performance Appraisal : Nature, objectives and importance; Modern techniques of performance appraisal; potential appraisal and employee counseling; job changes - transfers and promotions; Compensation: concept and policies; job evaluation; methods of wage payments and incentive plans; fringe benefits; performance linked compensation.

Recommended Books / Suggested Readings:

1. Gary Dessler. *A Framework* for *Human Resource Management*. Pearson Education.
2. DeCenzo, D.A. and S.P. Robbins, *Personnel/Human Resource Management*, Pearson Education.
3. Bohlendar and Snell, *Principles of Human Resource Management*, Cengage Learning.
4. Ivancevich, John M. *Human Resource Management*. McGraw Hill.

BIT307: Multimedia Technology
Credits: 3
LTP 300

Course Description: The course aims to equip the students basic understanding the multimedia system and understanding technical details of JPEG and MPEG.

Course Outcomes (CLO):

On successful completion of this course, the students will be able to

CO1: Understand Multimedia works.
CO2: Create a multimedia component using various tools and techniques.
CO3: Analyze and interpret Multimedia Technology.
CO4: Describe the Animation and Multimedia on the Web.

Course Contents

UNIT-I

Multimedia: Introduction to multimedia, Components, Development platforms for multimedia: DOS, Windows, Linux, Uses of multimedia.

Text: Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia and Hypertext.

Images: Still Images: Bitmaps, Vector Drawing, 3D Drawing & rendering, Natural Light & Colors, Computerized Colors, Color Palettes, Image File Formats.

UNIT-II

Sound: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.

Video: How Video Works, Analog Video, Digital Video, Video File Formats, Video Shooting and Editing.

UNIT-III

Animation: Basics of animation, Principle and use of animation in multimedia, Effect of resolutions, pixel depth, Images size on quality and storage. Overview of 2-D and 3-D animation techniques and software. Animation on the Web features and limitations, Software for animation.

UNIT-IV

Multimedia on the Web: Bandwidth relationship, broadband technologies, Text in the web: Dynamic and embedded font technology, Audio on the Web: Real Audio and MP3/MP4, Audio support in HTML, Graphics: HTML safe color palate, Interlaced V/s Non-interlaced model, Graphics support in HTML, Video on the Web: Streaming video, Real Video, MPEG and SMIL.

Recommended Books / Suggested Readings:

1. Multimedia: Making It Work (4thEdition) by Tay Vaughan, Tata Mcgraw Hills.
2. Fundamentals of Multimedia, Ze-Nian Li and Mark S. Drew, Pearson Prentice Hall.
3. Multimedia Basics Volume 1 Technology, Andreas Holzinger, Firewall Media (Laxmi Publications Pvt. Ltd) New Delhi.
4. Tay Vaughan, “Multimedia: Making it work”, TMH, Eighth edition. 2006.
5. Keyes, “Multimedia Handbook”, TMH. 2000.

BIT401: Software Engineering
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of Software Engineering.
The course includes Software life cycle models, Software Metrics, Software Design, and Software Testing.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand the different techniques and models on which software development is based.
CO2: Extract and analyze software requirements specifications for different projects
CO3: Develop some basic level of software architecture/design
CO4: Apply standard coding practices
CO5: Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
CO6: Apply different testing and debugging techniques and analyzing their effectiveness.

Course Content

UNIT I

Introduction: The Problem Domain, Software Eng. Challenges, Software Eng. Approach. Program Vs Software, and Software
process, Software Characteristics, Brief introduction about product and process, Software process and product matrices.
Software life cycle models: Definition, Waterfall model, Increment process models, Evolutionary process models, Selection of a
life cycle model.

UNIT II

Software Requirement Analysis and Specification: Requirements Engineering, type of requirements, Feasibility Studies, Requirement Elicitation, Various steps for requirement analysis, Requirement documentation, Requirement validation, an example to illustrate the various stages in Requirement analysis**.**
Project planning: Size estimation, cost estimation, the constructive cost model (COCOMO).
Software Metrics: Definition, Importance, Categories of metrics.

UNIT III

Software Design: Definition, Various types, Objectives and importance of Design phase, Modularity, Strategy of design, Function
oriented design, IEEE recommended practice for software design descriptions.

UNIT IV

Coding: Programming Principles and Guidelines, Verification-code inspections, static analysis.
Software Testing: What is testing, Test, Test case and Test Suit, Verification and Validation, Alpha, beta and acceptance testing, functional testing, techniques to design test cases, boundary value analysis, Equivalence class testing, decision table-based testing, cause effect graphing technique, Structural testing, mutation testing.
Software maintenance: Categories of maintenance.
Software Reliability: Definition, uses of reliability studies.

Recommended Books / Suggested Readings:

1. An Integrated approach to Software Engineering, Third Edition 2005, Pankaj Jalote, Narosa Publications.
2. Software Engineering, Revised Second Edition, K.K. Aggarwal, Yogesh Singh, New Age International Publishers.
3. Software Engineering –A Practitioner's Approach, Fifth Edition, Roger. S. Pressman, McGraw Hill.
4. Ian Sommerville Software Engineering VII th Edition Pearson Education.

5. K K Aggarwal, Yogesh Singh, Software Engineering (Third Edition) New Age International Publication.

BIT402: Computer Networks
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the Principles of Computer Communications and Networks.
The course includes Types of Computer Networks, OSI reference model, Physical and data link layer Concepts, Network Hardware Components.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Gain the knowledge of networking of computers, data transmission between computers.
CO2: Understand about the various data communication concepts.
CO3: Gain awareness about the structure and equipment of computer network structures.
CO4: Define the concept of local area networks, their topologies, protocols and applications

Course Content

UNIT I

Overview of Computer Communications and Networking: Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability and Security, Network Standards, The Telephone System and Data Communications.

UNIT II

Essential Terms and Concepts: Computer Applications and application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes, analog and Digital Communications, Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.
Network Hardware Components: Introduction to Connectors, Trans receivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, switches Vs Routers.

UNIT III

Physical Layer: Introduction: Network topologies; Linear Bus Topology, Ring Topology, Star Topology, Hierarchical or Tree Topology, Topology Comparison, Considerations when choosing a Topology: Switching; Circuit switching, Message switching, Packet switching, Implementation of packet switching, Relationship between Packet Size and Transmission time, Comparison of switching techniques: Multiplexing; FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing, TDM – Time division multiplexing.
Transmission medium; Guided & Unguided Transmission medium, Twisted pair, Coaxial cable, Optical fiber, Comparison of fiber optics and copper wire: Wireless transmission; Electromagnetic spectrum, Radio transmission, Microwave transmission.

UNIT IV

Design issues of DLL; Services provided to the Network layer, Framing, Error control, Flow control, Link Management, ARQ strategies: Error Detection and correction; Parity bits, Importance of flaming distance for error correction.
Design issues of Network layer; Nature of the service provided, Internal organization, Routing, Congestion control, Internetworking: Principles of Routing; Types of routing algorithms, Classes of routing algorithms, Properties of routing algorithms, Optimality principle: Routing algorithms; Shortest path algorithm, Flooding, Distance vector routing, Hierarchical routing, Link state routing, Comparison of routing algorithms: Congestion; Factors of congestion, Comparison of flow control and congestion control, General principles of congestion control, Closed loop solution: IP protocol (IPV4)

Recommended Books / Suggested Readings:

1. Computer Communications and Networking Technologies, Michel A. Gallo and William H. Hancock, Thomson Brooks /Cole.
2. Data Communications and Networking –Behrouz A. Forouzan, Fourth Edition MC GRAW HILL EDUCATION, 2006.
3. Principles of Computer Networks and Communications, M. Barry Dumas, Morris Schwartz, Pearson.
4. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rdEdition, Pearson Education.

BIT422: Computer Networks Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the Computer Networks.
The course includes networking components and devices, TCP/IP, Proxy server, Ftp server.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Demonstrate the installation and configuration of network simulator.
CO2: Demonstrate and measure different network scenarios and their performance behavior.
C**O3:** Describe the Packet Tracer software.
CO4: Design and setup an organization network using packet tracer.

List of Practical:

1. Familiarization with networking components and devices: LAN Adapters, Hubs, Switches, Routers etc.
2. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
3. Study of various LAN topologies and their creation using network devices, cables and computers.
4. Study of network IP.
5. Connect the computers in Local Area Network.
6. Study of basic network command and Network configuration commands.
7. Configuration of TCP/IP Protocols in Windows and Linux.
8. Implementation of resource sharing (file, printer etc.)
9. Designing and implementing class A, B and C networks.
10. To configure dynamic IP address for a computer connected to a LAN.
11. To configure proxy server.
12. Installation of ftp server and client.
13. Introduction to Packet Tracer 5.3 & Simple 5 PC's network
14. Configure network Topology using packet tracer software.
15. Setting up first network in LAN and WAN.
16. Distance Vector routing protocol.

BIT403: Database Management System

Credits: 4

LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the Introduction to Database Management System.

The course includes Components of DBMS Environment, Database System Architecture, Entity-Relationship Model, and Relational Data Model.

Course Outcomes (CLO):

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

CO1: Analyze Data Base design methodology.

CO2: Acquire knowledge in fundamentals of Data Base Management System.

CO3: Analyze the difference between traditional file system and DBMS.

CO4: Handle with different Data Base languages.

Course Content

UNIT I

Basic Concepts: Data, Information, Records and files. Traditional file –based Systems-File Based Approach-Limitations of File Based Approach, Database Approach-Characteristics of Database Approach, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, Advantages and Disadvantages of DBMS. Roles in the Database Environment, Data and Database Administrator, Database Designers, Applications Developers and Users.

UNIT II

Database System Architecture: Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances. Data Independence, Logical and Physical Data Independence. Classification of Database Management System Centralized and Client Server architecture to DBMS. Data Models: Records- based Data Models, Object-based Data Models, Physical Data Models and Conceptual Modeling.

UNIT III

Entity-Relationship Model: Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams. Basic Concepts of Hierarchical and Network Data Model.

UNIT IV

Relational Data Model: Brief History, Relational Model Terminology-Relational Data Structure, Database Relations, Properties of Relations, Keys, Domains, Integrity Constraints over Relations, Base Tables and Views.

Recommended Books / Suggested Readings:

1. Desai, B.C., 1993: An Introduction to Database Systems, Galgotia Publ. Private Ltd.
2. Elmasri & Navathe, “Fundamentals of Database Systems”, 5th edition, Pearson Education.
3. Thomas Connolly Carolyn Begg, “Database Systems”, 3/e, Pearson Education.
4. C. J. Date, “An Introduction to Database Systems”, 8th edition, Addison Wesley N. Delhi.
5. Mukhi, Vijay 1992: Mastering Oracle 6.0, BPB Publications.

BIT423: Database Management System Lab

Credits: 2

LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the Introduction to Database Management System.

The course includes SQL Fundamentals, Joins, Queries, Tables.

Course Outcomes (CLO):

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

CO1: Gain knowledge about SQL Fundamentals.

CO2: Handle with different Data Base languages.

CO3: Understand the Database connectivity with front-end.

CO4: Understand the Commit & Rollback commands.

CO5: Understand the concepts of Table View, Log & Triggers.

List of Practical:

1. To implement Data Definition language
   - 1.1. Create, alter, drop, truncate
   - 1.2. To implement Constraints.
   - 1.2.1. (a). Primary key, (b).Foreign Key, (c). Check, (d). Unique, (e). Null, (f). Not null , (g) . Default, (h). Enable Constraints, (i). Disable Constraints (j). Drop Constraints
2. To implementation on DML, TCL and DRL
   - 2.1. (a). Insert, (b).Select, (c).Update, (d).Delete, (e).commit, (f).rollback, (g).save point, (i). Like'%', (j). Relational Operator.
3. To implement Nested Queries & Join Queries
   - 1.1 a). To implementation of Nested Queries
   - 1.2 (b). (a) Inner join, (b). Left join, (c). Right join (d).Full join
4. To implement Views
   - 4.1. (a). View, (b). joint view, (c). force view, (d). View with check option

BIT404: ASP.NET
Credits: 2
LTP 200

Course Description: The course aims to equip with modern web development technology using Microsoft ASP.Net and its various controls.
The course includes internet programming, concepts.

Course Outcomes (CLO):
Upon successful completion of this course, students should be able to:
CO1: Implement the server-side script.
CO2: Compare and contrast between client-side script & server-side script.
CO3: Develop a website in ASP.NET and make it online.
CO4: Make Database connectivity between Front End and Back End.

Course Contents:

UNIT I

Introduction to ASP.NET: .NET Framework (CLR, CLI, BCL), ASP.NET Basics, ASP.NET Page Structure, Page Life Cycle.
Controls: HTML Server Controls, Web Server Controls, Web User Controls, Validation Controls, Custom Web Controls.

UNIT II

State Management: View State, Control State, Hidden Fields, Cookies, Query Strings, Application State, Session State, Profile Properties, Master Pages, Themes, Site Navigation.

UNIT III

Introduction to ADO.NET, Data Binding, Importing the SqlClient Namespace, Defining the Database Connection, Managing Content Using Grid View and Details View. Security and User Authentication: Basic Security Guidelines, Securing ASP.NET Applications, ASP.NET Memberships and Roles.
Security and User Authentication: Basic Security Guidelines, Securing ASP.NET Applications, ASP.NET Memberships and Roles.

UNIT-IV

Working with Files and Email: Writing and Reading Text Files, Uploading Files, Sending Email with ASP.NET. Introduction to Web Services, Ajax, Silverlight.

Recommended Books / Suggested Readings:

1. Beginning ASP.NET 4: in C# andVB (Wrox),Imar Spaanjaars, Paperback Edition
2. Sams Teach Yourself ASP.NET 4 in 24 Hours, Complete Starter Kit Scott Mitchell
3. Microsoft ASP.NET
4. Step by Step (Microsoft), George Shepherd, Paperback Edition.

Weblinks:

1. www.asp.net
2. www.w3schools.com
3. www.learn-asp.net
4. www.aspnetutorials.com

BIT424: ASP.NET Lab
Credits: 1
LTP 002

Course Description: The course aims to equip with modern web development technology using Microsoft ASP.Net and its various controls.
The course includes internet programming, concepts.

Course Outcomes (CLO):
Upon successful completion of this course, students should be able to:

Course Contents:
CO1: Implement the server-side script.
CO2: Compare and contrast between client-side script & server-side script.
CO3: Develop a website in ASP.NET and make it online.
CO4: Make Database connectivity between Front End and Back End.

List of Practical:
1. Create a windows form with the following controls Textbox, Radio button, Check box, Command Button
2. Write a program for Menu option.
3. Create a program to connect with database and manipulate the records in the database using ADO .NET
4. Create a program to implement the concepts of OOPS for creating class, inheritance 5.Create a program to perform input validation using procedure.
5. Write a program to open a file and using I/O operations write contents into a file and read the contents from the file.
6. Create a window form using HTML controls.
7. Create a program to perform validation using validation controls.
8. Create a program in ASP .NET to connect with the database using ADODB connectivity and manipulate the records.
9. Write a program to store the employee details using class and methods in ASP.NET 11.Write a program to Handle Exceptions
10. Write a program to create a form with Basic controls in ASP.NET.

BIT405: Advanced Web Development
Credits: 2
LTP 200

Course Description: The course aims to equip the students with a comprehensive study of Advanced Web Application Development.
The course includes Frameworks, AJAX, JQUERY and JS.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Generate web page using AJAX, JQUERY and JSP.
CO2: Understand website dynamic behavior and server-side programming.
CO3: Understand persistence Data storage.
CO4: Generate dynamic web pages using databases.
CO5: Develop web services and comprehend the significance of frameworks.

Course Content

UNIT I

Introduction: Rich Internet Applications, HTML 5: Responsive web design HTML and CSS Frameworks. Introduction to JavaScript, Objects and Events, AJAX: History of AJAX, AJAX using XML HttpRequest object-using XML and DOM, creating a full scaled AJAX Enabled Application using JSON.

PHP: Introduction String processing and regular expressions, Viewing Client/Server environment variables-Form processing and Business logic, verifying a username and password, connecting to a database.

UNIT II

JQUERY: JQuery basic, JQuery core, events, effects, plugins, user interface using jQuery UI.
JSP and SERVLETS: Overview of JSP and Servlet, creating dynamic web pages using JSP Standard.

UNIT III

Database Connectivity: Introduction, Relational Database: SQL-MYSQL-JBDC-Driver and Connection Management, Understanding JDBC ODBC connectivity, Connection and Pooled connection, Resultset, Datatype support, Prepared statement, Callable statements, Microsoft Language Integrate Query.

UNIT IV

Web Servers and Web Frameworks: Web servers: Introduction, HTTP/HTTPS Transactions, Multi-tier Application architecture, configuring web servers, Apache installation, Microsoft IIS Express and web matrix-Web Frame works. Web Services: WSDL, UDDI, SOAP-RPC.

Recommended Books / Suggested Readings:

1. A Beginner's Guide To Html Http://www.Ncsa.Nine.Edit/General/Internet/w ww/Html.Prmter
2. BayrossIvan, “HTML, DHTML, JavaScript, PERL, CGI”, 3rd Edition, BPB Publication,2009.
3. Programming PHP, “Kevin Tetroi”, O' Reilly.

BIT425: Advanced Web Development Lab
Credits: 1
LTP 002

Course Description: The course aims to equip the students with a comprehensive study of Advanced Web Application Development.
The course includes Frameworks, AJAX, JQUERY and JS.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Create web pages using several technologies.
CO2: Store data in a table using web pages.
CO3: Develop website and web applications.
CO4: Generate web page using HTML5, AJAX, JQUERY.

List of Practical:

1. To study different web programming tools.
2. HTML5 Input Types.
3. HTML5 Canvas.
4. HTML5 Web Storage.
5. Create a webpage using AJAX.
6. Implement jQuery.
7. JSP Programs.
8. Create a simple website. The website should contain at least two to three pages. It should have a table, a menu and some photograph. Also create an image map in website. Demonstrate the use of summary tags, headings, colours etc.
9. Create a simple Web application.

BIT406: Latex
Credits: 2
LTP 200

Course Description: The course aims to equip the students with a comprehensive study of the LATEX. The course includes Typesetting text, references.

Course Outcomes (CLO):

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

CO1: Structure the document with well familiarized documenting abilities.

CO2: Frame a document for self or University.

CO3: Define and use Equations within LaTeX.

CO4: Use BibTeX to maintain bibliographic information and to generate a bibliography for a particular document.

Course Content

UNIT-I

Introduction-What is LATEX.

Document Structure- Essentials, Troubleshooting**,** Creating a title, Sections, Labelling, Table of Contents.

UNIT-II

Typesetting text-Font effects, Coloured text,Font sizes, Lists, Comments and spacing, Special characters.

UNIT-III

Tables, Figures.

Equations-Inserting Equations, Mathematical Symbols.

UNIT-IV

Inserting References- Introduction,The BibTeX file, Inserting the bibliography, Citing references, Styles.

Recommended Books / Suggested Readings:

1. Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

2. L. Lamport. LATEX: A Document Preparation System, User's Guide and ReferenceManual. Addison-Wesley, New York, second edition, 1994.

BIT426: Latex Lab
Credits: 1
LTP 002

Course Description: The course aims to equip the students equip the students with a comprehensive study of the LATEX.
The course includes Typesetting text, references.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Structure the document with well familiarized documenting abilities.
CO2: Frame a document for self or University.
CO3: Type the mathematical formulae using LaTeX.
CO4: Use the preamble of LaTeX file to define document class and layout options.

List of Practical:

1. Installation of the software LaTeX
2. Understanding Latex compilation, Basic Syntex, Writing equations, Matrix, Tables
3. Page Layout –Titles, Abstract Chapters, Sections, Referrences, Equation references, citation. List making environments Table of contents, generating new commands, Figure handling numbering, List of figures, List of tables, Generating index.
4. Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tilez listing.
5. Classes: article, book, report, beamer, slides.
6. Applications to: Writing Resume, writing question paper, writing articles/ research papers , Presentation using beamer.

BIT407: MATLAB Programming
Credits: 2
LTP 200

Course Description: The course aims to equip the students to understand, how to develop and deploy an application to the app market.
The course includes various concepts of MATLAB

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Describe the fundamentals in MATLAB.
CO2: Discuss the programming in MATLAB.
CO3: Describe the graphics plotting.
CO4: Discuss the Procedures and Functions.

Course Content

UNIT I

Introduction: Components of a computer, working with numbers, Machine code, Software hierarchy, Features of MATLAB, Uses of MATLAB.

UNIT II

Programming Environment: MATLAB Windows, Commands for Managing a Session, Commands for Working with the System, data types, A First Program, operator, Expressions, Constants, Variables and assignment statement.
Control Statements: decision making statements, Looping statements.

UNIT III

Array: One dimensional array, two-dimensional array, Special Arrays in MATLAB, Multidimensional Arrays.
Graph Plots: Basic plotting, built in functions, generating waveforms, Sound replay, load and save.

UNIT IV

Procedures and Functions: Arguments and return values, M-files, Formatted console input-output, String handling.
Manipulating Text: Writing to a text file, reading from a text file, Randomizing and sorting a list, searching a list.
GUI Interface: Attaching buttons to actions, Getting Input, Setting Output.

Recommended Books / Suggested Readings:

1. MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, Wiley, 2004.
2. C.B. Moler, Numerical Computing with MATLAB, SIAM, 2004.

BIT427: MATLAB Programming Lab

Credits: 1
LTP 002

Course Description: The course aims to equip the students able to carry out simple numerical computations and analyses using MATLAB.
The course includes simple calculations using MATLAB

Course Outcomes (CLO):

Upon successful completion of the course, the students should be able to:
CO1: Describe the fundamentals in MATLAB.
CO2: Understand the main features of the MATLAB development environment.
CO3: Write simple programs in MATLAB to solve scientific and mathematical problems.
CO4: Understand how to draw a basic graph application.

List of Practical:

1. Introduction to MATLAB.
2. Explain the main windows in MATLAB desktop.
3. Programming in MATLAB: Introduction, Branching statements, loops, functions, additional data types, arrays, inputs/outputs etc.
4. Program to display a Matrix
5. Program to Addition of matrix.
6. Basic graphic applications: Draw Curve, Refine the plot: Line pattern, color, and thickness, Draw multiple curves.

GWE101: Gender Equality and Women Empowerment

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Pre-Requisites: NA

Course Objectives:

1. To sensitize the participants regarding the issues of gender and the gender inequalities prevalent in society.
2. To raise and develop social consciousness among the students.
3. To introduce gender sensitization and related issues.

Course Level Learning Outcomes

Upon the successful completion of the course, student will be able to:

1. Recognize the intersections between gender and other social and cultural identities
2. Engage in promoting social justice and human rights
3. Explain how theories of gender and sexuality have been influenced by and influence their social contexts
4. Describe the social construction of gender and sexuality and explain who these constructions are shaped by the time, location, and culture.

Course Contents:

Unit-1

Introduction to Women's Studies: Sex and Gender, socialization, Definition, Nature, Scope and various dimensions.

Unit-2

Approaches of Feminism: Feminism and Patriarchy, Feminist ideology, Feminist Movements in brief.

Unit-3

Basic concepts of Gender and Society: Sexual division of Labour, Masculinity & feminity, Man and Woman relationship, Self-awareness, consciousness raising.

Unit-4

Women and Law: Constitutional Laws and Fundamental rights, Human Rights, Women related Law, Women in Politics

Unit-5

Skill development and presentation: Film/Documentary Screening , Field Visits, Group discussion and debate, Awareness Songs, Street plays, theatre and presentation skills for personality development**.**

Unit-6

Prevention of Sexual Harassment: Preconditions for Effective Working of Sexual Harassment, Complaints Committees, Role of men in prevention of sexual harassment at workplace, Gender sensitive language, work culture and workplace.

Suggested Readings:

1. Gill, Rajesh, Contemporary Indian Urban Society- Ethnicity, Gender and Governance, Bookwell Publishers, New Delhi, 2009
2. Jain, Devaki and Rajput, Pam, (eds), Narratives from the Women's Studies Family, Sage, New Delhi, 2003.

Suggested Books:

1. Mies, Maria, Indian Women and Patriarchy, Concept Publishing Company, New Delhi, 2004.

BIT501: Python Programming

Credits: 4

LTP 310

Course Description: The course aims to equip the students with a comprehensive study of Python Programming. The course includes Object-Oriented paradigm in Python programs, Python functions, Python exception handling mechanism.

Course Outcomes (CLO):

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

CO1: Familiar with Python environment, data types, operators used in Python.
CO2: Compare and contrast Python with other programming languages.
CO3: Learn the use of control structures and numerous native data types with their methods.
CO4: Design user defined functions, modules, and packages.
CO5: Identify and handle the exceptions in programs through appropriate exceptions handling methods.

Course Content

UNIT-I

Introduction: Why do people use python? Python a scripting language, Users of Python, Need of Python, Python's Technical
Strengths. How Python runs programs: Introducing the Python Interpreter, Program Execution.
Execution Model Variation: Python Implementation Alternatives.
Data Types & Input/Output: Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple
Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command.
Operators and Expressions: Operators in Python, Expressions, Precedence, Associativity of Operators, Non-Associative
Operators.

UNIT-II

Control Structures: Decision making statements, Python loops, Python control statements.
Strings Fundamentals: String Basics, String Literals, Strings in action, String Methods -Lists and Dictionaries, Tuples-Files.
Module: Importing Module, Math Module, Random Module, Package, Composition and The Distribution Utility.

UNIT-III

Functions: Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions.
Classes & OOP: Introduction, Class Coding Basics, Class Coding details: Class Statement, Methods, Inheritance, designing with
classes: Python and OOP, OOP Inheritance, Composition, Delegation, Methods and Classes act as Objects, Multiple Inheritance.

UNIT-IV

Exception Handling: Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.
File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read () & write () methods, tell () & seek () methods, renaming & deleting files in Python, directories in Python.

Recommended Books / Suggested Readings:

1. Programming in Python, Pooja Sharma, BPB Publications, 2017.2.
2. Core Python Programming, R. Nageswara Rao, 2nd Edition, Dreamtech.3.
3. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.
4. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.

BIT521: Python Programming Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of Python Programming. The course includes Object-Oriented paradigm in Python programs, Python functions, Python exception handling mechanism.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Solve simple to advanced problems using Python language.
CO2: Develop logic of various programming problems using numerous data types and control structures of Python.
CO3: Implement different data structures using Python.
CO4: Implement modules and functions using Python.
CO5: Design and implement the concept of object-oriented programming structures.
CO6: Implement files handling.

List of Practical:
1. Write a program to add two numbers.
2. Write a program that declares 3 integers, determines and prints the largest and smallest in the group.
3. Write a program for factorial of a number.
4. Write a program to calculate simple interest.
5. Write a program to find that given year is leap year or not.
6. Write a program to implement linear search and binary search.
7. Write a program to find that given number is Armstrong or not.
8. Write a program to print Fibonacci Series.
9. Write a program to convert decimal number into binary numbers.
10. Python Program to find sum of array.
11. Write a program to find largest number of elements in array.
12. Write a program to check if a string is palindrome or not.
13. Maintain book record as per their serial numbers in library using dictionary.
14. Write a program to concatenate two dictionaries into one.
15. Perform following operations on dictionary 1) Insert 2) delete 3) change 4) update.
16. Write a program to calculate addition of two number using methods.
17. Program to calculate average of numbers using function.
18. Fibonacci series using recursion.
19. Write a program to create a module of factorial in Python.
20. Write A Program to Find the Area of a Rectangle Using Classes
21. Write A Program to Append, Delete and Display Elements of a List Using Classes
22. Write A Program to Create a Class and Compute the Area and the Perimeter of the Circle
23. Write A Program to Create a Class which Performs Basic Calculator Operations
24. Write A Program to Create a Class in which One Method Accepts a String from the User and Another Prints it.
25. Write A Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File.
26. Write A Program to Read a Text File and Print all the Numbers Present in the Text File.

27. Write a program for generation of pyramid.

Pyramid 1	Pyramid 2	Pyramid 3	Pyramid 4	Pyramid 5
*	* * * *	*	*	1
* *	* * *	* *	* * *	1 2
* * *	* *	* * *	* * * * *	1 2 3
* * * *	*	* * * *	* * *	1 2 3 4
			*	

BIT502: Principles of Information Security
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the Principles of Information Security.
The course includes cryptography, encryption techniques, network security, cryptography.

Course Outcomes (CLO):

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

CO1: Acquire a practical overview of the issues involved in the field of information security.
CO2: Demonstrate a basic understanding of the practice of information security.
CO3: Understand the information security risks across diverse settings including the Internet and WWW based commerce systems.
CO4: Explore the idea that in Information Security answers are not always known, and proposed solutions could give rise to new, equally complex problems.
CO5: Develop the understating about information security.

Course Content

Unit-I

INTRODUCTION: Meaning, importance, basics -changing nature and global information systems. Threats: New Technologies Open Door Threats -information Level Threats Vs Network Level-Threats -Information system security -Computer Viruses -Classifications of Threats and assessing damages and protecting information system security.

Unit-II

INFORMATION SECURITY POLICY: Security policy, standards, guidelines, Information security management system, Basic Principles, Security related Terms, Three Pillars of Information Security. Information Classification, criteria for information and classification.

Unit-III

PHYSICAL SECURITY: Need, Meaning, Natural Disasters and control, basic tenets of physical security of information systems resources, physical entry controls. Biometrics Controls for Security: Introduction, Access Control, User Identification & Authentication. Meaning, Nature of Biometric identification/Authentication techniques, Biometric techniques. Key Success factors and benefits.

Unit-IV

NETWORK SECURITY, CRYPTOGRAPHY: Need, Basic concepts, network security dimensions, establishing security perimeter for network protection, Network types, Firewall: Introduction, need, topologies for different type of firewalls. Cryptography: basic elements of cryptography, Digital Signature, Cryptography algorithms –IES, DES, AES and public key cryptography (RSA).

Recommended Books / Suggested Readings:

1. Nina Godbole (2009), “Information Systems Security” , Wiley Publications.
2. Atul Kahate (2003), “Cryptography & Network Security”, TataMcgraw.

BIT522: Principles of Information Security Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the Principles of Information Security.
The course includes cryptography, encryption techniques, network security, cryptography.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Demonstrate a basic understanding of the practice of information security.
CO2: Be familiar with how threats to an organization are discovered, analyzed, and dealt with.
CO3: Be familiar with network security threats and countermeasures.
CO4: Develop the understating about information security.

List of Practical:

1. Study of Network Security fundamentals -Ethical Hacking, Social Engineering practices.
2. Study of System threat attacks -Denial of Services.
3. Study of Sniffing and Spoofing attacks.
4. Study of Techniques uses for Web Based Password Capturing.
5. Study of Different attacks causes by Virus and Trojans.
6. Study of Anti-Intrusion Technique: Honey pot.
7. Study of Symmetric Encryption Scheme: RC4.
8. Implementation different types of algorithms of Cryptography.
9. Study of IP based Authentication.

Note: Software: Turbo C++ IDE (TurboC3), Borland Turbo C++ (Version 4.5) and Cryp Tool.

BIT503: Cloud computing

Credits: 4

LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the Cloud computing. The course includes Cloud Computing Architecture, Infrastructure as a Service (IaaS), Cloud Platforms.

Course Outcomes (CLO):

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

CO1: Understand the basic concept and importance of cloud computing.

CO2: Present a survey on cloud building blocks and technologies.

CO3: Perform cloud computing admin and programming using open source tool and combinations.

CO4: Monitor and manage the cloud resources, applications and data while addressing the security concerns.

CO5: Use cloud solutions offered by industry leaders for various applications.

Course Content

UNIT-I

Overview of Computing Paradigm: Recent trends in Computing-Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing.

Introduction: Objectives, from collaborative to the Cloud -A short history Client-Server Computing, Peer-to-Peer Computing, Distributed Computing, Collaborative Computing, Cloud Computing, Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services, Industrial Applications.

UNIT-II

Cloud Computing Architecture: Cloud computing stack Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services Service Models (XaaS) Infrastructure as a Service(IaaS) , Platform as a Service(PaaS), Software as a Service(SaaS) Deployment Models Public cloud, Private cloud, Hybrid cloud, Community cloud.

UNIT-III

Infrastructure as a Service (IaaS): Introduction to IaaS, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine (VM) Resource Virtualization Server. Cloud Security - Infrastructure Security Network level security, Host level security, Application level security Data security and Storage Data privacy and security Issues.

UNIT-IV

Cloud Platforms in Industry: Amazon Web Services-Compute Services, Storage Services, Communication Services, Additional Services. Google App Engine-Architecture and Core Concepts, Application Life Cycle. Cost Model. Microsoft Azure-Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance.

Recommended Books / Suggested Readings:

1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, (2011), Cloud Computing: Principles and Paradigms, Wiley.
2. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, Tata McGraw Hill, ISBN-13: 978-1-25-902995-0, New Delhi, India, Feb 2013.
3. Cloud Computing Bible, Barrie Sosinsky, Wiley India Pvt. Ltd, ISBN-13: 978-81-265-2980-3, New Delhi, India, 2011.
4. Cloud Computing: Principles and paradigms, Raj Kumar Buyya, James Broberg, Andrezei M. Goscinski, Wiley India Pvt. Ltd, ISBN-13: 978-81-265-4125-6, New Delhi, India, 2011.
5. Cloud Computing for Dummies, Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Wiley India Pvt. Ltd, ISBN-13: 978-0-47-0597422, New Delhi, India, 2011.

BIT523: Cloud computing Lab

Credits: 2

LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the Cloud computing. The course includes Cloud Computing Architecture, Infrastructure as a Service (IaaS), Cloud Platforms.

Course Outcomes (CLO):

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

CO1: Earn the use of cloud computing tools offered by industry leaders.

CO2: Develop and deploy cloud applications using popular cloud platforms.

CO3: Configuration of the virtual machines on the cloud and building of a private cloud.

CO4: Monitor and manage the cloud resources, applications.

List of Practical:

1. Study and implementation of Infrastructure as a Service.
2. Study of Cloud Computing & Architecture
3. Installation and Configuration of virtualization using KVM.
4. Study and implementation of Infrastructure as a Service
5. Study and implementation of Storage as a Service
6. Study and implementation of identity management
7. Study Cloud Security management
8. Write a program for web feed.
9. User Management in Cloud.
10. Using public cloud service providers tools for exploring the usage of IaaS, PaaS and SaaS cloud services.
11. Setting up a private cloud using open source tools (Eucalyptus/Open Stack etc.).
12. Case study on Amazon EC2/Microsoft Azure/Google Cloud Platform

Note: Hardware / Software Required: Ubuntu operating system, Internet, open source software KVM, Virtual machine, WAMP/ZAMP server, any tool or technology can be used for implementation of web application e.g., JAVA, PHP, etc.

BIT504: Algorithm Design Techniques
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of Algorithm Design Techniques.
The course includes design techniques, Dynamic Programming algorithm, backtracking algorithm.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Decide the appropriate data type and data structure for a given problem.
CO2: Select the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.
CO3: Compare algorithms with respect to time and space complexity.
CO4: Develops ability to think rigorously and analytically to solve real-world problems.

Course Content

UNIT-1

Introduction: Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm, Fundamentals of the Analysis of Algorithm Efficiency Analysis Framework, Asymptotic Notations and Basic Efficiency Classes.

UNIT-II

Divide-and-conquer general approach, binary search, merge sort, quicksort.
Greedy algorithms: general approach, activity selection, knapsack problem, minimum-spanning tree, Dijkstra's algorithm, Huffman code.

UNIT-III

Dynamic Programming: General approach, multi-stage graph, matrix-chain multiplication, all-pairs shortest paths, traveling salesperson, 0/1 knapsack problem, longest common subsequence.
Backtracking: N-queen problem, sum of subsets, knapsack problem, traveling salesperson problem, Graph coloring.
Branch-and-Bound: Assignment problem, 0/1 knapsack problem.

UNIT-IV

Advanced Sorting techniques: Heap Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques, Medians & Order Statistics, complexity analysis**.**
String Processing: String Matching, KMP Technique.

Recommended Books / Suggested Readings:

1. Fundamental of Computer algorithms – Horowitz and Sahni.
2. The art of Computer Programming – Donald Knuth.
3. Design Methods and Analysis of Algorithms – S.K. Basu.
4. The Design and Analysis of Computer Algorithms – Aho, Hopcraft and Ullaman.
5. Sarabasse & A.V. Gelder Computer Algorithm – Introduction to Design and Analysis, Publisher – Pearson 3rd Edition 1999

BIT524: Algorithm Design Techniques Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of Algorithm Design Techniques.
The course includes design techniques, Dynamic Programming algorithm, backtracking algorithm.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Identify the problem given and design the algorithm using various algorithm design techniques.
CO2: Implement various algorithms in a high-level language.
CO3: Analyze the performance of various algorithms.
CO4: Compare the performance of different algorithms for same problem.

List of Practical:

1. Write a program to implement Insertion Sort.
2. Write a program to implement Merge Sort.
3. Write a program to implement Heap Sort
4. Quick sort algorithm for sorting a list of integers in ascending order.
5. Create a Red-Black Tree and perform following operations on it: (i) Insert a node. (ii) Delete a node (iii) Search for a number & also report the color of the node containing this number.
6. Write a program to implement the DFS algorithm for a graph.
7. Write a program to implement the BFS algorithm for a graph.
8. Write program to implement backtracking algorithm for the N-queens problem.
9. Write a program to implement the backtracking algorithm for the sum of subsets problem.
10. Write a program to determine the minimum spanning tree of a graph.
11. Write a program to implement greedy algorithm for job sequencing with deadlines.
12. Write a program to implement Dijkstra's algorithm for the Single source shortest path problem.
13. Write a program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
14. Write a program to implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.

BIT505: **RDBMS**
Credits: 4
LTP 310

Course Description: The course aims to equip the students to understand the importance of database in real world applications.
The course includes relational database concepts and transaction management concepts in database system. SQL commands.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Knowledge in the areas of database design and SQL programming.
CO2: Understand relational database technology for building applications for the current trend.
CO3: Analyze a business situation and build suitable database applications.
CO4: Describe the Concurrency Control and Physical Storage Media.

Course Content

UNIT I

Introduction: Data, Database, DBMS, File Processing System Vs DBMS-Data Independence, Data Catalog, Three schema Architecture of a database, Functional components of DBMS.
ER Model: Entity, Attributes and its Type, Entity and Relationship, Design Issues of ER Model Constraint.
Understanding the history of RDBMS, its role and importance of creating robust database, RDBMS Terminology, CODD's rule for RDBMS, Concept of Relational Model.

UNIT II

Structured Query Language (SQL): Overview of SQL, Data Definition Commands, Set operations, Aggregate function, Null values, Data Manipulation commands, Data Control commands, Views in SQL, Nested and Complex queries.
Working with SQL: triggers, use of data base triggers, database triggers Vs. SQL*forms, types of triggers, how to apply database triggers, BEFORE vs. AFTER triggers, combinations, syntax for creating and dropping triggers, Views and Packages.

UNIT III

Relational Database Design: Relational Database Design: Design guidelines for relational schema, Function dependencies.
Integrity and Security in Database: Domain Constraints, Referential integrity.
Transactions Management: Transaction concept, Transaction states, ACID properties, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of isolation.

UNIT IV

Concurrency Control: Lock-based, Timestamp-based, Validation-based protocols, Deadlock handling, Recovery System: Failure Classification, Storage structure.
Overview of Physical Storage Media: Magnetic Disks, RAID, Tertiary storage, File Organization, Organization of Records in Files, Indexing and Hashing, Ordered Indices, Static Hashing, Dynamic Hashing.
Database Security techniques and storage technique: - DAS, NAS, SAS.

Recommended Books / Suggested Readings:

1. Abraham Silberschatz, Henry F. Korth, SudharshanS, (2006), "Database System Concepts", Fifth Edition, Tata McGraw Hill.(Unit I, IV & V).
2. Date C.J., Kannan A., Swamynathan S., (2006), "An Introduction to Database Systems",Eighth Edition, Pearson Education.
3. Ramez Elmasri, Shamkant B. Navathe(2007),"Fundamentals of Database Systems", Fourth Edition , Pearson / Addision Wesley.

BIT525: RDBMS Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students to understand the importance of database in real world applications.
The course includes use of Structured Query Language (SQL), learn SQL syntax and PL/SQL.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Design and implement a database schema for a given problem-domain Course Outcome.
CO2: Create and maintain tables using PL/SQL.
CO3: Create and maintain tables using PL/SQL.
CO4: Develop programs using PL/SQL.

List of Practical:

1. TABLE CREATION: a) Create table CUST based on the following details

Name	Type	Remark
CID	VARCHAR2(6)	PRIMARY KEY
CNAME	VARCHAR2(10)	
CCITY	VARCHAR2(8)	

2. Create table PROD based on the following detail

Name	Type	Remark
PID	VARCHAR2(6)	PRIMARY KEY
PNAME	VARCHAR2(10)	
PCOST	NUMBER (4,2)	
PPROFIT	NUMBER (3)	

3. Create table SALE_DETAIL based on the following details

Name	Type	Remark
CID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
PID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
SALE	NUMBER (3)	
SALEDT	DATE	

INSERTION AND DATA RETRIEVAL:
a) Insert and Save Records in CUST, PROD and SALE_DETAIL table.
b) Data Retrieval using SELECT-WHERE, RELATIONAL OPERATOR, ARITHMETIC OPERATOR and use of ORDERBY, DISTINCT, BETWEEN, IN, DUAL and LIKE operator.
2.FUNCTIONS:
a) Date Functions, Numeric Functions, Character Functions, Conversion Functions.
b) Group Functions, Set Functions.
4.ALTER, UPDATE, DELETE, SUBQUERY AND JOINS:

a) Use of ALTER, UPDATE, DELETE and DROP Commands.
b) Using SUBQUERY and JOINS (Equi Join, Non-Equi Join, Outer Join, Self-Join) in data retrieval.
c) Create Views, Sequences and Constraints related Query.

PL/SQL:

1. Make use of COMMIT, ROLLBACK, and SAVEPOINT in a PL/SQL Block.
2. Create a PL/SQL Script to convert temperature in Fahrenheit into Celsius, and vice versa.
3. Calculate the sum of the even integers between 1 and 100.
4. Create a PL/SQL block to find ODD or EVEN NUMBER by using Searched CASE Statements.
5. Calculate a factorial of given number by using FOR loop.
6. Program development using BUILT –IN Exceptions, USER defined Exceptions, RAISE-APPLICATION ERROR.
7. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
8. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
9. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.
10. Develop programs using CURSORS-Declaring, Opening, Fetching, and Closing a Cursor, including the use of CURSOR attributes.
11. Develop Programs using BEFORE and AFTER Triggers, and INSTEAD OF Triggers.

BIT550: Minor Project
Credits: 2
LTP 004

Course Description: The course aims to equip the students with practical application of IT principles for designing, fabrication and testing of working models.
The course includes SDLC, Project Management.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand the team working and team management.
CO2: Learn how to develop components & systems in isolation which meets a common goal.
CO3: Understand practical application of engineering principles for designing, fabrication and testing of working models.
CO4: Design a system, model, component or a process to meet desired/industrial/R&D needs.

Guidelines for Minor Project
The minor project is considered as a steppingstone in implementing Major projects. Hence students should plan and organize their minor projects meticulously and necessary discussions and planning should be done so as to achieve this objective. The following guidelines should be adhered to:

1. Team size should preferably be two with a maximum limit of 3 members.
2. Individual projects may be permitted.
3. Minor Projects should be purely internal in nature.
4. No restriction on tools/platform/language chosen should be made.
5. Students must ensure that they have to submit their synopsis of Project within 30 days from the start of the project.
6. Two interim reports (one after analysis and another after design) should be submitted to internal guides.
7. The number of records to be submitted is limited to team size + one (Departmental copy). Hard binding of reports is mandatory.
8. The report format guidelines used to document Minor Projects should be followed for making the final report and evaluation will be made on the same grounds.

Evaluation of Minor Project:

External Evaluation:
Criteria for external evaluation of Minor Project, External evaluation is done by two external examiners appointed by the HOD/DEAN of the department. The following components are to be assessed for the End Semester external Evaluation of the Minor Project:

Quality of documentation	20 marks.
Presentation of work	20 marks
Viva	20 marks
Total	**60 marks**

Internal Evaluation:
Criteria for internal evaluation of Minor Project, Internal evaluation is be done by conducting a Viva by a team of evaluators comprising of the concerned guides and/or Head of the Department. The following are the components for internal evaluation of the Minor Project:

Presentation of the work/Internal Viva	15 marks
Individual involvement & teamwork	10 marks
Attendance	5marks

Timely submission and assessment of 2 interim reports	10 marks
Total	**40 marks**

BIT560: Industrial Training
Credits: 2

Course Description: The course aims to equip the students with a professional environment and/or style typical of a global IT industry.
The course includes Project feasibility, Process Modeling, System Design, Program design, Program coding and unit testing, System integration, System implementation and acceptance testing.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand the team working and team management.
CO2: Learn how to develop components & systems in isolation which meets a common goal.
CO3: Understand practical application of engineering principles for designing, fabrication and testing of working models.
CO4: Design a system, model, component or a process to meet desired/industrial/R&D needs.

Course Contents:
Summer Professional Training is an important part of BCA course curriculum. It provides an opportunity to BCA students to write a summer training report on latest trends/technology related to software project. Following are guidelines for summer training report writing and assessment:

General Instructions:

1. Summer training report should not be less than 50 pages.
2. Proper guidelines to be followed for preparation of summer training report.
3. Proper dress code is mandatory for presenting and attending summer training PPT presentations.
4. Attendance is compulsory for all students.
5. If a student is absent for his presentation as per schedule, he/she must assess later on with reduced weightage in the presentation assessment.
6. Always prepare a draft report first and print it out.
7. Read it yourself first and correct any typographical or grammatical errors.
8. One copy of final summer training report must be submitted as a spiraled report to the coordinator.

Main Components of a Report:

1. Cover page.
2. Abstract
3. Acknowledgement and declaration.
4. Certificate.
5. Table of contents/Index page.
6. conclusions.
7. References.

Typing Instructions for Summer Training Report:

- Specification for Fonts:
- Font Face: Times new Romano.
- Font Size: As per following preview:
  - Headings (Size 16 Bold).
  - Sub-Heading (Size 14 Bold and Italic).
  - Contents (Size 12Normal)
  - Line spacing: 1.5.
  - Text Alignment: Both left and right justified.

- Page Dimensions: Standard A4 size (297mm x 210mm).
- Margins:
    - Top margin: 0.75”
    - Bottom margin: 0.75”
    - Left margin: 1”
    - Right margin: 0.75”
- Footer: Page number should be bottom centered.
- Sections should be numbered as for example,1. Introduction.
- Subsections should be numbered as for example,3.1 Simulation Toltec.
- Paragraphs and sentences should be short.
- Start of a paragraph should not be intended, rather, give one-line space between two paragraphs.
- A sub heading at the bottom of a page must have at least two full lines below it or else it should be carried over to the next page.
- The last word of any page should not be split using a hyphen.
- References:
    - Book titles must be in capitals.
    - Reference numbers should be marked liberally inside the text of the report-e.g., ...as given in [3].
    - References should either be in chronological order or in the order in which they appear in the text.

Evaluation of Professional Training

Internal/External Evaluation:

Criteria for external evaluation of Professional Training, External evaluation is done by two external examiners from the department is appointed by the HOD/DEAN of the department. The following components are to be assessed for the End Semester external Evaluation of the Professional Training:

Training Report	25 marks.
PPT Content	20 marks
Viva	25 marks
Communication skills	15 marks
Query Handling	15 marks
Total	100 marks

BIT601: Software Testing
Credits: 2
LTP 200

Course Description: The course aims to equip the students with comprehensive study of the Software Testing. The course includes Testing Strategies and Testing Tools.

Course Outcomes (CLO):

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

CO1: Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.
CO2: Implement various test processes for quality improvement.
CO3: Design test planning and Manage the test process.
CO4: Describe different types of testing.

Course Content

UNIT-I

Software Quality, Role of testing, verification and validation, objectives and issues of testing, Testing activities and levels, Sources of Information for Test Case Selection, White-Box and Black-Box Testing , Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation, Test Team Organization and Management
Concept of Unit Testing, Static Unit Testing, Defect Prevention, Dynamic Unit Testing , Mutation Testing , Debugging , Unit Testing in extreme Programming,

UNIT-II

System Test Categories: Basic Tests, Functionality Tests, Robustness Tests, Interoperability Tests, Performance Tests.
Functional Testing: Equivalence Class Partitioning, Boundary Value Analysis, Decision Tables, Random Testing.

UNIT-III

System Test Design: Test Design Factors, Requirement Identification, Characteristics of Testable Requirements, Test Design Preparedness Metrics, Test case Design Effectiveness.
System Test Planning and Automation: Structure of a System Test Plan, Introduction and Feature Description, Test Suite Structure, Test Environment, Test Execution Strategy, Test Effort Estimation, Scheduling and Test Milestones, System Test Automation.

UNIT-IV

System Test Execution: Preparedness to Start System Testing, Metrics for Tracking System Test, Metrics for Monitoring Test Execution, Beta Testing, First Customer Shipment, System Test Report, Product Sustaining, Measuring Test Effectiveness.
Acceptance Testing: Types of Acceptance Testing, Acceptance Criteria, Selection of Acceptance Criteria, Acceptance Test Plan, Acceptance Test Execution, Acceptance Test Report.

Recommended Books / Suggested Readings:

1. Naresh Chauhan, “Software Testing Principles and Practices”, Oxford University Press, 2010.
2. 'Software Testing and Quality Assurance: Theory and Practice' by Sagar Naik, University of Waterloo, Piyu Tripathy, Wiley, 2008.
3. Software Testing: Principles and Practices by Naresh Chauhan, 2012, Oxford Univesity Press.

BIT621: Software Testing Lab
Credits: 1
LTP 002

Course Description: The course aims to equip the students with comprehensive study of the Software Testing. The course includes Testing Strategies and Testing Tools.

Course Outcomes (CLO):

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

CO1: Apply the software testing techniques.
CO2: Use practical knowledge of a variety of ways to test software.
CO3: Construct and test simple programs.
CO4: Understand Selenium and automation testing approach.
to perform testing

List of Practical:

Implement the below mentioned exercises using any Testing Tool .

1. Introduction to Selenium and automation testing approach.
2. Test case execution- (i) Pause test case execution (ii) Resume it later (iii) Stop test case execution at a required step: Using breakpoint (iv) Start test case execution from a required step: Using Set Start point.
3. Commands to input data to AUT- type, send Keys, select, check, uncheck, click, submit, and Wait.
4. Retrieve data from AUT- storeText, storeAttribute, storeElementPresent
5. Wait for events in AUT- waitForText, waitForElementPresent, waitForAtrribute
6. Create a test case for various assert commands to examine the direction of test cases and display the result.
7. Demonstrate the use of verify commands to compare test results or output values
8. Build a test case script to record user actions on WebPages through automated testing.
9. Build a test suite to manually configure user login and search on WebPages.
10. Construct a test suite containing 4 test cases for add, subtract, multiply & divide.
11. Implementation of user extensions and regular expressions for Test cases.
12. Write applicable locating strategies with ID, Name, Link text, XPath for search dropdown box, search box, search button for any web-based platform.
13. Construct test cases for slideshare.net handling login, upload a file, delete and logout function.
14. Conduct a test suite for online bus ticket booking service. Test suite should also include search functionality for the ongoing process.

BIT602: Android Programming
Credits: 2
LTP 200

Course Description: The course aims to equip the students with a comprehensive study of the Android Programming. The course includes User Interface Architecture, User Interface Design.

Course Outcomes (CLO):

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

CO1: Learn android or other app development basics.
CO2: Design Mobile applications.
CO3: Understand the user interface design.
CO4: Describe the SQLite database.

Course Contents

UNIT-I

Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture.

UNIT-II

Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jellybean (Emulator), configuring the installed tools, creating an android project -Hello Word, run on emulator, Deploy it on USB-connected Android device**.**

UNIT-III

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen size.

UNIT-IV

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, and Dialog.

Database: Understanding of SQLite database, connecting with the database.

Recommended Books / Suggested Readings:

1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.
2. Grant Allen, Beginning Android 4, Apress, 2012.
3. The official site for Android developers -https://developer.android.com.

BIT622: Android Programming Lab
Credits: 1
LTP 002

Course Description: The course aims to equip the students with a comprehensive study of the Android Programming. The course includes User Interface Architecture, User Interface Design.

Course Outcomes (CLO):

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

CO1: Describe the platforms upon which the Android operating system will run.
CO2: Create a simple application that runs under the Android operating system.
CO3: Access and work with the Android file system.
CO4: Create an application that uses multimedia under the Android operating system.
CO5: Access and work with databases under the Android operating system.

List of Practical:

1. Install Android Studio and build simple Hello World application.
2. Design Login Activity.
3. Create "Hello World" application. That will display "Hello World" in the middle of the screening the emulator. Also display "Hello World" in the middle of the screen in the Android Phone.
4. Create an application with login module. (Check username and password).
5. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
6. Create a menu with 5 options and selected option should appear in text box.
7. Create and validate a login application using username as Email ID else login button must remain disabled.
8. Create an application to display "Hello World" string the number of times user inputs a numeric value. (Example. If user enters 5, the next screen should print "Hello World" five times.).
9. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
10. Create an application with three option buttons, on selecting a button color of the screen will change.
11. Create and Login application as above. On successful login, pop up the message.
12. Create an application to Create, Insert, update, Delete and retrieve operation on the database.
13. Create an application to change screen color as per the user choice from a menu.

BIT603: Data Mining & Warehousing
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the data mining. The course includes Classification, prediction and cluster analysis techniques.

Course Outcomes (CLO):

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

CO1: Justify the need of Data Warehousing & Mining.
CO2: Identify the real-life applications where data mining can be applied.
CO3: Apply different data mining algorithms on wide range of data sets.
CO4: Describe the Spatial Data Mining, Multimedia Data Mining, Text Mining and web Mining.

Course Content

UNIT-I

Introduction: Data Mining, Data ware House, Transactional Databases, Data Mining Functionalities, Characterization and Discrimination, Mining frequent patterns, Association and correlation, Classification and Prediction, Classification of Data Mining Systems, Data Mining Task Primitive, Integration of Data Mining systems, Major issues in Data Mining, Data integration and transformation, Data reduction, Data discretization.

UNIT-II

Data Warehouse and OLAP technology: Data Warehouse, Multidimensional data Model, Data warehouse architecture, Data Warehouse implementation, LAP, Data Warehouse and data mining.

UNIT-III

Association Pattern Mining: Introduction, Frequent Pattern Mining Model, Association Rule Generation Framework, Frequent Item set Mining Algorithms, Brute Force Algorithms, Apriori Algorithm, Enumeration, Tree Algorithms, Pattern Summarization.

UNIT-IV

Mining Complex Data: Spatial Data Mining, Multimedia Data Mining, Text Mining and Mining WWW.

Recommended Books / Suggested Readings:

1. Jiawei Han and Micheline Kamber Data Mining - Concepts and Techniques (Second Edition) Elsevier, 2006.
2. Soman, Divakar and Ajay Data Mining Theory and Practice PHI, 2006.
3. Charu C. Aggarwal, Data Mining: The Textbook, Springer, 2015.LTP312.

BIT623: Data Mining & Warehousing LAB
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the data mining. The course includes Classification, prediction and cluster analysis techniques.

Course Outcomes (CLO):

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

CO1: Identify different data mining tools used to analyze data.
CO2: Implement different data mining algorithms to analyze data.
CO3: Use effective visualization for representing data.
CO4: Implement Decision Tree.

List of Practical:

1. Study of WEKA Data Mining Tool.
2. Installation of WEKA Data Mining Tool.
3. Fundamental programming using WEKA tool.
4. Create an Employee Table with the help of Data Mining Tool WEKA.
5. To apply different kind of preprocessing techniques on given dataset.
6. To list all the categorical (or nominal) attributes and the real valued attributes using Weka mining tool.
7. Create a Weather Table with the help of Data Mining Tool WEKA.
8. To implement the Apriori Algorithm.
9. To develop a decision tree and cross validate accuracy of data set is increasing order increasing or decreasing.
10. To Construct Decision Tree for various types of data and classify it.
11. One Hierarchical clustering algorithm.
12. To demonstrate K-means clustering.

Note: Software: WEKA Tools and R tools.

BIT604: Big Data Analytics
Credits: 4
LTP 310

Course Description: The course aims to equip the students with to provide a comprehensive study of the big data. The course includes Streams Concepts, Big Data Analytics applications, HiveQL, Querying Data in Hive, User-Defined Functions.

Course Outcomes (CLO):

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

CO1: Be Familiar with the solution of Big Data.
CO2: Implement the basic knowledge of design of Hadoop Distributed File System.
CO3: Perform analytics on data streams.
CO4: Work with big data tools and its analysis techniques.

Course Content

UNIT I

Introduction to Big Data: Big Data and its Importance, Challenges of Conventional Systems, Four V's of Big Data, Drivers for Big Data, Introduction to Big Data Analytics, Big Data Analytics applications, Intelligent data analysis Nature of Data, Analytic Processes and Tools, Analysis vs Reporting.

UNIT II

Introduction to Streams Concepts: Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, estimating moments, Counting oneness in a window Realtime Analytics Platform (RTAP) applications.

UNIT III

Big Data Technologies: History of Hadoop, The Hadoop Distributed File System, Components of Hadoop, Analyzing the Data with Hadoop, Scaling Out-Hadoop Streaming, HDFS basics, developing a Map Reduce Application, How Map Reduce Works.

UNIT IV

Big Data Tools and Techniques: Applications on Big Data Using Pig, Comparison with Databases, Pig Latin, User-Defined Functions, Data Processing Operators in Pig.

Introduction of Hive: HiveQL, Querying Data in Hive, User-Defined Functions.

Recommended Books / Suggested Readings:

1. Jason Kolb, Jeremy Kolb, "The Big Data Revolution Jason Kolb (2013).
2. WAGmob , "Big Data and Hadoop", WAGmob; 1.5 edition (2013).

BIT624: Big Data analytics Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with to provide a comprehensive study of the big data. The course includes Streams Concepts, Big Data Analytics applications, HiveQL, Querying Data in Hive, User-Defined Functions.

Course Outcomes (CLO):

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

CO1: Provide the solution of Big Data.
CO2: Implement the basic knowledge of design of Hadoop.
CO3: Understand Hive and MongoDB technology.
CO4: Describe the various Analytics tools used in big data.

List of Practical:

1. Perform setting up and Installing Hadoop.
2. HDFS shell commands.
3. Introduction to Hive: a) HIVE Installation & Configuration with MYSQL. b) Hive Data Types & Create, Drop Database. c) Hive Create, Alter & Drop Table. d) Hive Partitions & Buckets with Example. e) Hive Indexes and View with Example. f) Hive Queries: Order By, Group By, Distribute By, Cluster by Examples.
4. Install MongoDB on Windows a) How to Create Database & Collection in MongoDB. b) Add MongoDB Array using insert () with Example. c) MongoDB Primary Key: Example to set _id field with ObjectId (). d) MongoDB Query Document using find () with Example. f) MongoDB Cursor Tutorial: Learn with EXAMPLE. g) MongoDB order with Sort () & Limit () Query with Examples. h) MongoDB Count () & Remove () Functions with Examples. i)MongoDB Update () Document with Example. j) MongoDB Security, Backup & Monitoring. k) How to Create User & add Role in MongoDB.

BIT605: Ethical Hacking
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of Ethical Hacking. The course includes Intrusion Detection, Policy Creation, Social Engineering, Buffer Overflows and different types of Attacks and their protection mechanisms.

Course Outcomes (CLO):

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

CO1: Describe the concepts of ethical hacking.
CO2: Explain the stages of a cyber-attack.
CO3: Describe and perform basic reconnaissance exercises.
CO4: Describe various types of malware and cyber-attack vectors and players.
CO5: Describe and perform various methods for evading security controls.
CO6: Describe and perform vulnerability and pen testing assessments and exercises.

Course Content

UNIT-I

Introduction to Ethical Hacking: Hacking Methodology, Process of Malicious Hacking, Foot printing and Scanning: Foot printing, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques.

UNIT-II

Hacking Methodology: Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques.

UNIT-III

Web and Network Hacking: SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls.

UNIT-IV

Ethical Hacking Laws and Tests: An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking, ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking, Social Engineering, Host Reconnaissance.

Recommended Books / Suggested Readings:

1. Michael T. Simpson, Kent Backman, James E. "Corley, Hands-On Ethical Hacking and Nework Defense", Second Edition, CENGAGE Course.
2. Steven DeFino, Barry Kaufman, Nick Valenteen, "Official Certified Ethical Hacker Review Guide", CENGAGE Course. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Basics Series, Elsevier.
3. Whitaker & Newman, "Penetration Testing and Network Defense", Cisco Press, Indianapolis.

BIT625: Ethical Hacking Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of Ethical Hacking. The course includes Intrusion Detection, Policy Creation, Social Engineering, Buffer Overflows and different types of Attacks and their protection mechanisms.

Course Outcomes (CLO):

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

CO1: Describe the concepts of ethical hacking.
CO2: Describe and perform vulnerability and pen testing assessments and exercises.
CO3: Discuss about various hacking tools.
CO4: Describe the password cracking tools.

List of Practical:

1. To study various Hacking tools.
2. To study various Potential Security Threats.
3. Passive Reconnaissance using “Who is” and Online tools.
4. Active Reconnaissance using “Sampad” and web site details.
5. Full Scan, Half Open Scan and Stealth scan using “nmap”.
6. UDP and Ping Scanning using “Advance Lan Scanner” and “Superscan”.
7. Packet crafting using “Packet creator” tools.
8. Password Revelation from browsers and social networking application.
9. Creating and Analyzing spoofed emails.
10. Creating and Analyzing Trojans.
11. Configure ARP entries in Windows.
12. To study various password cracking tools.
13. Crack Wireless Password
14. OS password cracking.

BIT606: Advance Java Programming
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of Advanced Java Programming. The course includes design and develop applications -Using Java Technology.

Course Outcomes (CLO):

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

CO1: Use of input, output and stream objects and will use them for file processing as well as client/server communications tasks.

CO2: Develop web application using Java Servlet.

CO3: Interact with databases using JDBC.

CO4: Describe the advanced concepts such as RMI and Spring Framework and Hibernate .

Course Content

UNIT-I

Web Applications in java: Introduction to web applications, Benefits of web applications, Web Architecture Models. Socket Programming: Client/Server Communication, distributed Client Server model, Java Socket Programming, Sockets and Socket-based Communication, TCP/IP Socket Programming, UDP Socket Programming.

UNIT-II

Introduction to JDBC: Introducing JDBC, communicating with database: obtaining connection, creating jdbc statement object, executing SQL statement, closing connection. Creating DSN, understanding various JDBC drivers. Creating table by using JDBC, types of statements: statement, prepared statement, callable statement, working with result set.
Multithreading: Introduction to Thread, Life cycle of thread, Thread Creation - By using Thread Class - By Using Runnable interface, Priorities and Synchronization, Inter thread communication, Implementation of Thread with Applet.

UNIT-III

Servlet: Introduction, How It differ from CGI, Types of servlet, Life cycle of servlet, Execution process of Servlet Application, Session Tracking, Cookie class, Servlet- Jdbc.
Remote Method Invocation: Introduction to remote object RMI architecture, Stubs and skeleton, Registry, Setting up RMI.

UNIT-IV

Spring Framework and Hibernate: Overview, Benefits of Using the Spring Framework, Architecture, Bootstrapping Spring framework, Configuring Spring framework, Data Persistence, Object/relational Mapping, Hibernate ORM, Hibernate architecture, Mapping Entities to Tables.

Recommended Books / Suggested Readings:

1. Java-The Complete Reference, Herbert Schildt, Tenth Edition, Tata McGraw Hill.
2. Core Java- An Integrated Approach, R. Nageswara Rao, DreamTech Press.
3. Nicholas S. Williams, Professional Java for Web Applications, Wrox Press, 2014.
4. Christian Bauer, Gavin King, Gary Gregory, Java Persistence with Hibernate, 2015.
5. Craig Walls, Spring in Action Paperback, Manning Publications, 2014.

BIT626: Advance Java Programming Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of Advanced Java Programming. The course includes design and develops applications -Using Java Technology.

Course Outcomes (CLO):

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

CO1: Use of input, output and stream objects and will use them for file processing as well as client/server communications tasks.

CO2: Develop web application using Java Servlet and Java Server Pages technology.

CO3: Develop sophisticated, interactive user interfaces using the Java Swing technology.

CO4: Learn to interact with databases using JDBC.

List of Practical:

1. Write a program to implement Multithreading
2. Write a program to implement client server communication.
3. Write a program to implement Uniform Resource Locator.
4. Write a program to implement InetAddress.
5. Write a program to sending e-mail in java.
6. Write a Chat Program Java: Chat communication.
7. Write a Java program to implement Swing components.
8. Write a Program that displays two textboxes for entering a students' Roll-no and Name with appropriate labels and buttons using java swing.
9. Write a Java program to implement Calculator using java Swing.
10. Write a program to create GUI component of Online exam site using swing without database.
11. Write a program to create login form with database.
12. Create Servlet file which contains following functions:1. Connect 2. Create Database 3. Create Table 4. Insert Records into respective table 5. Update records of particular table of database 6. Delete Records from table. 7. Delete table and also database.
13. User can create a new database and also create new table under that database. Once database has been created then user can perform database operation by calling above functions. Use following Java Statement interface to implement program:1. Statement 2. Prepared statement 3. Callable statement.
14. Write a program to insert data into table using JSP.
15. Write a program to show validation of user using JSP.
16. Write a program to display message on browser using JSP.

BIT607: Artificial Intelligence
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the Artificial Intelligence. The course includes basic decision-making algorithms, including search based and problem-solving techniques, and first-order logic.

Course Outcomes (CLO):

Upon successful completion of this course, students will be able to

CO1: Analyze Data Base design methodology.
CO2: Acquire knowledge in fundamentals of Data Base Management System.
CO3: Analyze the difference between traditional file system and DBMS.
CO4: Handle with different Data Base languages.

Course Content

UNIT-I

Overview of A.I: Introduction to AI, Importance of AI, Foundations of artificial intelligence, AI and its related field, AI techniques, Criteria for success.

Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem.

Heuristic search techniques: Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction.

UNIT-II

Knowledge representation: Definition and importance of knowledge, Knowledge presentation, various approaches used in knowledge representation, Issues in knowledge representation.

Using Predicate Logic: Representing Simple Facts in logic, representing instances and is-a relationship, Computable function and predicate.

UNIT-III

Natural language processing: Introduction syntactic processing, Semantic processing, Discourse and pragmatic processing.

Learning: Introduction learning, Rote learning, learning by taking advice, learning in problem solving, learning from example-induction, Explanation based learning

UNIT-IV

Pattern Recognition: Recognition and Classification Process-Decision Theoretic Classification, Syntactic Classification; Learning Classification Patterns, Recognizing and Understanding Speech.

Expert System: Introduction, Representing using domain specific knowledge, Expert system shells. LISP and other AI Programming Language

Recommended Books / Suggested Readings:

1. E. Rich and K. Knight, “Artificial intelligence", TMH, 2nd ed., 1999.
2. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1999.
3. Nils J Nilsson, “Artificial Intelligence-A new Synthesis" 2nd Edition (2000), Harcourt Asia Ltd.

BIT627: Artificial Intelligence Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the Artificial Intelligence. The course includes basic decision-making algorithms, including search based and problem-solving techniques, and first-order logic.

Course Outcomes (CLO):

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

CO1: Develop simple applications using AI tools.

CO2: Attain the capability to represent various real-life problem domains using logic-based techniques and use this to perform inference or planning.

CO3: Apply basic principles of AI in solutions that require problem solving.

CO4: Demonstrate awareness and a fundamental understanding of various applications of AI.

List of Practical:

1. Write a python program to print the multiplication table for the given number.
2. Write a python program to check whether the given number is prime or not.
3. Write a python program to find factorial of the given number.
4. Write a python program to implement simple Chatbot.
5. Write a python program to implement List operations (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing).
6. Write a python program to implement List methods (Add, Append, Extend & Delete).
7. Write a python program to Illustrate Different Set Operations.
8. Write a python program to generate Calendar for the given month and year.
9. Write a python program to implement Simple Calculator program.
10. Write a python program to Add Two Matrices.
11. Write a python program to Transpose a Matrix.
12. Write a python program to implement Breadth First Search Traversal.
13. Write a python program to implement Water Jug Problem.
14. Write a python program to remove punctuations from the given string.
15. Write a python program to sort the sentence in alphabetical order.
16. Write a program to implement Hangman game using python.
17. Write a program to implement Tic-Tac-Toe game using python.

BIT608: Data Sciences
Credits: 4
LTP 310

Course Description: The course aims to equip the students with a comprehensive study of the Introduction to Data Sciences.
The course includes Data Visualization, R programming.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Explain data science and its fundamentals.
CO2: Provide data science solution to business problems and visualization.
CO3: Apply principles of Data Science to the analysis of business problems.
CO4: Demonstrate proficiency with statistical analysis of data.

Course Contents

UNIT-I

Introduction to Data Science: Definition, working, benefits and uses of Data Science, Data science vs BI, The data science process, Role of a Data Scientist.

UNIT-II

Data Scientist's Toolbox: Turning data into actionable knowledge, introduction to the tools that will be used in building data analysis software: version control, markdown, git, GitHub, R, and RStudio.
R Programming Basics: Overview of R, R data types and objects, reading and writing data, Control structures, functions, scoping rules, dates and times, Loop functions, debugging tools, Simulation, code profiling.

UNIT-III

Getting and Cleaning Data: Obtaining data from the web, from APIs, from databases and from colleagues in various formats, basics of data cleaning and making data tidy.
Data Visualization: basics, techniques, types, applications, tools, Data Journalism, Interactive dashboards.

UNIT-IV

Exploratory Data Analysis: Essential exploratory techniques for summarizing data, applied before formal modeling commences, eliminating or sharpening potential hypotheses about the world that can be addressed by the data, common multivariate statistical techniques used to visualize high-dimensional data.

Recommended Books / Suggested Readings:

1. D. Cielen, Arno D. B. Meysman, M. Ali, Introducing Data Science, Dreamtech Press.
2. Rachel Schutt, Cathy O'Neil, "Doing Data Science: Straight Talk from the Frontiline" by Schroff/O'Reilly, 2013.
3. Foster Provost, Tom Fawcett, "Data Science for Business" What You Need to Know About Data Mining and Data-Analytic Thinking" by O'Reilly, 2013.www.w3schools.com.
4. John W. Foreman, "Data Smart: Using data Science to Transform Information into Insight" by John Wiley &Sons, 2013.

BIT628: Data Sciences Lab
Credits: 2
LTP 004

Course Description: The course aims to equip the students with a comprehensive study of the Introduction to Data Sciences.
The course includes new language R used for data science.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Install and use R for simple programming tasks.
CO2: Use R Graphics and Tables to visualize results of various statistical operations on data.
CO3: Apply the knowledge of R gained to data Analytics.
CO4: Apply R programming for problem solving.

List of Practical:

1. Installation of R programming language.
2. Write a program that prints „Hello World„ to the screen.
3. Write a program that asks the user for a number n and prints the sum of the numbers 1to n.
4. Write a program that prints a multiplication table for numbers up to 12.
5. Write a function that returns the largest element in a list.
6. Write a function that computes the running total of a list.
7. Write a function that tests whether a string is a palindrome.
8. Implement linear search.
9. Implement binary search.
10. Implement matrices addition, subtraction and Multiplication.
11. Fifteen students were enrolled in a course. There are ages were20 20 20 20 20 21 21 21 22 22 22 22 23 23 23
    a. Find the median age of all students under 22 years
    b. Find the median age of all students.
    c. Find the mean age of all students.
    d. Find the modal age for all students.
    e. Two more students enter the class. The age of both students is 23. What is now mean, mode and median?

BIT650: Major Project
Credits: 3
LTP 006

Course Description: The course aims to equip the students with a professional environment and/or style typical of a global IT industry.
The course includes Project feasibility, Process Modelling, System Design, Program design, Program coding and unit testing, System integration, System implementation and acceptance testing.

Course Outcomes (CLO):
Upon successful completion of the course, the students should be able to:
CO1: Understand the team working and team management.
CO2: Develop components & systems in isolation which meets a common goal.
CO3: Understand practical application of engineering principles for designing, fabrication and testing of working models.
CO4: Design a system, model, component or a process to meet desired/industrial/R&D needs.

Guidelines for Major Project
Hence students should plan and organize their minor projects meticulously and necessary discussions and planning should be done so as to achieve this objective. The following guidelines should be adhered to:

1. Group Size: Maximum 4, most preferably:3.
2. Certificate should include the names of all members.
3. The minimal phases for the project are: Project feasibility, Investigation of system requirements, Data and Process Modelling, System Design, Program design, Program coding and unit testing, System integration, System implementation and acceptance testing.
4. A Major Project consist of Formulation of Groups, problem identification in IT field, defining objectives and methodology to be used in carrying out project work which will add value to society and knowledge based of Information technology.
5. In Major project, students are developing the project based on the ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, IT field, academic institutions and research laboratories.
6. Students must ensure that they have to submit their synopsis of Project within 15 days from the start of the project.
7. Two interim reports (one after analysis and another after design) should be submitted to internal guides.
8. The number of records to be submitted is limited to team size + one (Departmental copy). Hard binding of reports is mandatory.
9. The report format guidelines used to document Major Projects should be followed for making the final report and evaluation will be made on the same grounds.
10. **Typing Instructions for Major Project Report:**
    - Specification for Fonts:
    - Font Face: Times new Romano.
    - Font Size: As per following preview:
        - Headings (Size 16 Bold).
        - Sub-Heading (Size 14 Bold and Italic).
        - Contents (Size 12Normal)
        - Line spacing: 1.5.
        - Text Alignment: Both left and right justified.

- Page Dimensions: Standard A4 size (297mm x 210mm).
- Margins:
  - Top margin: 0.75”
  - Bottom margin: 0.75”
  - Left margin: 1”
  - Right margin: 0.75”
- Footer: Page number should be bottom centered.
- Sections should be numbered as for example,1. Introduction.
- Subsections should be numbered as for example,3.1 Simulation Toltec.
- Paragraphs and sentences should be short.
- Start of a paragraph should not be intended, rather, give one-line space between two paragraphs.
- A sub heading at the bottom of a page must have at least two full lines below it or else it should be carried over to the next page.
- The last word of any page should not be split using a hyphen.
- References:
  - Book titles must be in capitals.
  - Reference numbers should be marked liberally inside the text of the report-e.g., ...as given in [3].
  - References should either be in chronological order or in the order in which they appear in the text.

Evaluation of Major Project:

External Evaluation:

Criteria for external evaluation of Major Project, External evaluation is done by two external examiners appointed by the HOD/DEAN of the department. The following components are to be assessed for the End Semester external Evaluation of the Minor Project:

Quality of documentation	20 marks.
Presentation of work	20 marks
Viva	20 marks
Total	**60 marks**

Internal Evaluation:

Criteria for internal evaluation of Major Project, Internal evaluation is be done by conducting a Viva by a team of evaluators comprising of the concerned guides and/or Head of the Department. The following are the components for internal evaluation of the Minor Project:

Presentation of the work/Internal Viva	15 marks
Individual involvement & teamwork	10 marks
Attendance	5marks
Timely submission and assessment of 2 interim reports	10 marks
Total	**40 marks**