STUDENT HANDBOOK FOR BACHELOR IN COMPUTER APPLICATIONS

BACHELOR IN COMPUTER APPLICATIONS (BCA)

Effective from 2019-20 Academic Session

SEM.	COURSE OPTED	COURSE NAME	CREDITS	Time (hrs.)
I	Ability Enhancement Course-1	AEC-1 (Environmental Science)	4	45
	Core Course-1	Digital Logic	4	45
	Core Course-1 Practical	Digital Logic LAB	2	45
	Core Course-2	Programming using C	4	45
	Core Course-2 Practical	Programming using C LAB	2	45
	Generic Elective/ Inter-disciplinary Course -1	GE/IC-1 (Principles of Management)	4	45
	Generic Elective/ Inter disciplinaryCourse -1 Tutorial/Practical	GE/IC -1 Tutorial/ LAB (Principles of Management Tutorial)	2	45
II	Ability Enhancement Course-2	AEC-2 (English/ MIL Communication)	4	45
	Core Course-3	Programming using C++	4	45
	Core Course-3 Practical	Programming using C++ LAB	2	45
	Core Course-4	Data Structure	4	45
	Core Course-4 Practical	Data Structure LAB	2	45
	GenericElective/ Inter-disciplinaryCourse -2	GE/IC-2 (Statistics)	4	45
	Generic Elective/ Inter disciplinaryCourse-2 Tutorial/Practical	GE/IC -2 Tutorial/ LAB (Statistics LAB)	2	45
III	Core Course-5	Computer Organization	4	45
	Core Course-5 Practical	Computer Organization LAB	2	45
	Core Course-6	JAVA Programming	4	45
	Core Course-6 Practical	JAVA Programming LAB	2	45

	Core Course-7	Discrete Mathematical Structures	4	45
	Core Course-7 Practical	Discrete Mathematical Structures LAB	2	45
	Skill Enhancement Course-1	SEC-1 (Python Programming)	4	45
	Generic Elective/ Inter-disciplinary Course -3	GE/IC-3 (Business Accounting)	4	45
	Generic Elective/ Inter disciplinaryCourse -3 Tutorial/Practical	GE/IC -3 Tutorial/ LAB (Business Accounting Tutorial)	2	45
IV	Core Course-8	Operating System	4	45
	Core Course-8 Practical	Operating SystemLAB	2	45
	Core Course-9	Computer Networks	4	45

	Core Course-9 Practical	Computer Networks LAB	2	45
	Core Course-10	Database Systems	4	45
	Core Course-10 Practical	Database Systems LAB	2	45
	Skill Enhancement Course-2	SEC-2 (Android Programming)	4	45
	Generic Elective/ Inter-disciplinary Course -4	GE/IC-4 (Business Economics)	4	45
	Generic Elective/ Inter-disciplinary Course -4 Tutorial/Practical	GE/IC-4 Tutorial/ LAB (Business Economics Tutorial)	2	45
V	Core Course-11	Web Technology	4	45
	Core Course-11 Practical	Web Technology LAB	2	45
	Core Course-12	Software Engineering	4	45
	Core Course-12 Practical	Software Engineering LAB	2	45
	Discipline Specific Elective-1	DSE-1 (Unix Programming)	4	45
	Discipline Specific Elective-1 Practical	DSE-1 LAB/ Tutorial (Unix Programming LAB)	2	45

	Discipline Specific Elective-2	DSE-2 (Data Mining)	4	45
	Discipline Specific Elective-2 Practical	DSE-2 LAB/ Tutorial (Data Mining LAB)	2	45
VI	Core Course-13	Computer Graphics	4	45
	Core Course-13 Practical	Computer Graphics LAB	2	45
	Core Course-14	Numerical Techniques	4	45
	Core Course-14 Practical	Numerical Techniques LAB	2	45
	Discipline Specific Elective-3	DSE-3 (Data Science)	4	45
	Discipline Specific Elective-3 Practical	DSE-3 LAB/ Tutorial (Data Science LAB)	2	45
	Discipline Specific Elective-4	DSE-4 (Project Work / E-Commerce)	6/4	45
	Discipline Specific Elective-4 Practical	DSE-4 LAB/ Tutorial(E-Commerce Tutorial)	2	45

CORE Papers:

CORE – 1: Digital Logic

CORE – 2: Programming Using C

CORE – 3: Programming Using C++

CORE – 4: Data Structure

CORE – 5: Computer Organization

CORE – 6: Java Programming

CORE – 7: Discrete Mathematical Structures

CORE – 8: Operating System

CORE – 9: Computer Networks

CORE – 10: Database Systems

CORE – 11: Web Technologies

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CORE – 12: Software Engineering

CORE – 13: Computer Graphics

CORE – 14: Numerical Techniques

Discipline Specific Electives (DSE) Papers:

DSE–1: Unix Shell Programming

DSE–2: Data Mining

DSE–3: Data Science

DSE–4: Project Work / E-Commerce

Skill Enhancement Courses (SEC):

SEC – 1: Python Programming

SEC – 2: Android Programming

Ability Enhancement Courses(AEC): (Credit: 02 each)

AEC – 1: Environmental Science.

AEC – 2: English/MIL Communication

Generic Elective (GE)/ InterdisciplinaryCourse (IC):

GE/IC – 1:Principles of Management

GE/IC – 2:Statistics

GE/IC – 3:Business Accounting

GE/IC – 4: Business Economics

Curriculum Aspects

The Curriculum Aspects are the mainstay of any educational institution. However, the responsibilities of various HEIs in this regard vary depending on their administrative standing. That is, an Affiliated College is essentially a teaching unit which depends on a larger body namely university for legitimizing its academic and administrative processes. Its engagement with curricular aspects is mainly in their implementation while its participation in curriculum development, procedural detailing, assessment procedures as well as certification is peripheral and these are "givens''.

Curricular Planning and Implementation

The Affiliating/Constituent Colleges have rather insignificant role in curriculum designing and development. They adopt the curriculum overview provided by the respective universities. Each college operationalize the curriculum within the overall frame work provided, in one's own way depending on its resource potential, institutional goals and concern and so on. That is, each college visualizes the way the curriculum has to be carried out – activities, who, how, when etc. This process makes each institution unique and reflects on the concern of the college for quality in the form of values emphasized, sensitivities focused on, etc.

As our CREATIVE TECHNO COLLEGE is affiliated by UTKAL UNIVERSITY, we have to follow the syllabus as provided by university. Apart from the syllabus and exam guidelines we are also conducting few additional things for better academic performance by students. Also we are providing some courses, projects, activity, exams, workshops, seminars by faculty and experts from different institutions etc.

The additional courses are:-

1. We are conducting 4 extra exams for students.
    -   Unit test 1- only the 1st unit of all subject
    -   Unit test 2- only the 3rd unit of all subject
    -   Internal 1- 1st & 2nd unit of all subjects
    -   Internal 2- 3rd & 4th unit of all subjects

    Note:-we take only one internal mark between these two, which over's performance is better.

    VST exam- very similar test like semester before the actual semester conducted

    by the university

2. University guidelines says we have to assign one project in 3 years but we are doing 4 mini projects in 5 semesters and major project in last semester for BCA and B.SC.
   - 1ST SEM-Project related to MS Office
   - 2nd sem-Project related to C/C++
   - 3rd sem-Project related to JAVA & PYTHON
   - 4th sem-Project related to ANDROID
   - 5th sem-project related to PHP/WEBDESIGN
   - 6th sem-project related to DATA SCIENCE/AI

For BBA we are doing 3 mini projects in 2nd, 3rd, 4th semesters and one Dissertation Project in last semester.

3. We are sending our students to ISO certified/ Govt. Registered Pvt.Ltd companies for internship in 2nd & 4th & 6th semester. The internship may be in online /offline mode.
4. To grab more technical and management knowledge we are enrolling our students some online courses, value added courses and workshops.
5. To gain outer knowledge about recent trends in different industries we are conducting seminars by experts from outside and also faculty seminar in their respective areas.
6. Again we are preparing our students for the placement by providing pre-placement activity (how to write the resume, formal dress up, group discussion, personal interview etc), aptitude & reasoning classes and some other activities in order to enhance self-confidence among them.

STUDENTS' HANDBOOK ON CODE OF ETHICS AND CONDUCT ALONG WITH STANDARD PROCEDURES

1. **PREAMBLE**.   This Handbook indicates the standard procedures and practices of the Creative Techno College (hereinafter referred to as the 'Institute') for all students enrolling with the Institute for pursuing varied courses. All students must know that it is incumbent upon them to abide by this Code of Ethics and Conduct (hereinafter referred to as the 'Code') and the rights, responsibilities including the restrictions flowing from it. That the Institute's endeavour by means of enforcing this Code is to pioneer and administer a student discipline process that is egalitarian, conscientious, effectual and expeditious; and providing a system which promotes student growth through individual and collective responsibility. All Students are requested to be well conversant with this Code, which can be also reviewed on the official website of the Institute

2. **JURISDICTION**

    2.1   The Institute shall have the jurisdiction over the conduct of the students associated /enrolled with the Institute and to take cognisance of all acts of misconduct including incidents of ragging or otherwise which are taking place on the Institute campus or in connection with the Institute related activities and functions.

    2.2   Institute may also exercise jurisdiction over conduct which occurs off-campus violating the ideal student conduct and discipline as laid down in this Policy and other regulations, as if the conduct has occurred on campus which shall include

        (a)   Any violations of the Sexual Harassment Policy of the Institute against other students of the Institute.

        (b)   Physical assault, threats of violence, or conduct that threatens the health or safety of any person including other students of the Institute;

        (c)   Possession or use of weapons, explosives, or destructive devices off campus

(d)   Manufacture, sale, or distribution of prohibited drugs, alcohol etc.

(e)   Conduct which has a negative impact or constitutes a nuisance to members of the surrounding off-campus community. The Institute, while determining whether or not to exercise such off-campus jurisdiction in situations enumerated hereinabove, the Institute shall consider the seriousness of the alleged offense, the risk of harm involved, whether the victim(s) are members of the campus community and/or whether the off campus conduct is part of a series of actions, which occurred both on, and off-campus.

3.   **Ethics and Conduct**.

3.1   This Code shall apply to all kinds of conduct of students that occurs on the Institute premises including in University sponsored activities, functions hosted by other recognized student organizations and any off-campus conduct that has or may have serious consequences or adverse impact on the Institute's Interests or reputation.

3.2   At the time of admission, each student must sign a statement accepting this Code and by giving an undertaking that

(a)   he/she shall be regular and must complete his/her studies in the Institute.

(b)   In the event, a student is forced to discontinue studies for any legitimate reason, such a student may be relieved from the Institute subject to written consent of the Deans.

(c)   As a result of such relieving, the student shall be required to clear pending hostel / mess dues and if a student had joined the Institute on a scholarship, the said grant shall be revoked.

3.3.   Institute believes in promoting a safe and efficient climate by enforcing behavioural standards. All students must uphold academic integrity, respect all persons and their rights and property and safety of others; etc.

3.4   All students must deter from indulging in any and all forms of misconduct including partaking in any activity off-campus which can affect the

Institute's interests and reputation substantially. The various forms of misconduct include:

3.5   Any act of discrimination (physical or verbal conduct) based on an individual's gender, caste, race, religion or religious beliefs, colour, region, language, disability, or sexual orientation, marital or family status, physical or mental disability, gender identity, etc.

3.6   Intentionally damaging or destroying Institute property or property of other students and/or faculty members

3.7   Any disruptive activity in a class room or in an event sponsored by the Institute

3.8   Unable to produce the identity card, issued by the Institute, or refusing to produce it on demand by campus security guards

3.9   Participating in activities including

    3.9.1 Organizing meetings and processions without permission from the Institute.

    3.9.2 Accepting membership of religious or anti national groups banned by the Institute/Government of India

    3.9.3 Unauthorized possession, carrying or use of any weapon, ammunition, explosives, or potential weapons, fireworks, contrary to law or policy.

    3.9.4 Unauthorized possession or use of harmful chemicals and banned drugs
    3.9.5 Smoking on the campus of the Institute

    3.9.6 Possessing, Consuming, distributing, selling of alcohol and tabaco like Gutka and Khaini etc in the Institute and/or throwing empty bottles / packets on the campus of the Institute.

3.9.7 Parking a vehicle in a no parking zone or in area earmarked for parking other type of vehicles.

3.9.8 Rash driving on the campus that may cause any inconvenience to others.

3.9.9 Not disclosing a pre-existing health condition, either physical or psychological, to the Chief Medical Officer which may cause hindrance to the academic progress.

3.9.10 Theft or unauthorized access to others resources

3.9.11 Misbehavior during any activity of the Institute.

3.9.12 Engaging in disorderly, lewd, or indecent conduct, including, but not limited to, creating unreasonable noise; pushing and shoving; inciting or participating in a riot or group disruption at the Institute.

3.10 Students are expected not to interact, on behalf of the Institute, with media representatives or invite media persons on to the campus without the permission of the Institute authorities.

3.11 Students are not permitted to either audio or video record lectures in class rooms or actions of other students, faculty, or staff without prior permission.

3.12 Students are not permitted to provide audio and video clippings of any activity on the campus to media without prior permission.

3.13 Students are expected to use the social media carefully and responsibly. They cannot post derogatory comments about other individuals from the Institute on the social media or indulging in any such related activities having grave ramifications on the reputation of the Institute.

3.14 Theft or abuse of the Institute computers and other electronic resources such as computer and electronic communications facilities, systems, and services which includes unauthorized entry, use, tamper, etc. of Institute property or facilities, private residences of staff/professors etc. offices,

classrooms, computers networks, and other restricted facilities and interference with the work of others is punishable.

3.15 Damage to, or destruction of, any property of the Institute, or any property of others on the Institute premises.

3.16 Making a video/audio recording, taking photographs, or streaming audio/video of any person in a location where the person has a reasonable expectation of privacy, without that person's knowledge and express consent.

3.17 Indulging in any form of Harassment which is defined as a conduct that is severe and objectively, a conduct that is motivated on the basis of a person's race, colour, national or ethnic origin, citizenship, sex, religion, age, sexual orientation, gender, gender identity, marital status, ancestry, physical or mental disability, medical condition,

4. If there is a case against a student for a possible breach of code of conduct, then a committee will be formed to recommend a suitable disciplinary action who shall inquire into the alleged violation and accordingly suggest the action to be taken against the said student. The committee may meet with the student to ascertain the misconduct and suggest one or more of the following disciplinary actions based on the nature of misconduct.

4.1 **WARNING**. Indicating that the action of the said delinquent student was in violation of the Code and any further acts of misconduct shall result in severe disciplinary action.

4.2 **RESTRICTIONS**. Reprimanding and Restricting access to various facilities on the campus for a specified period of time.

4.3 **COMMUNITY SERVICE**.For a specified period of time to be extended if need be. However, any future misconduct along with failure to comply with any conditions imposed may lead to severe disciplinary action, including suspension or expulsion.

4.4 **EXPULSION**. Expulsion of a student from the Institute permanently. Indicating prohibition from entering the Institute premises or participating in any student related activities or campus residences etc.

4.5 **MONETARY PENALTY**. May also include suspension or forfeiture of scholarship/fellowship for a specific time period.

4.6 **SUSPENSION**. A student may be suspended for a specified period of time which will entail prohibition on participating in student related activities, classes, programs etc. Additionally, the student will be forbidden to use various Institute facilities unless permission is obtained from the Competent Authority. Suspension, may also follow by possible dismissal, along with the following additional penalties.

4.7 Ineligibility to reapply for admission to the Institute for a period of three years, and

4.8 Withholding the grade card or certificate for the courses studied or work carried out

5 **APPEAL**: If the delinquent student is aggrieved by the imposition of any of the aforementioned penalties, he/she may appeal to the Director. The Director may decide on one of the following:

5.1 Accept the recommendation of the committee and impose the punishment as suggested by the Committee or modify and impose any of the punishments a as stipulated in this Code which is commensurate with the gravity of the proved misconduct, Or

5.2 Refer the case back to the committee for reconsideration. In any case the Director's decision is final and binding in all the cases where there is a possible misconduct by a student.

6 **Academic Integrity** As a premier institution for advanced technological research and education, the Institute values academic integrity and is committed to fostering an intellectual and ethical environment based on the principles of academic integrity. Academic Integrity encompasses honesty and responsibility and awareness relating to ethical standards for the conduct of research and scholarship. The Institute believes that in all academic work, the ideas and contributions of others must be appropriately acknowledged. Academic integrity is essential for the success

of the Institute and its missions, and hence, violations of academic integrity constitutes a serious offence.

6.1   **Scope and Purpose A**. This Policy on academic integrity, which forms an integral part of the Code, applies to all students at the Institute and are required to adhere to the said policy. The purpose of the Policy is twofold:

- To clarify the principles of academic integrity, and

- To provide examples of dishonest conduct and violations of academic integrity.

NOTE :

A.   These examples are only illustrative, NOT exhaustive.

B.   Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

C.   The principles of academic integrity require that a student,

- properly acknowledges and cites use of the ideas, results, material or words of others.

- properly acknowledges all contributors to a given piece of work.

- makes sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.

- obtains all data or results by ethical means and reports them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.

- treats all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitates academic dishonesty by others nor obstructs their academic progress.

6.2   Violations of this policy include, but are not limited to:

(i)   Plagiarism means the use of material, ideas, figures, code or data as one's own, without appropriately acknowledging the original source. This may involve submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself. Examples of plagiarism include:

(a)   Reproducing, in whole or part, text/sentences from a report, book, thesis, publication or the internet.

(b)   Reproducing one's own previously published data, illustrations, figures, images, or someone else's data, etc.

(c)   Taking material from class-notes or incorporating material from the internet graphs, drawings, photographs, diagrams, tables, spreadsheets, computer programs, or other non-textual material from other sources into one's class reports, presentations, manuscripts, research papers or thesis without proper attribution.

(d)   Self plagiarism which constitutes copying verbatim from one's own earlier published work in a journal or conference proceedings without appropriate citations.

(e)   Submitting a purchased or downloaded term paper or other materials to satisfy a course requirement.

(f)   Paraphrasing or changing an author's words or style without citation.

(ii)   **Cheating**.   Cheating includes, but is not limited to:

(a)   Copying during examinations, and copying of homework assignments, term papers, theses or manuscripts.

(b)   Allowing or facilitating copying, or writing a report or taking examination for someone else.

(c)   Using unauthorized material, copying, collaborating when not authorized, and purchasing or borrowing papers or material from various sources.

(d)   Fabricating (making up) or falsifying (manipulating) data and reporting them in thesis and publications.

(e)   Creating sources, or citations that do not exist

(f)   Altering previously evaluated and re-submitting the work for re-evaluation.

(g)   Signing another student's name on an assignment, report, research paper, thesis or attendance sheet.

(iii)   **Conflict of Interest**:   A clash of personal or private interests with professional activities can lead to a potential conflict of interest, in diverse activities such as teaching, research, publication, working on committees, research funding and consultancy. It is necessary to protect actual professional independence, objectivity and commitment, and also to avoid an appearance of any impropriety arising from conflicts of interest. Conflict of interest is not restricted to personal financial gain; it extends to a large gamut of professional academic activities including peer reviewing, serving on various committees, which may, for example, oversee funding or give recognition, as well as influencing public policy. To promote transparency and enhance credibility, potential conflicts of interests must be disclosed in writing to appropriate authorities, so that a considered decision can be made on a case-by-case basis. Some additional information is available also in the section below dealing with resources.

4.3   Guidelines for academic conduct are provided below to guard against negligence as well as deliberate dishonesty:

(a)   Use proper methodology for experiments and computational work. Accurately describe and compile data.

(b)   Carefully record and save primary and secondary data such as original pictures, instrument data readouts, laboratory notebooks, and computer folders. There should be minimal digital manipulation of images/photos; the original version should be saved for later scrutiny, if required, and the changes made should be clearly described.

(c)   Ensure robust reproducibility and statistical analysis of experiments and simulations. It is important to be truthful about the data and not to omit some data points to make an impressive figure (commonly known as "cherry picking").

(d)   Laboratory notes must be well maintained in bound notebooks with printed page numbers to enable checking later during publications or patenting. Date should be indicated on each page.

(e)   Write clearly in your own words. It is necessary to resist the temptation to "copy and paste" from the Internet or other sources for class assignments, manuscripts and thesis.

(f)   Give due credit to previous reports, methods, computer programs, etc. with appropriate citations. Material taken from your own published work should also be cited; as mentioned above, it will be considered self-plagiarism otherwise.

6.3.   **Individual and Collective Responsibility**: The responsibility varies with the role one plays.

(a)   **Student roles**: Before submitting a note or assignment to the department, the student is responsible for checking the details for plagiarism using software that is available on the web. In addition, the student should undertake that he/she is aware of the academic guidelines of the Institute, has checked the document for plagiarism, and that the thesis is original work. A web-check does not necessarily rule out plagiarism. If a student observes or becomes aware of any violations of the academic integrity policy he/she is strongly encouraged to report the misconduct in a timely manner.

(b) **Faculty roles**: Faculty members should ensure that proper methods are followed for experiments, computations and theoretical developments, and that data are properly recorded and saved for future reference. In addition, they should review manuscripts and theses carefully. Faculty members are also responsible for ensuring personal compliance with the above broad issues relating to academic integrity. Faculty members are expected to inform students of the Institute's academic integrity policy within their specific courses, to ensure minimal academic dishonesty, and to respond appropriately and timely to violations of academic integrity.

(c) **Institutional roles**: A breach of academic integrity is a serious offence with long lasting consequences for both the individual and the institute, and this can lead to various sanctions. In the case of a student the first violation of academic breach will lead to a warning and/or an "F" course grade. A repeat offence, if deemed sufficiently serious, could lead to expulsion. It is recommended that faculty bring any academic violations to the notice of the department Chairperson. Upon receipt of reports of scientific misconduct, the Director may appoint a committee to investigate the matter and suggest appropriate measures on a case by case basis.

7. **RAGGING** The Institute has a coherent and an effective anti-ragging policy in place which is based on the 'UGC Regulation on Curbing the Menace of Ragging in Higher Educational Institutions, 2009 [hereinafter referred to as the 'UGC Regulations']'.The UGC Regulations have been framed in view of the directions issued by the Hon'ble Supreme Court of India to prevent and prohibit ragging in all Indian Educational Institutions and Colleges. The said UGC Regulations shall apply mutatis mutandis to the Institute and the students are requested kindly to

7.1 Ragging constitutes one or more of the following acts:

(a) any conduct by any student or students whether by words spoken or written or by an act which has the effect of teasing, treating or handling with rudeness any student;

(b) indulging in rowdy or undisciplined activities by any student or students which causes or is likely to cause annoyance, hardship, physical

or psychological harm or to raise fear or apprehension thereof in any other student;

(c)   asking any student to do any act which such student will not in the ordinary course do and which has the effect of causing or generating a sense of shame, or torment or embarrassment so as to adversely affect the physique or psyche of such a student;

(d)   Any act by a senior student that prevents, disrupts or disturbs the regular academic activity of any student;

(e)   Exploiting the services of a student for completing the academic tasks assigned to an individual or a group of students;

(f)   Any act of financial extortion or forceful expenditure burden put on a student by other students;

(g)   Any act of physical abuse including all variants of it: sexual abuse, stripping, forcing obscene and lewd acts, gestures, causing bodily harm or any other danger to health or person;

(h)   Any act or abuse by spoken words, emails, post, public insults which would also include deriving perverted pleasure, vicarious or sadistic thrill from actively or passively participating in the discomfiture to any other student ;

(i)   Any act that affects the mental health and self-confidence of any other student with or without an intent to derive a sadistic pleasure or showing off power, authority or superiority by a student over any other student.

7.2 **ANTI-RAGGING COMMITTEE**: The Anti-Ragging Committee, as constituted by the Director and headed by students affairs advisors shall examine all complaints of anti-ragging and come out with recommendation based on the nature of the incident. The committee shall be headed by students affairs advisors, and can have as its members, the Deans, Student Counselors, Faculty Advisors, Chairperson of the concerned Department.

7.3 **ANTI-RAGGING SQUAD** To render assistance to students, an Anti-Ragging Squad, which is a smaller body, has also been constituted consisting of various members of the campus community. The said Squad shall keep a vigil on ragging incidents taking place in the community and undertake patrolling functions. Students may note that the Squad is active and alert at all times and are empowered to inspect places of potential ragging, and also make surprise raids in hostels and other hotspots in the Institute. The Squad can also investigate incidents of ragging and make recommendations to the Anti-Ragging Committee and shall work under the guidance of the Anti-Ragging Committee.

7.4 A student found guilty by the committee will attract one or more of the following punishments, as imposed by the Anti-Ragging Committee:

(a) Suspension from attending classes and academic privileges.

(b) Withholding/ withdrawing scholarship/ fellowship and other benefits.

(c) Debarring from appearing in any test/ examination or other evaluation process.

(d) Withholding results.

(e) Debarring from undertaking any collaborative work or attending national or international conferences/symposia/meeting to present his/her research work.

(f) Suspension/ expulsion from the hostels and mess.

(g) Cancellation of admission.

(h) Expulsion from the institution and consequent debarring from admission to any other institution for a specified period.

(i) In cases where the persons committing or abetting the act of ragging are not identified, the institute shall resort to collective punishment.

(j)   If need be, in view of the intensity of the act of ragging committed, a First Information Report (FIR) shall be filed by the Institute with the local police authorities. The Anti-Ragging Committee of the Institute shall take appropriate decision, including imposition of punishment, depending on the facts and circumstances of each incident of ragging and nature and gravity of the incident of ragging.

7.5   An Appeal against the any of the orders of punishment enumerated hereinabove shall lie to:

(i)   In case of an order of an institution, affiliated to or constituent part, of the Institute, to the Director of the Institute.

8   **SEXUAL HARASSMENT**.   The Institute's Policy on prevention and prohibition of sexual harassment at workplace, 2016 shall apply **mutatis mutandis** to the students of the Institute which can be accessed and reviewed by the students at http://www.iisc.ernet.in/misc/harashment.htm Students should note that sexual misconduct or harassment encompasses a range of conduct, including but not limited to sexual assault, unwanted touching or persistent unwelcome comments, e-mails, or pictures of an insulting or degrading sexual nature, which may constitute harassment, which shall depend of the circumstances of each case.

9   **STUDENT GRIEVANCE PROCEDURE**   Any student of the Institute aggrieved by any acts of sexual harassment, misconduct or ragging as defined and summarised hereinabove can approach the Student Grievance Redressal cell at the Institute. Further, any student who is aware of any violations must report the same to the Cell. The Cell shall consist of members as appointed by the Director. Said grievance must be in writing and should be made within 60 days from the day of the alleged violation. The Cell shall take cognisance of the grievance and inform the Committee formed to enforce this Code or the Internal Complaints Committee, in cases of any sexual harassment complaints.

10   **STUDENT PARTICIPATION IN GOVERNANCE** As Students are members of the Institute campus, they have a substantial interest in the governance of the Institute. The Code, policies and the varied procedures laid down herein intends that the principle of student involvement in governance in both administrative and academic areas is essential and it is pivotal that Students must be, at all junctures, be

encouraged to put forth their views and advice, for an informed decision making. Student Participation is encouraged and must be strengthened through the involvement of students in all levels. Therefore, all students who are a part of the Institute and who are going to be enrolled in the Institute are advised to uphold the policy and inform the Institute of any violations and assist individually and collectively to improve the quality and effectiveness of this Code and appended policies.

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DETAILED SYLLABUS

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CORE–1: DIGITAL LOGIC

OBJECTIVES

- · To understand different methods used for the simplification of Boolean functions and binary arithmetic.
- · To design and implement combinational circuits, synchronous & asynchronous sequential circuits.
- · To study in detail about Semiconductor Memory Systems.

Unit-1

Character Codes, Decimal System, Binary System, Decimal to Binary Conversion, Hexadecimal Notation, Boolean Algebra, Basic Logic Functions: Electronic Logic Gates, Synthesis of Logic Functions, Minimization of Logic Expressions, Minimization using Karnaugh Maps, Synthesis with NAND and NOR Gates, Tri-State Buffers

Unit-2

Arithmetic: Addition and Subtraction of Signed Numbers, Addition/ Subtraction Logic Unit, Design of Fast Adders: Carry-Lookahead Addition, Multiplication of Positive Numbers, Signed-Operand Multiplication: Booth Algorithm, Fast Multiplication: Bit-Pair Recodng Multipliers, Carry-Save Addition of Summands, Integer Division, Floating-Point Numbers and Operations: IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers, Guard Bits and Truncation, Implementing Floating-Point Operations.

Unit-3

Flip-Flops, Gated Latches, Master-Slave Flip-Flops, Edge-Triggering, T Flip-Flops, JK Flip Flops. Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic Devices (PLDs), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Array (FPGA), Sequential Circuits, UP/ DOWN Counters, Timing Diagrams, The Finite State Machine Model, Synthesis of Finite State Machines.

Unit-4

Memory System: Semiconductor RAM Memories, Internal Organization of Memory Chips, Static Memories, Asynchronous DRAMS, Synchronous DRAMS, Structure of Large Memories, Memory System Considerations, RAMBUS Memory. Read-Only Memories:

ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size, and Cost of Memory. Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems.

Text Books:

1. Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/e (TMH)

Reference Books:

1. M. Morris Mano: Digital Logic and Computer Design, Pearson

CORE–2 PRACTICAL: DIGITAL LOGIC LAB

1. Introduction to Xilinx software (VHDL)

Write the VHDL code for

2. Realizing all logic gates.

3. Combination Circuit.

4. ADDER.

5. SUBTRACTOR.

6. MUX.

7. DE-MUX.

8. Encoder.

9. Decoder.

10. PAL.

11. PLA.

Write the VHDL program for the following Sequential Logic

Circuits 12. Flip Flops.

13. Shift Registers.

14. Counters.

15. Memory Elements.

CORE–2: PROGRAMMING USING C

OBJECTIVES:
· To learn basics of C programming language.
· To be able to develop logics to create programs/ applications in C.

Unit-1
Introduction: Introduction to Programming Language, Introduction to C Programming, Keywords & Identifiers, Constants, Variables, Input and Output Operations, Compilation and pre-processing, **Data types**: Different data types, Data types qualifier, modifiers, Memory representation, size and range, **Operators:** Operators (Arithmetic, Relational, Logical, Bitwise, Assignment & compound assignment, Increment & Decrement, Conditional), Operator types (unary, binary, ternary). Expressions, Order of expression (Precedence and associativity)
Control structures: Decision Making and Branching (Simple IF Statement, IF…ELSE Statement, Nesting IF… ELSE Statement, ELSE IF Ladder), Selection control structure (Switch Statement).

Unit-2
Loops: The WHILE Statement, The DO…WHILE Statement, The FOR Statement, Jumps in Loops, **Array:** Concept of Array, Array Declaration, types of array (one and multiple dimension), Character Arrays and Strings, Subscript and pointer representation of array, Array of Pointers, Limitation of array, **Pointers**: Concept of Pointer (null pointer, wild pointer, dangling pointer, generic pointer), Pointer Expressions, Accessing the Address of a Variable, Declaring Pointer Variables, Initializations of Pointer Variable, Accessing a Variable through its Pointer, Pointer arithmetic.

Unit-3 Storage class: Types (auto, register, static, extern), scope rules, declaration and definition.**Function**: Function & types (User defined function, library function) Function Definition, Declaration, Function Calls, Header file and library, Function Arguments, string handling function (strlen, strcmp, strcpy, strncpy, strcat, strstr), Function recursion, Functions Returning Pointers, Pointers to Functions, Command line arguments, Application of pointer (dynamic memory allocation).

Unit-4
Structure and Union: Defining, Declaring, Accessing, Initialization Structure, nested structure, self-referential structure, bit-field, Arrays of Structures, Structures and Functions, Unions, difference between structure and union, active data member, structure within union, Self-referential Structure.
File: File Management in C, Defining and Opening a File, File opening modes (read, write, append), Closing a File, File operations, file and stream, Error Handling During I/O Operations, sequential and random access file, low level and high level file.

Text Books:
    1. E. Balagurusamy, "Programming in ANSI C", 4/e, (TMH)

Reference Books:
    1. B. Kernighan & Dennis Ritchie, "The C Programming Language", 2/e PHI 2.
    Paul Deitel, Harvey Deitel, "C: How to Program", 8/e, Prentice Hall. 3. P.C.
    Sethi, P.K. Behera, "Programming using C", Kalyani Publisher, Ludhiana

Core-2PRACTICAL: PROGRAMMING USING C LAB

1. Write a Program to find greatest among three numbers.
2. Write a Program to all arithmetic operation using switch case.
3. Write a Program to print the sum and product of digits of an integer.
4. Write a Program to reverse a number.
5. Write a Program to compute the sum of the first n terms of the following series
$$S = 1+1/2+1/3+1/4+\ldots\ldots$$
6. Write a Program to compute the sum of the first n terms of the following series
$$S =1-2+3-4+5\ldots\ldots\ldots\ldots.$$
7. 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.
8. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
9. Write a Program to compute the factors of a given number.
10. Write a program to swap two numbers using macro.
11. Write a Program to print a triangle of stars as follows (take number of lines from user):
*
***
*****
****
12. Write a Program to perform following actions on an array entered by the user:
    a) Print the even-valued elements
    b) Print the odd-valued elements
    c) Calculate and print the sum and average of the elements of array
    d) Print the maximum and minimum element of array
    e) Remove the duplicates from the array
    f) 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.
13. Write a Program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
14. Write a program that swaps two numbers using pointers.
15. Write a program in which a function is passed address of two variables and then alter its contents.
16. 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.
17. Write a program to find sum and average of n elements entered by the user. To write this program, allocate memory dynamically using malloc( ) / calloc( ) functions. 18. 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
19. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
20. Write a program to copy the content of one file to other.

CORE–3: PROGRAMMING USING C++

OBJECTIVES

- To know about the Object Oriented Programming concepts.
- To learn basics of C++ programming language.
- To be able to develop logics to create programs/ applications in **C++.**

Unit-1
Principles of Object-Oriented Programming: Object-Oriented Programming (OOP) Paradigm, Basic Concepts of OOP, Benefits of OOP, Characteristics of OOPS, Object Oriented Languages, Applications of OOP.
Introduction to C++, Difference between C & C++, Tokens, Data types, Operators, Structure of C++ Program, C++ statements, Expressions and Control Structures.
Functions in C++: Argument passing in function, Inline Functions, Default Arguments, Const. Arguments, Friend function.

Unit-2
Classes and Objects: Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friend Functions.
Constructors & Destructors: Constructors, Parameterized Constructors, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Destructors.

Unit-3
Inheritance: Basics of Inheritance, Type of Inheritance, Virtual Base Classes, Abstract Classes, Member Classes, Nesting of Classes. Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions, Function Overloading, Operator Overloading.

Unit-4
Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators. Files: Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, File Modes, File Pointers and their Manipulations, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling during File Operations, Command-line Arguments.

Text Books

1. E. Balgurusawmy, Object Oriented Programming with C++, 4/e (TMH). 2. Paul Deitel, Harvey Deitel, "C++: How to Program", 9/e. Prentice Hall.

Reference Books:
1. Bjarne Stroustroup, Programming - Principles and Practice using C++, 2/e, Addison Wesley 2014
2. HerbtzSchildt, C++: The Complete reference, MGH, 4/ed.
3. P. C. Sethi, P. K. Behera, "Programming in C++"- Kalyani Publisher, Ludhiana

CORE–3 PRACTICAL: PROGRAMMING USING C++ LAB

1. Write a Program to find greatest among three numbers using nested if…else statement.
2. Write a Program to check a number is prime or not.
3. Write a Program to find the GCD and LCM of two numbers.
4. Write a program to print the result for following series: 1! + 2! + 3! + …………
5. Write a program to print multiplication table from 1 to 10.
6. Write a Program for Swapping of two numbers using pass by value. 7. Write a Program for Swapping of two numbers using pass by address. 8. Write a Program for Swapping of two numbers using pass by reference. 9. Write a Program to find sum of four numbers using default argument passing. 10. Write a Program to find square and cube of a number using inline function. 11. Write a Program to find the factorial of a number.
12. Write a Program to find reverse of a number.
13. Write a program to find sum of four numbers using default argument passing in member function.
14. Write a Program to find area of circle, triangle and rectangle using function overloading.
15. Write a program to distinguish the properties of static and non-static ata members.
16. Write a program to show the method of accessing static private member function. 17. Write a program to show the ways of calling constructors and destructors. 18. Write a program to perform ++ operator overloading using member function. 19. Write a program to perform ++ operator overloading using friend function. 20. Write a program to perform + operator overloading for two complex number addition. 21. Write a program to perform + operator overloading for string concatenation. 22. Write a program to perform single inheritance.
23. Write a program to perform multiple inheritance.
24. Write a program to create an integer array using new operator and find the sum and average of array elements.
25. Write a program to implement virtual destructor.
26. 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).
27. Write a program to Copy the contents of one file to other.

CORE–4: DATA STRUCTURE

OBJECTIVES

· To learn how the choice of data structures impacts the performance of programs. · To study specific data structures such as arrays, linear lists, stacks, queues, hash tables, binary trees, binary search trees, heaps and AVL trees.

· To learn efficient searching and sorting techniques.

Unit-1

Introduction: Basic Terminology, Data structure, Time and space complexity, Review of Array, Structures, Pointers.

Linked Lists: Dynamic memory allocation, representation, Linked list insertion and deletion, Searching, Traversing in a list, Doubly linked list, Sparse matrices.

Unit-2

Stack: Definition, Representation, Stack operations, Applications (Infix–Prefix–Postfix Conversion & Evaluation, Recursion).

Queues: Definition, Representation, Types of queue, Queue operations,

Applications. **Unit-3**

Trees: Tree Terminologies, General Tree, Binary Tree, Representations, Traversing, BST, Operations on BST, Heap tree, AVL Search Trees, M-way search tree, Applications of all trees.

Unit-4

Sorting: Exchange sorts, Selection Sort, Bubble sort, Insertion Sorts, Merge Sort, Quick Sort, Radix Sort, Heap sort.

Searching: Linear search, Binary search.

Text book
 1. Classic Data Structure ,D. Samanta , PHI , 2/ed.

REFERENCES

 1. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Publications, 2000.

 2. Sastry C.V., Nayak R, Ch. Rajaramesh, Data Structure & Algorithms, I. K. International Publishing House Pvt. Ltd, New Delhi.

CORE – 4 PRACTICAL: DATA STRUCTURE LAB

Write a C/ C++ Program for the followings

 1. To insert and delete elements from appropriate position in an array. 2. To
search an element and print the total time of occurrence in the array. 3. To
delete all occurrence of an element in an array.
4. Array implementation of Stack.
5. Array implementation of Linear Queue.
6. Array implementation of Circular Queue.
7. To implement linear linked list and perform different operation such as node insert and
   delete, search of an item, reverse the list.
8. To implement circular linked list and perform different operation such as node insert and
   delete.
9. To implement double linked list and perform different operation such as node insert and
   delete.
10. Linked list implementation of Stack.
11. Linked list implementation of Queue.
12. Polynomial representation using linked list.
13. To implement a Binary Search Tree.
14. To represent a Sparse Matrix.
15. To perform binary search operation.
16. To perform Bubble sort.
17. To perform Selection sort.
18. To perform Insertion sort.
19. To perform Quick sort.
20. To perform Merge sort.

CORE–5: COMPUTER ORGANIZATION

OBJECTIVES

· To study the basic organization of digital computers (CPU, memory, I/O, software). · To have a better understanding and utilization of digital computers.
· To be familiar with Assembly Language Programming (ALP)

Unit-1

Basic Structure of Computers: Computer Types, Functional Units, Input Unit, Memory Unit, Arithmetic and Logic Unit, Output Unit, Control Unit, Basic Operational Concepts, Bus Structures, Software. Machine Instructions and Programs: Numbers, Arithmetic Operations, and Characters: Number Representation, Addition of Positive Numbers, Addition and Subtraction of Signed Numbers, Overflow of Integer Arithmetic, Floating-Point Numbers & Operations, Characters, Memory Locations and Addresses, Byte Addressability, Word Alignment, Accessing Numbers, Characters, and Character Strings, Memory Operations, Instructions and Instruction Sequencing, Register Transfer Notation, Basic Instruction Types, Instruction Execution and Straight-Line Sequencing, Branching, Condition Codes, Generating Memory Addresses, Addressing Modes, Implementation of Variables and Constants, Indirection and Pointers, Indexing and Arrays, Relative Addressing.

Unit-2

Basic Processing Unit: Register Transfers, Performance on Arithmetic or Logic Operation, fetching a Word from Memory, Storing a Word in Memory. Execution of a Complete Instruction, Branch Instruction, Multiple Bus Organization Hardwired Control, A Complete Processor. Microprogrammed Control: Microinstructions, Microprogram Sequencing, Wide Branch Addressing, Microinstructions with Next-Address Field, Prefetching Microinstructions, Emulation. Cache Memories: Mapping Functions, Replacement Algorithms, Example of Mapping Technique. Performance Considerations: Interleaving, Hit Rate and Miss Penalty, Caches on Processor Chip, Other Enhancements, Virtual Memories: Address Translation.

Unit-3

Input/ Output Organization: Accessing I/O Devices, Interrupts, Interrupt Hardware, Enabling & Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions. Direct Memory Access, Bus Arbitration, Buses, Synchronous Bus, Asynchronous Bus, Interface Circuits: Parallel Port, Serial Port, Standard I/O Interfaces, Peripheral Component Interconnect (PCI) Bus, SCSI Bus, Universal Serial Bus (USB)

Unit-4

Pipelining: Role of Cache Memory, Pipeline Performance, Data Hazards: Operand Forwarding, Handling Data Hazards in Software, Side Effects. Instruction Hazards: Unconditional Branches, Conditional Branches and Branch Prediction. Influence on Instruction Sets: Addressing Modes, Condition Codes, Data path and Control Considerations. Superscalar Operation: Out-of-Order Execution, Execution Completion, Dispatch Operation, RISC & CISC Processors.

Text Books

1. Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/Ed (TMH)

   Reference Books
   1. William Stallings: Computer Organization and Architecture (Design for Performance), 9/Ed
   2. S. Brown, & Z. Vranesic, "Fundamentals of Digital Logic Design with VHDL", 2/Ed, McGraw-Hill

CORE-5PRACTICAL: COMPUTER ORGANIZATION LAB

1. Study of the complete Architecture of 8085 Microprocessor along with its instruction

set. 2. Introduction to GNU Simulator 8085, with its features.

3. Write an Assembly Language Program to add N consecutive numbers.

4. Write an Assembly Language Program to find the smallest and largest number from a given series.

5. Write an Assembly Language Program for subtraction of two 8-bit numbers. 6. Write an Assembly Language Program for displaying a Rolling message "Hello 123".

7. Write an Assembly Language Program to perform ASCII to Decimal conversion.

8. Write an Assembly Language Program to add two unsigned binary numbers.

9. Write an Assembly Language Program to subtraction of two unsigned binary numbers.

CORE – 6: JAVA PROGRAMMING

OBJECTIVES

    1. To learn the fundamentals of Object Oriented Programming in Java environment.
    2. To learn the use of Java language and the Java Virtual Machine.
    3. To write simple Java programming applications.

Unit-1

Introduction to Java: Java History, Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords (super, this, final, abstract, static, extends, implements, interface) , Data Types, Wrapper class, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods). Input through keyboard using Command line Argument, the Scanner class, BufferedReader class.

Unit-2

Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining & Using Classes, Class Variables & Methods, Objects, Object reference, Objects as parameters, final classes, Garbage Collection.
Constructor- types of constructor, this keyword, super keyword. Method overloading and Constructor overloading. Aggregation vs Inheritance, Inheritance: extends vs implements, types of Inheritance, Interface, Up-Casting, Down-Casting, Auto-Boxing, Enumerations, Polymorphism, Method Overriding and restrictions. Package: Pre-defined packages and Custom packages.

Unit-3

Arrays: Creating & Using Arrays (1D, 2D, 3D and Jagged Array), Array of Object, Referencing Arrays Dynamically. Strings and I/O: Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability& Equality, Passing Strings To & From Methods, StringBuffer Classes and StringBuilder Classes. IO package: Understanding StreamsFile class and its methods, Creating, Reading, Writing using classes: Byte and Character streams, FileOutputStream, FileInputStream, FileWriter, FileReader, InputStreamReader, PrintStream, PrintWriter. Compressing and Uncompressing File.

Unit-4

Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

Text Books:
1. E. Balagurusamy, "Programming with Java", TMH, 4/Ed,
Reference books:
1. Herbert Schildt, "The Complete Reference to Java", TMH, 10/Ed.

CORE – 6

PRACTICAL: JAVA PROGRAMMING LAB

1. To find the sum of any number of integers entered as command line arguments.
2. To find the factorial of a given number.
3. To convert a decimal to binary number.
4. To check if a number is prime or not, by taking the number as input from the keyboard. 5. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument 6. Write a program that show working of different functions of String and StringBufferclasss like setCharAt( ), setLength( ), append( ), insert( ), concat( )and equals( ).
7. Write a program to create a – "distance" class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer
8. Modify the – "distance" class by creating constructor for assigning values (feetandinches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.
9. Write a program to show that during function overloading, if no matching argument is found, then Java will apply automatic type conversions (from lower to higher data type)
10. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword.
11. Write a program to show the use of static functions and to pass variable length arguments in a function.
14. Write a program to demonstrate the concept of boxing and unboxing. 15. Create a multi-file program where in one file a string message is taken as input from the user and the function to display the message on the screen is given in another file (make use of Scanner package in this program).
16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to the same package.
17. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages
18. Write a program – "DivideByZero" that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
19. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
20. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
21. Write a program to demonstrate priorities among multiple threads.
22. Write a program to demonstrate different mouse handling events like mouseClicked( ), mouseEntered( ), mouseExited( ), mousePressed( ), mouseReleased( ) &mouseDragged( ).
23. Write a program to demonstrate different keyboard handling events.

CORE – 7: DISCRETE MATHEMATICAL STRUCTURES

OBJECTIVES

· To learn the mathematical foundations for Computer Science.
· Topics covered essential for understanding various courses.

Unit-1
Logics and Proof: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers Nested Quantifiers, Rules inference, Mathematical Induction.

Sets and Functions: Sets, Relations, Functions, Closures of Equivalence Relations, Partial ordering well ordering, Lattice, Sum of products and product of sums principle of Inclusions and Exclusions

Unit-2
Combinatory: Permutations, Combinations, Pigeonhole principle
Recurrence Relation: Linear and Non-linear Recurrence Relations, Solving Recurrence Relation using Generating Functions.

Unit-3
Graphs: Introduction to graphs, graphs terminologies, Representation of graphs, Isomorphism,
Connectivity & Paths: Connectivity, Euler and Hamiltonian Paths, Introduction to tree, tree traversals, spanning tree and tree search: Breadth first search, Depth first search, cut-set, cut vertex.

Unit-4
Modeling Computation: Finite State Machine, Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (NFA), Grammars and Language, Application of Pumping Lemma for Regular Language.

Text Books:

1. "Discrete Mathematics and its Applications with Combinatory and Graph Theory" 7th edition by Kenneth H. Rosen.

Reference Books:
1. Elements of Discrete Mathematics by C. L. Liu and D.P. Mohapatra, TMH, 2012 2. J. P Tremblay, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH, 1997.
3. A Modern Approach to Discrete Mathematics and Structure by J. K. Mantri & T. K Tripathy ,Laxmi Publication

CORE – 7 PRACTICAL: DISCRETE MATHEMATICAL STRUCTURES LAB

Write the following programs using C/ C++
1. Tower of Hanoi

2. Graph representation using Adjacency List.

3. Graph representation using Adjacency Matrix.

4. String Matching using finite state machine.

5. Detecting whether a number is even or odd using Finite State Machine. 6. To identify keywords such as char, const, continue using Finite State Machine. 7. To find the power set for a given set.

8. To find GCD of two numbers using recursion.

9. To find Binomial coefficients.

10. To find Permutation and Combination result for a given pair of values n and r.

11. To check a number is prime or not.

12. To calculate the Euclidean distance between two points.

13. To find the Roots of polynomials.

14. Find the shortest path pair in a plane.

CORE–8: OPERATING SYSTEM

OBJECTIVES

  • To understand Operating system structure and services.
  • To understand the concept of a Process, memory, storage and I/O management.

Unit–1

Introduction to Operating System, System Structures: Operating system services, system calls, system programs, Operating system design and implementation, Operating system structure.

Unit–2

Process Management: Process Concept, Operations on processes, Process scheduling and algorithms, Inter-process Communication, Concepts on Thread and Process, Deadlocks: Deadlock detection, deadlock prevention, and deadlock avoidance fundamentals.

Unit-3

Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management: Concepts, implementation (Demand Paging), Page Replacement, Thrashing.

Unit–4

Storage Management: File System concept, Access Methods, File System Mounting, File Sharing and File Protection, Implementing File Systems, Kernel I/O Systems.

Text book:
   1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, Eighth Edition, Wiley Student Edition 2009.

Reference book:
   1. Modern Operating System, Tanenbaum, Pearson, 4/Ed. 2014
   2. Richard F Ashley, Linux with Operating System Concepts, Chapman and Hall/CRC Published August 26, 2014
   3. Richard Blum, Linux Command Line and Shell Scripting Bible, O‟ Reilly

CORE-8 PRACTICAL: OPERATING SYSTEM LAB

   1. Write a program (using *fork()* and/or *exec()* commands) where parent and child execute:
         a) same program, same code.
         b) same program, different code.
 c) before terminating, the parent waits for the child to finish its task.
   2. Write a program to report behavior of Linux kernel including kernel version, CPU type and model. (CPU information)
   3. Write a program to report behavior of Linux kernel including information on configured memory, amount of free and used memory. (memory information) 4. Write a program to print file details including owner access permissions, file access time, where

file name is given as argument.
5. Write a program to copy files using system calls.
6. Write a program using C to implement FCFS scheduling algorithm.
7. Write a program using C to implement Round Robin scheduling algorithm.
8. Write a program using C to implement SJF scheduling algorithm.
9. Write a program using C to implement non-preemptive priority based scheduling algorithm.
10. Write a program using C to implement preemptive priority based scheduling algorithm.
11. Write a program using C to implement SRTF scheduling algorithm.
12. Write a program using C to implement first-fit, best-fit and worst-fit allocation

   strategies.

CORE – 9: COMPUTER NETWORKS
OBJECTIVES

· To learn how do computers and terminals actually communicate with each other.

· To understand the parts of a communication network and how they work together.

Unit-1
Introduction to Data Communications and Network Models: Protocols and Standards, Layers in OSI Models, Analog and Digital Signals, Transmission Modes, Transmission Impairment, Data Rate Limits, Performance, Digital Transmission, Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge (fundamental concepts only).

Unit-2
Signal Conversion: Digital-to-Digital Conversion, Analog-to-Digital Conversion, Digital-to analog Conversion, Analog-to-analog Conversion.
Transmission Media: Guided Media, Unguided Media, Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, Virtual-Circuit Networks, and Structure of a Switch.

Unit-3
Error Detection and Correction: Checksum, CRC, Data Link Control: Framing, Flow and Error Control, Noiseless Channels, Noisy channels, (Stop and Wait ARQ, Slidding Window Protocol , Go Back N, Selective Repeat) HDLC, Point-to-Point Protocol. Access Control: TDM, CSMA/CD, and Channelization (FDMA, TDMA, and CDMA).

Unit-4
Network Layer: Logical Addressing, IPv4 Addresses, IPv6 Addresses, Virtual-Circuit Networks: Frame Relay and ATM, Transport Layer: Process-Process Delivery: UDP, TCP. Application layers: DNS, SMTP, POP, FTP, HTTP, Basics of WiFi (Fundamental concepts only), Network Security: Authentication, Basics of Public Key and Private Key, Digital Signatures and Certificates (Fundamental concepts only).

Text Books: 1. Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan,TMH.

Reference Books: 1. Computer Networks, A. S. Tanenbaum, 4th edition, Pearson Education.

CORE – 9 PRACTICAL: COMPUTER NETWORKS LAB

Use C/C++/ any Network Simulator

1. Simulate Even Parity generator and checker.
2. Simulate two dimensional Parity generator and checker.
3. Simulate checksum generator and checker.
4. Simulate Hamming code method.

5. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
6. Simulate and implement stop and wait protocol for noisy channel.
7. Simulate and implement go back n sliding window protocol.
8. Simulate and implement selective repeat sliding window protocol.
9. Simulate and implement distance vector routing algorithm.

CORE-10: DATABASE SYSTEMS
OBJECTIVES

• To learn the fundamental elements of database system.
• To learn the basic concepts of relational database management systems. •
To learn various SQL commands.

Unit-1

Introduction to Database and Database Users, Database System Concepts and Architecture: data Models, schema, and instances, Conceptual Modeling and Database Design: Entity Relationship (ER) Model: Entity Types, Entity Sets, Attributes, Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, ER Naming Conventions. Enhanced Entity-Relationship (EER) Model.

Unit-2

Database Design Theory and Normalization: Functional Dependencies, Normal Forms based on Primary Keys, Second and third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

Unit-3

Relational data Model and SQL: Relational Model Concepts, Basic SQLs, SQL Data Definition and Data types, Constraints in SQL, Retrieval Queries in SQL, INSERT, DELETE, UPDATE Statements in SQL, Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT, Binary Relation: JOIN and DIVISION.

Unit-4

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing, Transaction and System Concepts, Properties of Transactions, Recoverability, Serializability, Concurrency Control Techniques, Locking techniques for Concurrency Control, Concurrency Control based on Time-Stamp Ordering.

Text Book:

1. Fundamentals of Database Systems, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson Education

Reference Book:

1. An Introduction to Database System, Date C. J. - Pearson Education, New Delhi - 2005

CORE-10 PRACTICAL: DATABASE SYSTEMS LABS

Create and use the following database schema to answer the given

queries. **EMPLOYEE Schema**

Field Type NULL KEY DEFAULT

Eno Char(3) NO PRI NIL
Ename Varchar(50) NO NIL
Job_type Varchar(50) NO NIL
Manager Char(3) Yes FK NIL
Hire_date Date NO NIL
Dno Integer YES FK NIL
Commission Decimal(10,2) YES NIL
Salary Decimal(7,2) NO NIL

DEPARTMENT Schema

Field Type NULL KEY DEFAULT

Dno Integer No PRI NULL
Dname Varchar(50) Yes NULL
Location Varchar(50) Yes New Delhi

Query List
1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee
   with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
 4. Query to display all the data from the Employee Table. Separate each Column by a
comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than
   Rs2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
 7. Query to display Employee Name and Salary for all employees whose salary is not in the
range of Rs.1500 and Rs.2850.
 8. Query to display Employee Name and Department No. of all the employees in Dept 10
   and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
 10. Query to display Name and Job of all employees who don‟t have a current Manager.
 11. Query to display the Name, Salary and Commission for all the employees who earn
commission.
 12. Sort the data in descending order of Salary and Commission.

13. Query to display Name of all the employees where the third letter of their name is „A‟.
14. Query to display Name of all employees either have two „R‟s or have two „A‟s in their

name and are either in Dept No = 30 or their Mangers Employee No = 7788. 15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.

16. Query to display the Current Date.

17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.

18. Query to display Name and calculate the number of months between today and the date each employee was hired.

19. Query to display the following for each employee <E-Name> earns <Salary> monthly but wants <3*Current Salary>. Label the Column as Dream Salary.

20. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with „J", „A" and „M".

21. Query to display Name, Hire Date and Day of the week on which the employee started.

22. Query to display Name, Department Name and Department No for all the employees.

23. Query to display Unique Listing of all Jobs that are in Department # 30.

24. Query to display Name, Department Name of all employees who have an „A" in their name.

25. Query to display Name, Job, Department No. and Department Name for all the employees working at the Dallas location.

26. Query to display Name and Employee no. Along with their Manger"s Name and the Manager"s employee no; along with the Employees Name who do not have a Manager.

27. Query to display Name, Department No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.

28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies Rs100.

29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees.

30. Query to display the number of employees performing the same Job type functions.

31. Query to display the no. of managers without listing their names.

32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.

33. Query to display Name and Hire Date for all employees in the same dept. as Blake.

34. Query to display the Employee No. And Name for all employees who earn more than the average salary.

35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a „T".

36. Query to display the names and salaries of all employees who report to King. 37. Query to display the department no, name and job for all employees in the Sales department.

CORE – 11: WEB TECHNOLOGY

OBJECTIVES

· To learn the fundamentals of web designing.
· To design and develop standard and interactive web pages.
· To learn some popular web scripting languages.

Unit-1

Web Essentials: Clients, Servers and Communication:
The Internet – Basic Internet protocols – The WWW, HTTP request message – response message, web clients web servers – case study.
Introduction to HTML: HTML, HTML domains, basic structure of an HTML document – creating an HTML document, mark up tags, heading, paragraphs, line breaks, HTML tags. Elements of HTML, working with text, lists, tables and frames, working with hyperlink, images and multimedia, forms and controls

Unit-2

Introduction to cascading style sheets: Concepts of CSS, creating style sheet, CSS properties, CSS styling (background, text format, controlling fonts), working with the block elements and objects. Working who lists and tables, CSS ID and class. Box model (introduction, border properties, padding properties, margin properties), CSS colour, groping, Dimensions, display, positioning, floating, align, pseudo class, Navigation bar, image sprites.

Unit-3

Java scripts: Client side scripting, what is java script, simple java script, variables, functions, conditions, loops and repetitions. Java scripts and objects, java script own objects, the DOM and web browser environment, forms and validations.
DHTML: Combining HTML, CSS, java scripts, events and buttons, controlling your browser.

Unit-4

PHP: Starting to script on server side, PHP basics, variables, data types, operators, expressions, constants, decisions and loop making decisions. Strings – creating, accessing strings, searching, replacing and formatting strings. Arrays: Creation, accessing array, multidimensional arrays, PHP with Database.

Text Book:
    1. Web Technologies – Black Book – DreamTech Press
    2. Matt Doyle, Beginning PHP 5.3 (wrox-Willey publishing)
    3. John Duckett, Beginning HTML, XHTML, CSS and Java script.
    Reference Book:
    1. HTML, XHTML and CSS Bible, 5ed, Willey India-Steven M.

    Schafer.

CORE – 11 PRACTICAL: WEB TECHNOLOGY LAB

    1. Acquaintance with elements, tags and basic structure of HTML files.
    2. Practicing basic and advanced text for formatting.
    3. Practice use of image, video and sound in HTML documents.

4. Designing of web pages- Document layout, list, tables.

5. Practicing Hyperlink of web pages, working with frames.

6. Working with forms and controls.

7. Acquaintance with creating style sheet, CSS properties and styling.

8. Working with background, text, font, list properties.

9. Working with HTML elements box properties in CSS.

10. Develop simple calculator for addition, subtraction, multiplication and division operation using java script.

11. Create HTML page with java script which takes integer number as a input and tells whether the number is odd or even.

12. Create HTML page that contains form with fields name, Email, mobile number, gender, favorite colour and button; now write a java script code to validate each entry. Also write a code to combine and display the information in text box when button is clicked.

13. Write a PHP program to check if number is prime or not.

14. Write a PHP program to print first ten Fibonacci numbers.

15. Create a MySQL data base and connect with PHP.

16. Write PHP script for string and retrieving user information from my SQL table. a. Write a HTML page which takes Name, Address, Email and Mobile number from user (register PHP).

b. Store this data in MySQL data base.

c. Next page display all user in HTML table using PHP (display .PHP). 17. Using HTML, CSS, Javascript, PHP, MySQL, design a authentication module of a web page.

CORE – 12: SOFTWARE ENGINEERING

OBJECTIVES:

· To learn the way of developing software with high quality and the relevant techniques.
· To introduce software engineering principles for industry standard.
· To focus on Project management domain and Software risks management.

Unit-1

Introduction: Evolution of Software to an Engineering Discipline, Software Development Projects, Exploratory Style of Software Development, Emergence of Software Engineering, Changes in Software Development Practices, Computer Systems Engineering. Software Lifecycle Models: Waterfall Model and its Extensions, Rapid Application Development (RAD), Agile Development Models, Spiral Model.

Unit-2
Software Project Management: Software Project Management Complexities, Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project

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Estimation Techniques, Empirical Estimation Techniques, COCOMO, Halstead"s Software Science, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management, Software Configuration Management.

Unit-3

Requirement Analysis and Specification: Requirements Gathering and Analysis, Software Requirement Specifications, Formal System Specification Axiomatic Specification, Algebraic Specification, Executable Specification and 4GL.
Software Design: Design Process, Characterize a Good Software Design, Cohesion and Coupling, Layered Arrangements of Modules, Approaches to Software Design (Function Oriented & Object-Oriented).

Unit-4
Coding and Testing: Coding: Code Review, Software Documentation, Testing, Unit Testing, Black Box and White Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing, Software Maintenance.

Text Book:
1. Fundamental of Software Engineering, Rajib Mall, Fifth Edition, PHI Publication, India.
2. **Reference Books:**
1. Software Engineering– Ian Sommerville, 10/Ed, Pearson.
2. Software Engineering Concepts and Practice – Ugrasen Suman, Cengage Learning India Pvt, Ltd.
3. R. Misra, C. Panigrahi, B. Panda: Principles of Software Engineering & System Design, YesDee Publication

CORE – 12 PRACTICAL: SOFTWARE ENGINEERING LAB

S. No. Practical Title

1. • Problem Statement,
   • Process Model

2. Requirement Analysis:
  • Creating a Data Flow
  • Data Dictionary, Use Cases
3. Project Management:
  • Computing FP
  • Effort
  • Schedule, Risk Table, Timeline chart
4. Design Engineering:
  • Architectural Design
  • Data Design, Component Level Design
5. Testing:
  • Basis Path Testing

Sample Projects:

1. **Criminal Record Management:** Implement a criminal record management system for jailers, police officers and CBI officers.

2. **Route Information**: Online information about the bus routes and their frequency and fares

3. **Car Pooling**: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively. 4. Patient Appointment and Prescription Management System

5. Organized Retail Shopping Management Software

6. Online Hotel Reservation Service System

7. Examination and Result computation system

8. Automatic Internal Assessment System

9. Parking Allocation System

10. Wholesale Management System

CORE – 13: COMPUTER GRAPHICS
OBJECTIVES

· To be able to learn the core concepts of Computer Graphics.
· To be able to create effective programs for solving graphics problems.

Unit-1

Computer Graphics: A Survey of Computer graphics, Overview of Graphics System: Video Display Devices, Raster-Scan Systems, Input Devices, Hard-Copy Devices, Graphics Software.

Unit-2

Graphics Output Primitives: Point and Lines, Algorithms for line, circle & ellipse generation, Filled-Area Primitives. Attributes of Graphics Primitives: Point, line, curve attributes, fill area attributes, Fill methods for areas with irregular boundaries.

Unit-3

Geometric Transformations (both 2-D & 3-D): Basic Geometric Transformations, Transformation Matrix, Types of transformation in 2-D and 3-D Graphics: Scaling, Reflection, shear transformation, rotation, translation. 2-D, 3-D transformation using homogeneous coordinates.

Unit-4

Two Dimensional Viewing: Introduction to viewing and clipping, Viewing transformation in 2-D, Viewing pipeline, Clipping Window, Clipping Algorithms: Point clipping, Line clipping and Polygon clipping.

Text books
   1. Mathematical Elements for Computer Graphics, D. F. Rogers & J. A. Adams, MGH, 2/ed.
   2. Donald Hearn & M. Pauline Baker, "Computer Graphics with OpenGL", Pearson Education.

Reference books
   1. D. Hearn and M. Baker, "Computer Graphics with Open GL", Pearson, 2/ed.
   2. D. F. Rogers, "Procedural Elements for Computer Graphics", MGH

CORE – 13 PRACTICAL: COMPUTER GRAPHICS LAB

Develop the programs using C/C++ or Java

1. Write a program to implement Bresenham''s line drawing algorithm.
2. Write a program to implement mid-point circle drawing algorithm.
3. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.
4. Write a program to clip a polygon using Sutherland Hodgeman algorithm.
5. Write a program to fill a polygon using Scan line fill algorithm.
6. Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).
7. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.

CORE – 14: NUMERICAL TECHNIQUES

OBJECTIVES:

· To learn various numerical techniques.
· To be able to implement different numerical techniques using programming language.

Unit-1
Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method, Convergence and terminal conditions, Efficient computations.

Unit-2
Bisection method, Secant method, Regula−Falsi method Newton−Raphson method, Newton''s method for solving nonlinear systems.

Unit-3
Interpolation: Lagrange''s form and Newton''s form Finite difference operators, Gregory Newton forward and backward differences Interpolation Piecewise polynomial interpolation: Linear interpolation.

Unit-4
Numerical integration: Trapezoid rule, Simpson''s rule (only method), Newton−Cotes formulas, Gaussian quadrature, Ordinary differential equation: Euler''s method Modified Euler''s methods, Runge-Kutta second methods

Text books
1. S.S. Sastry, "Introductory Methods of Numerical Analysis", EEE , 5/ed. 2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012)

Reference books
1. Numerical Analysis: J. K. Mantri & S. Prahan, Laxmi Publication.
2. Introduction to Numerical Analysis, Josef Stoer and Roland Bulirsch, Springer.

CORE – 14 PRACTICAL: NUMERICAL TECHNIQUES LAB

Implement using C/ C++ or MATLAB/ Scilab

1. Find the roots of the equation by bisection method.

2. Find the roots of the equation by secant/Regula−Falsi method.

3. Find the roots of the equation by Newton‚s method.

4. Find the solution of a system of nonlinear equation using Newton"s method.

5. Find the solution of tri-diagonal system using Gauss Thomas method. 6.

Find the solution of system of equations using Jacobi/Gauss-Seidel method. 7.

Find the cubic spline interpolating function.

8. Evaluate the approximate value of finite integrals using Gaussian/Romberg integration.

9. Solve the boundary value problem using finite difference method.

DSE-1: UNIX PROGRAMMING

OBJECTIVES:

· To learn the basics of UNIX OS, UNIX commands and File system. ·
To familiarize students with the Linux environment.
· To learn fundamentals of shell scripting and shell programming.
· To be able to write simple programs using UNIX.

Unit-1
Introduction: Unix Operating systems, Difference between Unix and other operating systems, Features and Architecture, Installation, Booting and shutdown process, System processes (an overview), External and internal commands, Creation of partitions in OS, Processes and its creation phases – Fork, Exec, wait, exit.

Unit-2
User Management and the File System: Types of Users, Creating users, Granting rights, User management commands, File quota and various file systems available, File System

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Management and Layout, File permissions, Login process, Managing Disk Quotas, Links (hard links, symbolic links)

Unit-3
Shell introduction and Shell Scripting: Shell and various type of shell, Various editors present in Unix, Different modes of operation in vi editor, Shell script, Writing and executing the shell script, Shell variable (user defined and system variables), System calls, Using system calls, Pipes and Filters.

Unit-4
Unix Control Structures and Utilities: Decision making in Shell Scripts (If else, switch), Loops in shell, Functions, Utility programs (cut, paste, join, tr, uniq utilities), Pattern matching utility (grep).

Text Books:

1. Sumitabha, Das, Unix Concepts And Applications, Tata McGraw-Hill Education, 2017, 4/Ed.

Reference Books:
1. Nemeth Synder& Hein, Linux Administration Handbook, Pearson Education, 2010, 2/ Ed.

DSE–1 PRACTICAL: UNIX PROGRAMMING LAB

1. Write a shell script to check if the number entered at the command line is prime or not.

2. Write a shell script to modify "cal" command to display calendars of the specified months.

3. Write a shell script to modify "cal" command to display calendars of the specified range of months.

4. Write a shell script to accept a login name. If not a valid login name display message "Entered login name is invalid".

5. Write a shell script to display date in the mm/dd/yy format.

6. Write a shell script to display on the screen sorted output of "who" command along with the total number of users.

7. Write a shell script to display the multiplication table of any number. 8. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.

9. Write a shell script to find the sum of digits of a given number.

10. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.

11. Write a shell script to find the LCD (least common divisor) of two numbers.

12. Write a shell script to perform the tasks of basic calculator.

13. Write a shell script to find the power of a given number.

14. Write a shell script to find the greatest number among the three numbers.

15. Write a shell script to find the factorial of a given number.

16. Write a shell script to check whether the number is Armstrong or not.

DSE–2: DATA MINING

OBJECTIVES:

· To introduce the basic concepts of data warehousing, data mining, Issues, and Implication.
· To learn the core topics like Association rules, Classification & Prediction and Clustering techniques.
· To make a study on the Applications and Trends in Data Mining.

Unit-1

Data Warehouse Fundamentals: Introduction to Data Warehouse, OLTP Systems, OLAP, Differences between OLTP and OLAP, Characteristics of Data Warehouse, Functionality of Data Warehouse, Advantages and Applications of Data Warehouse, Advantages, Applications, Top- Down and Bottom-Up Development Methodology, Tools for Data warehouse development, Data Warehouse Types, Data cubes

Unit-2

Introduction to Data Mining: Data mining, Functionalities, Data Preprocessing: Preprocessing the Data, Data cleaning, Data Integration and Transformation, Data reduction, Discretization and Concept hierarchies.

Unit-3

Mining Association Rules: Basics Concepts – Single Dimensional Boolean Association Rules from Transaction Databases, Multilevel Association Rules from transaction databases, Multi dimension Association Rules from Relational Database and Data Warehouses. Apriori Algorithm, FP-Tree algorithm

Unit-4

Classification and Prediction: Introduction, Issues, Decision Tree Induction, Naïve Bayesian Classification, Classification based on Concepts from Association Rule Mining, Classifier Accuracy.

Text Books:

1. J. Han and M. Kamber, Data Mining Concepts and Techniques, Elsevier,

   2011

2. **Reference Books:**

   1. K.P. Soman ,Shyam Diwakar, V.Ajay ,2006, Insight into Data Mining

   Theory and Practice, Prentice Hall of India Pvt. Ltd - New Delhi.

2. Data Mining Techniques, Arun K. Pujari, Universities Press, 2006

3. Modern Approaches of Data Mining: Theory & Practice, M. Panda, S. Dehuri, M. R. Patra, Narosa Publishing House, 2018.

DSE–2 PRACTICAL: DATA MINING LAB

Using Scilab/ MATLAB/ C/ Python/ R

1. Build a Data Warehouse and perform its operations.

2. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets.

3. Demonstrate performing classification on data sets.

4. Demonstrate performing clustering on data sets.

5. Demonstrate performing Regression on data sets.

6. Credit Risk Assessment. Sample Programs using German Credit Data.

7. Sample Programs using Hospital Management System.

DSE-3: DATA SCIENCE

OBJECTIVES:

· To learn emerging issues related to various fields of data science.
· To understand the underlying principles of data science, exploring data analysis. ·
To learn the basics of R Programming.

Unit-1
Data Scientist‟s Tool Box: 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.

Unit-2
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-3
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".

Unit-4
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.

Text Books
1. Rachel Schutt, Cathy O'Neil, "Doing Data Science: Straight Talk from the Frontiline" by

Schroff/O'Reilly, 2013.

Reference Books

1. Foster Provost, Tom Fawcett, "Data Science for Business" What You Need to Know About Data Mining and Data-Analytic Thinking by O'Reilly, 2013.
2. John W. Foreman, "Data Smart: Using data Science to Transform Information into Insight" by John Wiley & Sons, 2013.
3. Eric Seigel, "Predictive Analytics: The Power to Predict who Will Click, Buy, Lie, or Die", 1st Edition, by Wiley, 2013.

DSE-3PRACTICAL: DATA SCIENCE LAB

1. Write a program that prints "Hello World" to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12. 4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
7. Implement linear search.
8. Implement binary search.
9. Implement matrices addition, subtraction and Multiplication
10. Fifteen students were enrolled in a course. There ages were:

<div align="center">20 20 20 20 20 21 21 21 22 22 22 22 23 23 23</div>

   i. Find the median age of all students under 22 years
   ii. Find the median age of all students
   iii. Find the mean age of all students
   iv. Find the modal age for all students
   v. Two more students enter the class. The age of both students is 23. What is now mean, mode and median?

DSE-4: PROJECT WORK / E-COMMERCE

DSE-4: E-COMMERCE

OBJECTIVES

   · To introduce the concepts of electronic commerce.
   · To make the user understand how electronic commerce is affecting business enterprises,

governments, consumers and people in general.

Unit-1
Introduction to E-Commerce: Definition and scope of E-Commerce and M-Commerce, E Commerce trade cycle, Electronic Markets, Internet Commerce, Benefits and Impacts of E Commerce.

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Elements of E-Commerce: Various elements, e-visibility, e-shops, Delivery of goods and services, Online payments, After- sales services, Internet E-Commerce security.

Unit-2
EDI and Electronic Payment Systems: Introduction and definition of EDI, EDI layered Architecture, EDI technology and standards, EDI communications and transactions, Benefits and applications of EDI with example, Electronic Payment Systems: credit/debit/smart cards, e-credit accounts, e-money.

Unit-3
Introduction to EC models: Inter-organization and intra-organization E-Commerce, E Commerce Models: B2B, B2C, C2B, C2C, G2C, C2G
E-Business: Introduction to Internet bookshops, Grocery Suppliers, Software Supplies and support, Electronic newspapers, Virtual auctions, Online share dealing, e-diversity.

Unit-4
E-Security and Legal Issues: Security concerns in E-Commerce, Privacy, integrity, authenticity, non-repudiation, confidentiality, SSL, Digital Signatures and fire walls, IT Act 2000, Cyber-crimes and cyber laws
Mobile Commerce and Future of E-Commerce: Introduction to Mobile Commerce, Benefits of Mobile Commerce, Impediments of M-Commerce, M-Commerce framework, Emerging and future trends.

Text Books:
1. G.S.V.Murthy, E-Commerce Concepts, Models, Strategies, Himalaya Publishing House. 2. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, "E-Commerce Fundamentals and Applications, Wiley Student Edition.
Reference Books:
1. Gray P. Schneider , Electronic commerce, International Student

Edition.

DSE-4 Practical: E-Commerce Tutorial

SEC – 1: PYTHON PROGRAMMING

OBJECTIVES:

· To enable the students to understand the basic principles of the Python Language. ·

To use the tools to do simple programs in python.

Unit-1
Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Unit-2
Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

Unit-3

Overview of Programming: Structure of a Python Program, Elements of Python
Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)

Unit-4
Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments.

Text Books
1. T. Budd, Exploring Python, TMH, 1st Ed, 2011

Reference Books
1. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012

Online References:
1. Python Tutorial/Documentation www.python.or 2015
2. http://docs.python.org/3/tutorial/index.html
3. http://interactivepython.org/courselib/static/pythonds
4. http://www.ibiblio.org/g2swap/byteofpython/read/

Software Lab based on Python Programming:
1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon users choice.
2. Write a Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
    Grade A: Percentage >=80
    Grade B: Percentage>=70 and <80
    Grade C: Percentage>=60 and <70
    Grade D: Percentage>=40 and <60
    Grade E: Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user. 4. Write a Program to display the first n terms of Fibonacci series.
5. Write a Program to find factorial of the given number.
6. Write a Program to find sum of the following series for n terms: $1 – 2/2! + 3/3! - - - - - n/n!$

7. Write a Program to calculate the sum and product of two compatible matrices.

SEC-2: ANDROID PROGRAMMING

OBJECTIVES:

· To learn the basics of Android Programming.
· Todevelop simple Android applications.

Unit-1
Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture.

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Unit-2
Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

Unit-3
Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating an android project – Hello Word, run on emulator, Deploy it on USB-connected Android device.
User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.

Unit-4
User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, Dialog.
Database: Understanding of SQLite database, connecting with the database.

Text Books:
1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

Reference Book:
1. James C. Sheusi, "Android application Development for Java Programmers", Cengage Learning, 2013.
2. M. Burton, & D. Felker, "Android Application Development for Dummies", 2/e, Wiley India.

Online References:
1. http://www.developer.android.com
2. http://docs.oracle.com/javase/tutorial/index.htm (Available in the form of free downloadable ebooks also).
3. http://developer.android.com/guide/components/fundamentals.html
4. http://developer.android.com/training/multiscreen/screensizes.html
5. http://developer.android.com/guide/topics/ui/controls.html

Software Lab based on Android Programming:
1. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the emulator. Also display "Hello World" in the middle of the screen in the Android Phone.
2. Create an application with login module. (Check username and password).
3. Create spinner with strings taken from resource folder (res >> value folder) and on

changing the spinner value, Image will change.
4. Create a menu with 5 options and selected option should appear in text box. 5. 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.
6. Create an application with three option buttons, on selecting a button colour of the screen will change.
7. Create and Login application as above. On successful login, pop up the message. 8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

AEC–1: Environmental Science

AEC–2: English Communication/MIL

GE/IC–1: PRINCIPLES OF MANAGEMENT

OBJECTIVES

· To understand the basic principles of management.
· To provide a basis of understanding towards working of business organization through the process of management.

Unit-1
Nature of Management: Meaning, Definition, it's nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts ofmanagement-Administration-Organization.
Evolution of Management Thought: Contribution of F.W.Taylor, Henri Fayol ,Elton Mayo, Chester Barhard& Peter Drucker to the management thought. Various approaches tomanagement (i.e. Schools of management thought)Indian Management Thought.

Unit-2
Functions of Management (Part-I)
Planning - Meaning - Need & Importance, types levels– advantages& limitations, Forecasting - Need & Techniques, Decision making - Types - Process of rational decision making &techniques of decision making,
Organizing - Elements of organizing & processes:Types of organizations, Delegation of authority - Need, difficulties indelegation – Decentralization,

Unit-3
Functions of Management (Part-II)
Staffing - Meaning & Importance, Direction - Nature – Principles, Communication - Types & Importance, Motivation - Importance – theories, Leadership - Meaning - styles, qualities & functions of leaders
Controlling-Need, Nature, importance, Process & Techniques, Coordination - Need, Importance.

Unit-4
Strategic Management
Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India.

Text Books:
1. Horold Koontz and IteinzWeibrich, Essential of Management, McGrawhills International 2. K.Aswathapa, Essential of Business Administration, Himalaya Publishing House

Reference Books:
1. L.M.ParasadPrinciples & practice of management - Sultan Chand& Sons - New Delhi 2. Tripathi, Reddy, Principles of Management, Tata McGraw Hill

GE/IC–1 TUTORIAL/PRACTICAL: PRINCIPLES OF MANAGEMENT TUTORIAL

GE/IC–2: STATISTICS

OBJECTIVES

· To understand the concept of population and sample.
· To use frequency distribution to make decision.
· To understand and to calculate various types of averages and variation.

Unit-1
Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. **Data:** quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. **Presentation:** tabular and graphical, including histogram.

Unit-2
Measures of Central Tendency: mathematical and positional. **Measures of Dispersion:** range, quartiledeviation, mean deviation, standard deviation, coefficient of variation, Moments, absolute moments,factorial moments, skewness and kurtosis, Sheppard"s corrections.
Unit-3
Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3-variables only), rankcorrelation. Simple linear regression.

Unit-4
Principle of least squares and fitting of polynomials and exponential curves. Theory of attributes:Independence and association of attributes, consistency of data, measures of association and contingency,Yule"s coefficient of colligation.

Text Books:
1. S.C. Gupta, Fundamentals of Statistics, Sultan chand& sons, Delhi.
2. A.M.Goon, M.K.Gupta and B. Dasgupta, Fundamentals of Statistics, The World Press, Kolkata.

Reference Books:
1. S.P. Gupta, Statistical Methods, Sultan Chand and sons New Delhi

GE/IC–2 TUTORIAL/PRACTICAL: STATISTICS LAB

List of Practicals
1. Graphical representation of data.
2. Problems based on measures of central tendency.
3. Problems based on measures of dispersion.
4. Problems based on combined mean and variance and coefficient of variation. 5. Problems based on moments, skewness and kurtosis.
6. Fitting of polynomials, exponential curves.
7. Karl Pearson"s correlation coefficient.
8. Correlation coefficient for a bivariate frequency distribution.
9. Lines of regression, angle between two lines of regression and estimated values of variables.
10. Spearman rank correlation with and without ties.
11. Partial and multiple correlations.
12. Planes of regression and variances of residuals for given simple correlations.

GE/IC–3: BUSINESS ACCOUNTING

OBJECTIVES

· To impart the basic business accounting knowledge.

Unit-1
Introduction: Financial Accounting-definition and Scope, objectives of Financial Accounting, Accounting v/s Book Keeping terms used in accounting, users of accounting information and limitations of Financial Accounting.
Conceptual Framework: Accounting Concepts, Principles and Conventions, Accounting Standards concept, objectives, benefits, brief review of Accounting Standards in India, Accounting Policies, Accounting as a measurement discipline, valuation Principles, accounting estimates

Unit-2
Recording of transactions: Voucher system; Accounting Process, Journals, Subsidiary Books, Ledger, Cash Book, Bank Reconciliation Statement, Trial Balance. **Depreciation:** Meaning, need & importance of depreciation, methods of charging depreciation.

Unit-3
Preparation of final accounts: Preparation of Trading and Profit & Loss Account and Balance Sheet of sole proprietary business

Unit-4
Introduction to Company Final Accounts: Important provisions of Companies Act, 1956 in respect of preparation of Final Accounts, Understanding of final accounts of a Company.
Computerized Accounting: Computers and Financial application, Accounting Software packages, An overview of computerized accounting system - Salient features and significance, Concept of grouping of accounts, Codification of accounts, Maintaining the hierarchy of ledger, Generating Accounting Reports.

Text Books :
1. Anil Chowdhry, "Fundamentals of Accounting & Financial Analysis", Pearson Education 2. Rajesh Agarwal, R. Srinivasan, "Accounting Made Easy", TMH

Reference Books:
1. Amrish Gupta, "Financial Accounting for Management", Pearson Education 2. S.
N. Maheshwari, "Financial Accounting for Management: Vikas Publishing House

GE/ IC-3PRACTICAL/TUTORIAL: BUSINESS ACCOUNTING TUTORIAL

GE/IC-4: BUSINESS ECONOMICS

OBJECTIVES:

· To introduce the economic concepts.
· To familiarize with the students the importance of economic approaches in managerial decision making.
· To understand the applications of economic theories in business decisions.

Unit-1:
Demand, Supply and Market equilibrium: individual demand, market demand, individual supply, market supply, market equilibrium; Elasticity of demand and supply: Price elasticity of demand, income elasticity of demand, cross price elasticity of demand, elasticity of supply; Theory of consumer behavior: cardinal utility theory, ordinal utility theory (indifference curves, budget line, consumer choice, price effect, substitution effect, income effect for normal, inferior and giffen goods), revealed preference theory.

Unit-2:
Producer and optimal production choice: optimizing behavior in short run (geometry of product curves, law of diminishing margin productivity, three stages of production), optimizing behavior in long run (isoquants, isocost line, optimal combination of resources) Costs and scale: traditional theory of cost (short run and long run, geometry of cot curves, envelope curves), modern theory of cost (short run and long run), economies of scale, economies of scope.

Unit-3:
Theory of firm and market organization: perfect competition (basic features, short run equilibrium of firm/industry, long run equilibrium of firm/industry, effect of changes in demand, cost and imposition of taxes); monopoly (basic features, short run equilibrium, long run equilibrium, effect of changes in demand, cost and imposition of taxes, comparison with perfect competition, welfare cost of monopoly), price discrimination, multiplant monopoly; monopolistic competition (basic features, demand and cost, short run equilibrium, long run equilibrium, excess capacity); oligopoly (Cournot"s model, kinked demand curve model, dominant price leadership model, prisoner"s dilemma)

Unit-4:
Factor market: demand for a factor by a firm under marginal productivity theory (perfect competition in the product market, monopoly in the product market), market demand for a factor, supply of labour, market supply of labour, factor market equilibrium.

Text Books:

1. Yogesh Maheswari, Managerial Economics, PHI Learning, New Delhi.
2. G.S.Gupta, Managerial Economics, Tata Mcgraw-Hill, New Delhi.

Reference Books:
1. Moyer &Harris, Managerial Economics, Cengage Learning, New Delhi.

2. Geetika, Ghosh & Choudhury, Managerial Economics, Tata Mcgrawhill, New Delhi. 3. Dominick Salvatore, Principles of Microeconomics, Oxford University Press, (5th Ed.)

GE/IC-4 TUTORIAL/PRACTICAL: BUSINESS ECONOMICS TUTORIAL

EQUIPMENT

1.**Desktop Computer**

Core i5 (minimum 8th Generation Processor, 8 GB RAM, 2 TB HDD)

Number of Desktops: 30 (or as per student strength). It must be connected through structured Local Area Network (LAN).

2.Software

LibreOffice, Scilab, C, C++, Java, Assembler, VHDL, Linux/ Unix Prolog etc. , preferably Open Source Software.

FACULTY TRAINING

Most of the Colleges are offering BCA under self-financing mode. Faculty training is required forall Core Courses as well as Discipline Specific Elective Courses.

Faculty training may be organized for the following Courses in phased manner (six month beforethe beginning of the Subject in the concerned semester).

  i.   Digital Logic
  ii.   Computer Organization
  iii.   Data Structure
  iv.   Operating System
  v.   Database Systems
  vi.   Java Programming
  vii.   Web Technology