JAIPUR NATIONAL UNIVERSITY

A venture of The Seedling Group of Educational Institutions

Master of Computer Application (MCA)

Distance Mode: Starts at Page 2

Online Mode: Starts at Page 116

PROGRAM PROJECT REPORT MCA-Distance Mode

Contents

Master of Computer Application

1. Program Overview

1.1 Program's Mission and Objectives

The mission of the Master of Computer Applications program is to provide students with a comprehensive education in computer science and applications, equipping them with the knowledge, skills, and professional values necessary to excel in the dynamic and ever-expanding field of information technology. Through rigorous academic coursework, practical experience, and research opportunities, we aim to produce innovative and socially responsible leaders who can make meaningful contributions to the global IT community.

Objectives:

1. Technical Proficiency: Provide students with a strong foundation in computer science theory and practical skills, including programming languages, algorithms, data structures, and software engineering principles.
2. Application Development: Equip students with the knowledge and expertise to design, develop, and deploy software applications across a variety of platforms and domains.
3. Information Systems Management: Train students in the management of information systems, including database design, network administration, cybersecurity, and IT project management.
4. Emerging Technologies: Expose students to emerging technologies and trends in the IT industry.
5. Problem-solving and Analytical Skills: Foster students' ability to analyze complex problems, formulate innovative solutions, and evaluate the effectiveness of alternative approaches.
6. Communication and Collaboration: Develop students' communication, teamwork, and interpersonal skills, enabling them to effectively collaborate with colleagues, clients, and stakeholders in multidisciplinary settings.

7. Ethical and Professional Responsibility: Instill a sense of ethical awareness and professional responsibility in students, emphasizing the importance of integrity, honesty, and respect for intellectual property rights in their work.

8. Research and Innovation: Encourage students to engage in research activities, explore new ideas, and contribute to the advancement of knowledge in the field of computer science and applications.

9. Continuous Learning and Adaptability: Cultivate a mindset of lifelong learning and adaptability, preparing students to keep pace with rapid technological advancements and evolve as professionals throughout their careers.

1.2 Relevance of the Program with JNU's Vision and Mission

Jaipur National University (JNU) was established in 2007. JNU provides a world-class learning experience, with a highly accomplished faculty, numerous extracurricular activities, and a wide range of academic pursuits. The university fosters holistic development of students.

JNU with its vision to transform the Education Landscape of India and contribute to the maximum to improve the GER of India has plans to launch affordable and flexible education programs. Distance programs are an excellent way to launch affordable and flexible education programs in sync with the vision and mission of the university stated below:

University Vision:

To be a leader in creating unique and exclusive learning opportunities in all disciplines of study that ultimately lead to the advancement of learning and creation of a sustainable society and environment.

University Mission:

- Provide global opportunities of learning through broad and balanced academic programmes.
- Explore and hone the potential of stakeholders, develop their human and intellectual capacities to the fullest.
- Create and maintain excellence with high standard driven activities, universal significance and acknowledgement.
- Inculcate and keep track of the current trends and finest practices in education for constant growing and evolving.

1.3 Nature of Prospective Target Group of Students

The curriculum of MCA is designed in such a way that it helps the students to become not only more employable but also encourage them to become entrepreneurs. Primarily the target group of learners will be:

- population living in remote areas where higher education institutes are not easily accessible.
- Learners who could not get admission in the regular mode due to limited intake capacity.
- Learners who are working and who desire to pursue higher education as a means for movement up the ladder.
- Learners who are unable to pursue Higher education due to social, financial and economic compulsions as well as demographic reasons.

1.4 Appropriateness of programs to be conducted in Distance mode to acquire specific skills and competence

The Master of Computer Application degree holds significant value for students aiming to excel in careers within industries, businesses, finance, or the civil service. Moreover, it is highly regarded by employers for various roles where proficiency in logical and quantitative reasoning is essential, such as software development, database administration, systems analysis, and IT consulting.

2. Procedure for Admission and Curriculum Transaction

The academic programs catered to candidates enrolled in the Distance mode of learning are facilitated by CDOE-JNU, with the backing of various faculties within the University. Eligibility criteria, course structure, detailed curriculum, program duration, and evaluation criteria are subject to approval by the Board of Studies and Academic Council, adhering to UGC guidelines for programs falling under the purview of Distance mode for degree conferment.

Below are the details of the admission procedure, eligibility criteria, fee structure, curriculum, program delivery, information about the Learning Management System (LMS), and assessments and evaluations:

2.1Procedure for Admission

Students who are seeking admission in programs offered by CDOE-JNUneed to apply through https://online.jnujaipur.ac.inin the courses offered.

2.1.1 Minimum Eligibility Criteria for Admission

The minimum eligibility criteria for admission to the DistanceMCA program require candidates to hold a Bachelor's degree of a minimum duration of 3 years from a recognized University in any stream, in accordance with UGC norms. Additionally, candidates must have secured at least 40% marks in the qualifying examination with Mathematics as a subject. Candidates who have not studied Maths at Graduation level, will have to complete Bridge Program to enrol into the MCA program.

Candidates must also fulfill all documentation requirements as specified on the program's website for admission purposes. Failure to submit proof of eligibility within the stipulated timeframe specified by CDOE-JNU will result in the cancellation of admission. Prospective candidates are encouraged to carefully review all instructions provided on the website before proceeding with the application process.

2.1.2 Admission Process and Instructions: Learner Communication

The admission process for the students is provided below:

Step	**Process**	**Particulars**
Step 1	**Counselling**	Prospective students will receive guidance and counseling for their chosen program from designated and authorized counselors.
Step 2	**Registration on admission portal to get access to My Account.**	To initiate the registration process, prospective students are required to complete the application form by providing all necessary details and uploading mandatory documents.
Step 3	**Details of Document upload**	Student Uploads document as follows- <u>Personal Documents</u> Passport-size Photograph Student's Signature Aadhar Card (Back & Front) <u>Academic Documents</u> *UG Student -* 10th Marksheet

		12th Marksheet *PG Student -* 10th Marksheet 12th Marksheet UG Marksheet Other Certificates (detailed list of documents is provided in **Annexure II**)
Step 4	**Verification of documents by the Deputy Registrar**	The Deputy Registrar is responsible for verifying all documents uploaded by prospective students on the admission portal. Within a timeframe of 48 hours, the Deputy Registrar will review and either approve or disapprove the eligibility of the prospective student for the chosen program.
Step 5	**Undertaking**	Student will sign Undertaking after Approval in Application.
Step 6	**Payment of fees**	All eligible students, duly approved by the Deputy Registrar, will get fees payment link activated in their My Account for payment. The Fee is payable through any of the following means: (a) UPI (b) Credit/Debit Card (c) Net-banking Note: Cash, bank demand draft and Cheques are not accepted
Step 7	**Enrolment**	After the payment of program fee, the eligible student will get the Enrolment number and access to the LMS within 21 days.
Step 8	**Access to Learning Management System (LMS)**	

General Instructions:

1. Prior to applying for Distance programs, all students are advised to thoroughly read and comprehend the eligibility conditions provided in the student handbook document and outlined on the university website.
2. It is the responsibility of prospective learners to ensure that their educational or qualifying degree has been issued by a recognized university or board only. For learners from Indian higher education institutions, recognition by the regulatory authority of the Government of India is necessary. To verify degrees from recognized boards of education, refer to www.cobse.org.in/. For Polytechnic Diploma, check the respective State Board of Technical Education. Verification of degrees from recognized

universities can be done at www.ugc.ac.in/. Foreign prospective learners should verify their institutions at www.aiu.ac.in/.

3. Prospective learners must verify their eligibility on the date of admission and ensure that they have passed the qualifying exams before the commencement of the admission batch.

Upon enrollment, students must register with the Academic Bank of Credits (ABC), a central scheme for depositing credit formulated by the Ministry of Education, Government of India. Creation of an Academic Bank of Credits (ABC) ID is mandatory for all students. (Refer to Annexure V for details).

2.1.3 Program Fee for the Academic Session beginningJuly 2024

Program fees for students pursuing MCA offered by CDOE-JNU is mentioned below:

Program	Academic Total Fees (INR)	Exam Fees
MCA	**56,000**	**1500 per semester**

2.2 Curriculum Transactions

2.2.1 Program Delivery

The curriculum is delivered through Self Learning Materials (SLMs) in the form of e-Contents, supplemented by a variety of learning resources including audio-video aids via the Learning Management System (LMS).

2.2.2 Learning Management System to support Distance mode of Course delivery

The Learning Management System (LMS) is available on URL https://lms.jnujaipur.ac.in/is meticulously developed to offer students a truly global learning experience. With a user-friendly interface, the LMS simplifies the learning process and ensures it meets the highest global standards. Utilizing audio-visual teaching methods, self-learning materialsand evaluation patterns, the platform stands out as unique and aligns seamlessly with both industry requirements and the UGC Guidelines.

Students can engage in uninterrupted learning 24x7 via web and mobile devices, allowing them to progress at their preferred pace. The LMS boasts a simple and intuitive user interface, facilitating easy navigation through the e-learning modules. Designed in accordance with standard norms, all learning tools are easily accessible, ensuring a perfect learning experience for all users.

2.2.3 Course Design

The curriculum is designed by a committee comprising experts from the parent department of the University and Industry experts, keeping in view the needs of the diverse groups of learners.

2.2.4 Academic Calendar for Academic Session beginning July 2024

Sr. No.	Event	Session	Month (Tentative)
1.	Commencement of semester	January	January
		July	July
2.	Enrol learner to Learning Management system	January	Within 21 working days from fee deposit and Eligibility confirmation
		July	
3.	Interactive Live Lectures for query resolution	January	February to May
		July	August to November
4.	Assignment Submission	January	By April
		July	By October
5	Project Report Submission (Applicable during Final semester)	January	Last week of April
		July	Last week of November
6	Term End Examination	January	May onwards
		July	December onwards
7	Result Declaration of End Term Examination	January	By June
		July	By January

3. Instructional Design

3.1 Curriculum Design

The curriculum is meticulously designed by experts in the field of Computer Science, incorporating contemporary topics and fostering environmental awareness. It has received approval from the Board of Studies, the Centre for Internal Quality Assurance (CIQA), and the University Academic Council.

3.2 Program Structure and detailed Syllabus

3.2.1 Program Structure

Sem	Course Code	Course Category	Title	Credits	Contact week			Evaluation		
					L	T	P	Int	Ext	Total
Theory										
I	DMCACO101T24	CORE	Object Oriented Programming with C++ and JAVA	3	3	0	0	30	70	100
	DMCACO102T24	CORE	Database Management System	3	3	0	0	30	70	100
	DMCACO103T24	CORE	Computer Graphics	3	3	0	0	30	70	100
	DMCACO104T24	CORE	Information and Network Security	3	3	0	0	30	70	100
	DMCAVA105T24	VAC	Management Process and Organizational behavior with Environmental Ethics	3	3	0	0	30	70	100
	DMCASE106T24	SEC	Advance Data Structure and Algorithm Analysis	3	3	0	0	30	70	100
	OE/GE*	OE/GE*	OE/GE	2	2	0	0	30	70	100
Practical										
I	DMCACO107P24	CORE	Object Oriented Programming with C++ and Java Lab	2	0	0	4	30	70	100
	DMCACO108P24	CORE	Database Management System	1	0	0	2	30	70	100
	DMCACO109P24	CORE	Computer Graphics Lab	1	0	0	2	30	70	100
	DMCASE110P24	SEC	Advance Data Structure and Algorithm Analysis Lab	2	0	0	4	30	70	100
TOTAL				**26**	**20**	**0**	**12**			

*Students can choose any one of the subject from the following list of subjects or can pursue a MOOC course in order to get equal credits in Semester 1.

Sr. NO.	Subject Code	Name of Subject
1.	DMCAGE101T24	Understanding Prescription, Doses and doses forms

2.	DMCAGE102T24	Dining etiquettes
3.	DMCAGE103T24	Basics of Photography
4.	DMCAGE103T24	Crime and society
5.	DMCAGE104T24	Industrial Mathematics

Sem	Course Code	Course Category	Title	Credits	Contact week			Evaluation		
					L	T	P	Int	Ext	Total
II	DMCACO201T24	CORE	Theory of Computation	3	3	0	0	30	70	100
	DMCACO202T24	CORE	Software Engineering	3	3	0	0	30	70	100
	DMCACO203T24	CORE	Web Technology	3	3	0	0	30	70	100
	DMCACO204T24	CORE	Computer Based Optimization Techniques	3	3	0	0	30	70	100
	DMCASE205T24	SEC	Microprocessor & Assembly Language Programming	3	3	0	0	30	70	100
	DMCASE206T24	SEC	E-Commerce and Digital Marketing	3	3	0	0	30	70	100
	OE/GE*	OE/GE*	OE/GE	2	2	0	0	30	70	100
II	DMCACO207P24	CORE	Software Engineering Lab	2	0	0	4	30	70	100
	DMCACO208P24	CORE	Web Technology Lab	2	0	0	4	30	70	100
	DMCASE209P24	SEC	Microprocessor Lab	1	0	0	2	30	70	100
	DMCAAE210P24	AEC	Seminar	1	0	0	2	30	70	100
TOTAL				**26**	**20**	**0**	**12**			

*Students can choose any one of the subject from the following list of subjects or can pursue a MOOC course in order to get equal credits in Semester 2.

Sr. NO.	Subject Code	Name of Subject
1.	DMCAGE201T24	Introduction to Epidemiology
2.	DMCAGE202T24	Basics of Baking
3.	DMCAGE203T24	Videography
4.	DMCAGE204T24	Sociology of Health
5.	DMCAGE205T24	Nanotechnology

After completion of Semester – II, students are required to undergo Summer Training.

III SEMESTER

Sem	Course Code	Course Category	Title	Credits	Contact week			Evaluation		
					L	T	P	Int	Ext	Total
Theory										
III	DMCACO301T24	CORE	Compiler Design	3	3	0	0	30	70	100
	DMCADS302.1T24	DSE1	Advanced Database Concepts	3	3	0	0	30	70	100
	DMCADS302.2T24		Internet of Things							
	DMCADS302.3T24		Android Programming							
	DMCACO303T24	CORE	.NET Framework and ASP.NET	3	3	0	0	30	70	100
	DMCACO304T24	CORE	Introduction to Artificial Intelligence and Machine Learning	3	3	0	0	30	70	100
	DMCADS305.1T24	DSE2	Big Data Analytics	3	3	0	0	30	70	100
	DMCADS305.2T24		Mobile Computing							
	DMCADS305.3T24		Cloud Computing							
	DMCADS305.4T24		Human Computer Interaction							
	*OE/GE	OE/GE	OE/GE	2	2	0	0	30	70	100
Practical										
III	DMCADS307.1P24	DSE	Advanced Database Concepts Lab	2	0	0	4	30	70	100
	DMCADS307.2P24		Internet of Things Lab							
	DMCADS307.3P24		Android Programming Lab							
	DMCACO308P24	CORE	.NET Lab	2	0	0	4	30	70	100
	DMCACO309P24	CORE	Artificial Intelligence Lab using Python Lab	1	0	0	2	30	70	100
	DMCAAE310P24	AEC	Communication & Soft Skills	1	0	0	2	30	70	100
	DMCATP311P24	STP	Summer Training Presentation	1	0	0	1	30	70	100
TOTAL				**24**	**17**	**0**	**13**			

*Students can choose any one of the subject from the following list of subjects or can pursue a MOOC course in order to get equal credits in Semester 3.

S. No.	Subject Code	Name of Subject
1	DMCAGE301T24	Public Health Pharmacy
2	DMCAGE302T24	Rajasthan and Punjabi cuisine
3	DMCAGE303T24	Script writing for film
4	DMCAGE304T24	Sociology of Media
5	DMCAGE305T24	Research Methodology

Semester	Course Code	Course Category	Title	Credits	Contact week			Evaluation		
					L	T	P	Int	Ext	Total
Theory										
IV	DMCAIT401T24	INT	Industrial Training	20				150	350	500
	DMCAAE402T24	AEC	Research Paper Publication	5				30	70	100
TOTAL				25						

3.2.2 Detailed Syllabus of MCA

Detailed syllabus of MCA is attached in Annexure-I.

3.3 Duration of the Program

Program	Level	Duration	Maximum duration for completion	Credits
MCA	Master's Degree	2 years (4Semesters)	4 Years	101

3.4 Faculty and Support staff requirements (Refer Regulation Document for all Staff Details)

Academic Staff	Number available to meet the norms
Program Coordinator	1 Member
Course Coordinator	27
Course Mentor	1 Member per batch of 250 students

3.5 Instructional delivery mechanisms

JNU boasts a fully dedicated team of faculty members and staff proficient in delivering lectures through CDOE – JNU. At the commencement of each session, students will receive the academic calendar via the Learning

Management System (LMS). The distribution of self-learning material, audio, and video content to students will be facilitated through the LMS via the following delivery channels:

- Self-Learning Material
- EBooks
- Study Guide
- Question Bank in Learning Management system - For Practice Test through LMS
- Audio / Video Component in Learning Management System
- Assignments (Submitted through Assignment Response Sheet)
  Personal Contact Program would be conducted at University Campus.

3.6 Identification of media-print, audio, or video, online, computer aided

The Learning Management System (LMS) serves as a comprehensive digital platform, offering a multitude of features including recorded faculty video lectures, live sessions, e-content comprising study material, open source materials, and graded assessments.

For each module within a course, there will be one live session conducted by the respective faculty member, focusing on a specific topic. CDOE-JNU has curated study material that is clear and easily comprehensible, complete with concise summaries, self-assessment questions, and case studies.

Access to these course materials is facilitated through:

- Login credentials provided in the welcome email sent by the university
- Students can also log in on the University website at https://lms.jnujaipur.ac.in/

Courseware

Through the Learning Management System (LMS), students will have access to a comprehensive array of course materials mentioned in above clause.

The Dashboard feature of the LMS serves to track and monitor students' learning progress. It includes functionalities such as:

- Monitoring progress in learning
- Comparing progress with peers
- Receiving regular notifications about upcoming Live Sessions, assignments, and examinations

3.7 Student Support Services

Students will have access to support services provided by CDOE-JNU through the Student Relationship Management (SRM) system for queries related to administration and general technical issues. A ticketing system integrated into the LMS will enable learners to connect with the CDOE-JNU technical team for support

services, with resolutions handled by the appropriate authority. Notifications will also be sent to the Deputy Registrar to ensure queries are addressed within 24 hours or sooner.

For academic course-related queries, students can raise queries directly with the Course Coordinator, Program Coordinator, and Deputy Director. Queries should be resolved within 48 hours of being raised, with the Program Coordinator responsible for managing and resolving any unresolved matters. The Deputy Director will ensure the timely resolution of academic queries.

In addition to academic excellence, CDOE-JNU prioritizes the holistic development of its students. The department supports various initiatives to broaden students' opportunities and shape them into future leaders.

4. Assessment and Evaluation

4.1 Overview

The evaluation of students' learning will encompass internal assignments, quizzes, learner response sheets, and end-of-term examinations. CDOE-JNU follows a rigorous process in the development of question papers, creation of question and quiz banks, preparation and moderation of assignments, administration of examinations, analysis of answer scripts by qualified academics, and declaration of results. Question papers are meticulously framed to ensure comprehensive coverage of the syllabus.

The evaluation process will include two types of assessments:

Examination Name	Marks Division
Continuous internal assessment	30%
Summative assessment in the form of end-term examination. End-term examination will be held with proctored examination tool technology (follow **Annexure VI** for guidelines and pre-requisites for Proctored Examination)	70%

The examinations are designed to evaluate the knowledge acquired during the study period.

For theory courses, internal evaluation will be conducted through Continuous Internal Assessment (CIA), which includes assignments and quizzes. The internal assessment will contribute a maximum of 30 marks for each course.

At the end of each semester, an end-of-semester examination will be held for each course, lasting two hours.

Guidelines issued by the Regulatory Bodies from time-to-time about conduct of examinations shall be considered and new guidelines if any will be implemented.

4.2 Question Paper Pattern

Exam Time: 2 Hours

Max. Marks: 70

Exam will be comprising of 70 Multiple-Choice Questions (1 Mark Each) – 70 Marks

4.3 Distribution of Marks in Continuous Internal Assessments

The following procedure shall be followed for internal marks for theory courses. Weightage for Assignment is provided below:

Particular	A1 (MCQ Type)	A2 (MCQ Type)
Marks	15	15

Note: Refer to **Annexure VI** and **VII** for reference to the question paper pattern and formats of documents accepted.

Students may re-appear for CIA up to next two semesters and has to follow the same procedure. For the last semester the academic rules shall apply.

4.4 Statistical Method for the Award of Relative Grades

Letter Grade	Grade point	Range of Marks(%)
O (Outstanding)	10	90-100
A+ (Excellent)	9	80-89
A (Very good)	8	70-79
B+ (Good)	7	60-69
B (Above average)	6	50-59
C (Average)	5	40-49
p (Pass)	4	35-39
F (Fail)	0	0-34

Ab (Absent)	0	Absent

Abbreviations:

CO	Core Course	MM	Maximum Marks
DSC	Discipline Specific Course	MO	Marks Obtained
GE	Generic Elective Course	SE	Skill Enhancement
AE	Ability Enhancement	DSE	Discipline Specific Elective

4.4.1 Cumulative Grade Point Average (CGPA) and Semester Grade Point Average

Semester Grade Point Average (SGPA):

It is the summation of product of Credit Points and Grade Points divided by the summation of Credits of all Courses taught in a semester.

SGPA = $\Sigma C.G. / \Sigma C$

Where, G is grade and C. is credit for a Course.

Cumulative Grade Point Average (CGPA): $CGPA = \Sigma(C_i \times Si)/\sum c.$

Where, Si is the SGPA of the semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Note:

- In case of any mistake being detected in the preparation of the Grade Statement at any stage or when it is brought to the notice of the concerned authority the University shall have the right to make necessary corrections.

4.4.2 Cumulative Grade Point Average (CGPA)

CGPA will be used to describe the overall performance of a student in all courses in which letter grades are awarded since his entry into the University or transferred from other University upto the latest semester as per the procedure provided in JNU Academic Regulations. It is the weighted average of the grade points of all the letter grades received by the student from his entry into the University or transferred from other University. Since multiple performance in a course in which the student has already received a grade is

possible, whenever through such a process a new grade is obtained, it will replace the earlier one in the calculation of CGPA. On the other hand, if through this process merely a report emerges, this event by itself will not alter the CGPA.

A student's grades, reports, CGPA, etc. at the end of every semester/term will be recorded on a grade card, a copy of which will be issued to him. The grade card will be withheld if a student has not paid his dues or when there is a pending case of breach of discipline or a case of unfair means against him.

The faculty members also responsible for maintaining the complete records of each student's attendance, performance in different components of evaluation. If a scrutiny or statistical analysis becomes necessary, the above records and any other pertinent information should be made available by the faculty member of the course.

4.4.3 Conversion Factor

Formula for Conversion of CGPA to Percentage:

Percentage of marks = CGPA ^{x} 10

4.5 Grade card

All grades and reports and other pertinent information for a semester are given in a grade card which is a complete record of the outcome of what was intended in the original registration. The various grades and reports would be appropriately used to tally the grade card with the original registration.

Chronologically organized information from the grade cards of a student with the necessary explanation constitutes is transcript which is issued at the time the student leaves the University or at an intermediate point on request.

4.5.1 Grade cards and Certification – Student Communication

- The student can get soft copy of grade cards through the University website, the hard copy grade card would be provided only after successfully completion of full program along with degree certificate.
- Once the student completes all the mandated assignments, examinations and projects (if applicable) the final mark sheet/grade card and certificate would be dispatched by the University to the student registered address.
- All pending payments/dues need to be cleared by the student, before the final certification.
- If required, the University may request the mandatory documents from student as submitted during admission time, the students may have to re-submit the same if required during final degree certification.
- Students need to apply for degree by filling the degree application form and submit all the required documents and the applicable degree processing application fees as mentioned in this document.

4.5.2Results, grade card and Degree Logistics–Internal Process

- After verification of all data by the Controller of Examination, the results would be published on the CDOE-JNU website.
- Students need to download and save the copy of semester / year wise results.

CDOE-JNU would provide hard copy grade cards and degree certificate at the end of the program to students who have successfully completed the program. Students who successfully completed the program will receive hard copy mark sheet/grade cards and a degree certificate from the University at the end of the program. A provision for On Demand Mark Sheets can be provided wherein student would have to fill the requisition and pay postal charges enabling university to dispatch the hard copy marksheets as requested by the student; prior to completion of the overall program.

5. Requirement of the Laboratory Support and Library Resources

5.1 Laboratory Support

Jaipur National University offers access to state-of-the-art laboratories equipped with the latest tools and resources necessary for research and analytical work. The laboratory support at JNU aims to foster a robust research environment, encouraging students to develop essential skills required for their academic and professional growth.

5.*2 Library Resources*

The Central Library at CDOE-JNU offers a comprehensive range of sections, including reference, circulation, audio-visual, periodical, book-bank, digital library, and reprographic sections. With a collection exceeding 1,00,000 books, the library also provides access to e-journals, online databases such as Scopus and Web of Science, and institutional repositories featuring rare book collections. University has 449 subscriptions of online and offline Journals. Equipped with modern facilities like reading rooms, computer labs, and quiet study areas, the library fosters a conducive environment for learning and intellectual growth. Additionally, the library frequently organizes workshops, seminars, and exhibitions to enhance academic engagement and promote a culture of continuous learning.

All electronic resources can be accessed seamlessly through the Local Area Network (LAN) on campus, as well as remotely via login credentials. This ensures convenient access to resources for students, faculty, and researchers both on-site and off-site.

6. Cost Estimate of the Program and the Provisions

The Estimate of Cost & Budget could be as follows (all figures on Annual basis) :

Sr. No.	Expenditure Heads	Approx. Amount
1	Program Development (Single Time Investment)	42,00,000 INR
2	Program Delivery (Per Year)	8,00,000 INR
3	Program Maintenance (Per Year)	28,00,000 INR

7. Quality Assurance Mechanism

The quality of a program hinges upon the course curriculum, syllabus, and academic delivery, all of which are meticulously designed to bridge the gap between industry standards and academia. To uphold this standard, the Centre for Internal Quality Assurance (CIQA) and the Academic Council play crucial roles.

The Academic Council is entrusted with ratifying the curriculum and any proposed changes recommended by CIQA to ensure the continual enhancement and maintenance of quality in education at CDOE-JNU.

The Centre for Internal Quality Assurance (CIQA) is tasked with several responsibilities:

(i) Conducting periodic assessments of learning course materials and audio-video tutorials to maintain the quality of learning.

(ii) Soliciting stakeholder feedback and implementing recommended changes to meet the evolving needs of course delivery and industry requirements.

(iii) Evaluating the quality of assignments, quizzes, and end-term assessments and providing suggestions for enhancements to sustain the learning program's standards.

(iv) Ensuring that the learning experience is truly global, aligning with program outcomes and reflecting the vision and mission of JNU.

The Chief Operating Officer (CoE) of the University oversees examinations and the evaluation system to ensure fairness and integrity in the assessment process.

CDOE-JNU is committed to continual improvement, striving to enhance processes, assessments, teaching methodologies, and e-learning materials in line with the implementation of the New Education Policy (NEP). The University is dedicated to delivering exceptional education across all learning modes while adhering to NEP, UGC, and other regulatory guidelines, fostering a truly global educational environment.

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Master of Computer Application

Semester – I

Object Oriented Programming with C++ and JAVA

Course Outcomes:

After completion of the course, students will be able to:

1. Gain the basic knowledge on Object Oriented concepts and describe the differences between traditional imperative design and Object-oriented design.
2. Create & design applications using Object Oriented Programming Concepts
3. Explain class structures as fundamental, modular building blocks and explain the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code.
4. Write small/medium scale C++ / java programs with simple graphical user interface
5. Describe the file handling and error handling mechanisms in C++ and Create simple data structures like arrays in a Java program.
6. Describe to access database through Java programs, using Java Data Base Connectivity (JDBC).

Course Contents

Unit I

Introduction: Object oriented paradigm, elements of object oriented programming Merits and demerits of OO methodology , C++ fundamentals , data types, operators and expressions, control flow, arrays, strings, pointers and functions, Classes and objects, constructors and destructors, operator overloading, inheritance, virtual functions and polymorphism

UNIT II

File Handling: C++ streams , console streams , console stream classes, formatted and unformatted console I/O operations, manipulators , File streams , classes file modes file pointers and manipulations file I/O , Exception handling.

UNIT III

Java Introduction: An overview of Java, data types, variables and arrays, operators, control statements, classes, objects, methods, Inheritance, Packages and Interfaces, Exception handling, Multithreaded programming, Strings, Input

/Output

UNIT IV

Introduction to Threads: Non-Threaded Applications, Threaded Applications, Creating Threads, Thread States, Runnable Threads, Coordinating Threads, Interrupting Threads

Runnable Interface

UNIT V

Introduction to JDBC: JDBC Architecture, Common JDBC Components, JDBC Packages

Books Recommended:

1. K.R.Venugopal,RajkumarBuyya,T.Ravishankar,"MasteringC++",TMH,2003.
2. Herbert Schildt, "the Java 2: Complete Reference", Fourth edition, TMH,2002.
3. Ira Pohl, "Object oriented programming using C++", Pearson EducationAsia, 2003.
4. Bjarne Stroustrup, "The C++ programming language", Addison Wesley,2000.
5. John R.Hubbard, "Programming with C++", Shamus outlines series, TMH,2003.
6. H.M.Deitel, P.J.Deitel, "Java: how to program", Fifth edition, Prentice Hall of India private limited.
7. Programming in Java: E. Balagurusamy; TMH.
8. Core Java Fundamentals – Volume I and II; Cay Horstmann, GaryCornell; Pearson Education.

Database Management System

Course Outcomes:

After completion of the course students will be able to:

1. Describe the fundamental elements of relational database management systems
2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
3. Design ER-models to represent simple database application scenarios.
4. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
5. Improve the database design by normalization and will be familiar with basic recovery and concurrency control scheme.

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT - IV

Transaction Concept: Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition

2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

REFERENCES:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education

3. Introduction to Database Systems, C. J. Date, Pearson Education

4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.

5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, PHI.

6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

Computer Graphics

Course Outcomes:

After completion of the course, students will be able to:

1. Explain the core concepts of computer graphics, including viewing, projection, perspective, modeling and transformation in two and three dimensions.
2. Interpret the mathematical foundation of the concepts of computer graphics and Describe the fundamentals of animation, parametric curves and surfaces, and spotlighting.
3. Identify a typical graphics pipeline and apply graphics programming techniques to design and create computer graphics.
4. Apply the concepts of color models, lighting and shading models, textures, ray tracing, hidden surface elimination, anti-aliasing, and rendering.
5. Create effective OpenGL programs to solve graphics programming issues, including 3D transformation, objects modelling, colour modelling, lighting, textures, and ray tracing.

Course Contents

Unit - I

Components of Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan systems , Input devices, Graphics Software Coordinate Representations, Fundamental Problems in Geometry.

Unit –II

Algorithms: Line drawing algorithms- DDA Algorithm, Bresenham's Line Algorithm, Frame buffers, Circle and Eclipse generating algorithms, Midpoint Circle Algorithm and Sean-line polygon fill algorithm. Inside-Outside tests. Sean- Line fill of curved Boundary Areas, Boundary fill Algorithm, and Flood fill Algorithm, Character generation, Attributes of lines, curves, filling, and characters.etc.

Unit –III

Graphics Primitives: Primitive Operations, The display file interpreter-Normalized Device Coordinates. Display- File structure. Display – file algorithm. Display control and Polygons. Polygon Representation Attributes of output primitives: Line attributes - Line type. Line width, Pen and Brush options, and Line Color, Color and gray scale levels. Area- Fill Attributes- Fill styles. Pattern fill, Soft fill, Character Attributes and Text attributes.

Unit-IV

Geometric Transformations: Matrices. Scaling Transformations. Sin and Cos Rotation. Homogeneous Co-ordinates and Translation. Co-ordinate Translations. Rotation about an arbitrary point. Inverse Transformations, Transformations

Routines. 2-D Viewing- The viewing pipeline. Viewing co-ordinate, Reference Frame. Windows to view ports . co-ordinate transformation 2-D Viewing functions. Clipping operations point clipping. Line clipping. Cohen- Sutherland. Line Clipping, Polygon clipping, Sutherland Hodge man clipping.

Unit-V

Advance Concepts: Three dimensional Display Methods Parallel projection. Perspective projection. Visible line and surface identification. Surface rendering. Three Dimensional Object representations. Bezier curves and surfaces. B-Spline curves and surfaces. Visibility , Image and object precision Z- buffer algorithm. Floating horizons. Computer Animation: Design of Animation Sequences. General Computer Animation Functions- Raster Animations. Key Frame Systems. Morphing Simulating Accelerations. Motion Specifications. Kinematics andDynamics.

Books Recommended:

1. Donald Hearn and M. Pauline Baker, “Computer Graphics”,PHI.
2. Steven Harrington, “Computer Graphics: A ProgrammingApproach”, TMH.
3. Prajapati A. K, “Computer Graphics”, PPM Ed2.
4. Foley James D,”Computer Graphics”, AW Ed2.
5. Newman and Sproul, “Principle of to Interactive Computer Graphics”, McGrawHill
6. Rogers, “Procedural Elements of Computer Graphics”, McGrawHill
7. Rogers and Adams, “Mathematical Elements of Computer Graphics”, McGrawHill
8. Tay Vaughan “Multimedia, Making IT Work” Osborne McGrawHill.
9. Buford “Multimedia Systems” AddisonWesley.
10. David Hillman “Multimedia technology and Applications” GalgotiaPublications.

Information and Network Security

Course Outcomes:

After completion of the course, students will be able to:

1. Describe network security services and mechanisms.
2. Apply Symmetrical and Asymmetrical cryptography.
3. Implement Data integrity, Authentication, Digital Signatures.
4. Implement various network security applications, IPSec, Firewall, IDS, Web security, Email security, and Malicious software etc.
5. Understand how to deploy encryption techniques to secure data in transit across data networks.
6. Design security applications in the field of Information technology

Course Contents

UNIT-I

Introduction to security attacks: Services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard(DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

UNIT-II

Introduction to groupfield, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA.

UNIT-III

Message Authentication Codes: Authentication requirements, authentication functions,

message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA).

Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm.

UNIT-IV

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure.

Authentication Applications: Kerberos Electronic mail security: pretty good privacy (PGP), S/MIME.

UNIT-V

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic, transaction (SET).

System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls

Recommended Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, TMH.
3. Bruce Schiener, "Applied Cryptography". John Wiley & Sons.
4. Bernard Menezes," Network Security and Cryptography", Cengage Learning.
5. Atul Kahate, "Cryptography and Network Security", TMH .

Management Process and Organizational behavior with Environmental Ethics

Course Outcomes:

1. Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
2. Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
3. Analyze the complexities associated with management of the group behavior in the organization.
4. Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.
5. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
6. Articulate the basic structure, functions, and processes of key social systems affecting the environment

Course Contents

Unit- I

Principles of Management: Management: Introduction, Definition of management, Nature, Purpose and Functions, Levels and types of managers, managerial roles, skills for managers, evolution of management thought, Fayol's fourteen principles of management.

Unit – II

Planning: Meaning, Nature of Planning, Planning Process, Objectives, MBO, Strategies, level of strategies, policies, methods and programs, Planning Premises, Decision-making

Organizing: Organization structure, Formal and informal organizations, Principles of organizations

Controlling: Meaning, importance of controlling, controlling process, types of control, factors influencing control effectiveness.

Unit-III

Organizational Behaviour: Organizational Introduction, definition, fundamental principles of OB, contributing disciplines, challenges and opportunities. Evolution and Organizational Behavior in India.

Individual Behaviour: Foundations of individual behaviour. Ability: Intellectual abilities, Physical ability, the role of disabilities, Personality, Attitude, Motivation, Leadership

Unit-IV

Environmental Science: Definition, scope and importance, need for public awareness. Natural Resources: renewable and non-renewable resources, natural resources and associated problems, biodiversity, Threats to biodiversity, poaching of wildlife, man- wildlife conflicts. Endangered and endemic species of India, Environmental Pollution

Unit V

Social Issues and the Environment: Role of an individual in conservation of natural resources, Role of an individual in prevention of pollution. Disaster management: floods, earthquake, cyclone and landslides, resettlement and rehabilitation of people, Case Study

Books Recommended:

1. Organizational Behavior, Stephen P. Robbins, Pearson Education.
2. Organizational Behaviour, S.S.Khanka, S.Chand
3. Organizational Behavior , Mishra .M.N ,Vikas
4. Principles of Management, Koonz, Weihrich and Aryasri, Tata Mcgraw Hill.
5. Environmental Studies-Benny Joseph-Tata McgrawHill-2005
6. Environmental Studies -Dr. D.L. Manjunath, PearsonEducation-2006.
7. Text book of Environmental Science &Technology -M. Anji Reddy-BS Publication

Advance Data Structure and Algorithm Analysis

Course Outcomes:

Course Contents

Unit - I

Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Review ofStacks, Queues, Linked list, Binary Search Tree, Hash Table

Unit - II

Advanced Data Structure: BTree, 2-3 tree, 2-3-4 Tree, Splay Tree, Interval Tree, Red Black Tree, Data Structure for Disjoint Sets Union-find Algorithm, Dictionaries and priority Queues.

Unit - III

Advanced Design and Analysis Techniques: Greedy Algorithm (Knapsack Problem, Job Sequencing with Deadlines), Dynamic programming (0/1 Knapsack, TSP, Multistage Graphs), Backtracking (N Queen Problem, Sum of Subsets, Hamiltonian Cycles), Branch-and-Bound (TSP, Assignment Problem)

Unit - IV

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single source Shortest Path, Allpair Shortest Path, Maximum flow, Max Flow Min Cut Theorem, Ford Fulkerson Algorithm.

Unit – V

Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms, Vertex Cover Problem, Set Cover Problem, Hamiltonian Cycle, Clique Problem

Books Recommended

1. Horowitz Sahani, "Fundamentals of Computer Algorithms",Golgotia
2. CoremenLeisersonetal, "Introduction to Algorithms",PHI
3. Brassard Bratley, "Fundamental of Algorithms",PHI
4. M T Goodrich etal, "Algorithms Design", JohnWiley
5. A V Aho etal, "The Design and analysis of Algorithms", PearsonEducation

Object Oriented Programming with C++ and Java Lab

Course Outcomes:

After successful completion of the course students will be able to:

1. Acquire profound knowledge of object oriented programming.
2. Demonstrate the difference between the solutions offered by traditional imperative problem solving method and object-oriented method by class inheritance, data encapsulation, polymorphism as fundamental building blocks to generate reusable code.
3. Understand and implement error handling and file handling routines.
4. Explain the Internet Programming, using Java Applets.
5. Create and design a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT).
6. Describe to access database through Java programs, using Java Data Base Connectivity (JDBC)
7. Develop Mini Projects using constructs of OOPs and Java.

Course Contents:

1. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
2. Write a C++ program to declare Struct. Initialize and display contents of member variables.
3. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
4. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
5. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).
6. Write a C++ to illustrate the concepts of console I/O operations. 18
7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
8. Write a C++ program to allocate memory using new operator.
9. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
10. Write a C++ program to create an array of pointers. Invoke functions using array objects.
10. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

11. Write a Java Program to sort a list of names selection sort technique.
12. Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object.
13. Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object.
14. Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.
15. Write a Java Program to demonstrate use of sub class.
16. Write a Java Program to demonstrate use of nested class.
17. Write a Java program to practice – using String class and its methods. – using String Buffer class and its methods.
18. Write a Java Program to implement Vector class and its methods.
19. Write a Java Program to implement Wrapper classes and their methods.
20. Write a Java Program to implement inheritance and demonstrate use of method overriding.
21. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
22. Write a program to demonstrate -use of implementing interfaces. – use of extending interfaces.
23. Write a Java program to implement the concept of importing classes from user defined package and creating packages.
24. Write a program to implement the concept of threading. -by extending Thread Class -by implementing Runnable Interface.
25. Write a program to implement the concept of Exception Handling – using predefined exception – by creating user defined exceptions.
26. Write a program to execute select query using JDBC.

Mini Project (Application Development using C++ and Java)

1. Employee Record System
2. Hangman Game
3. Hospital Management System
4. Library Management System
5. Medical Store Management System
6. Modern Periodic Table
7. Pacman Game
8. Personal Diary Management System
9. Phonebook Application

10. Quiz Game
11. School Billing System
12. Snake Game

Database Management System Lab

Course Outcomes:

1. After completion of the course students will be able to:
2. Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS.
3. Develop a clear understanding of the conceptual frameworks and definitions of specific terms that are integral to the Relational Database Management
4. Attain a good practical understanding of the SQL.
5. Develop clear concepts about Relational Model.
6. Examine techniques pertaining to Database design practices
7. Prepare various database tables and joins them using SQL commands
8. Understand the basic concepts of Concurrency Control & database security
9. Understand the basic concept how storage techniques are used to backup data and maintain data access performance in peak hours
10. Evaluate options to make informed decisions that meet data storage, processing, and retrieval needs.

Lab Experiments:

11. Creation of a database and writing SQL queries to retrieve information from the database.
12. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
13. Creation of Views, Synonyms, Sequence, Indexes, Save point.
14. Creating an Employee database to set various constraints.
15. Creating relationship between the databases.
16. Study of PL/SQL block.
17. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
18. Write a PL/SQL block that handles all types of exceptions.
19. Creation of Procedures.
20. Creation of database triggers and functions

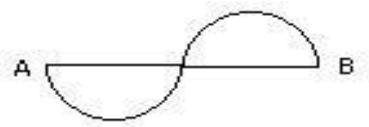
Mini project (Application Development using Oracle/ MySQL)

1. Inventory Control System.
2. Material Requirement Processing.
3. Hospital Management System.
4. Railway Reservation System.
5. Personal Information System.
6. Web Based User Identification System.
7. Timetable Management System.
8. Hotel Management System.

Computer Graphics Lab

Lab Experiments:

1. Write a program to implement DDAalgorithm.
2. Write a program to implement Bresenham's linealgorithm.
3. Modify the Bresenham's line algorithm so that it will produce a dashed-line pattern. Dash length should be independent ofslope.
4. Write a program to implement Midpoint circle generatingalgorithm.
5. Write a program to implement Bresenham's circle generatingalgorithm.
6. Write a program to draw the followingfigure:-



Point A and B is input.

7. Write a program to implement outlinecharacter.
8. Write a program to implement bitmapcharacter.
9. Write a program to implement ellipse generatingalgorithm.
10. Write a program for 2D line drawing as Raster GraphicsDisplay.
11. Write a program for circle drawing as Raster GraphicsDisplay.
12. Write a program for Polygon filling as Raster GraphicsDisplay.
13. Write a program to implement Line Clipping Algorithm using Cohen

SutherlandAlgorithm.

14. Write a program to implement Line Clipping Algorithm using Liang Barsky Algorithm.
15. Write a program to Implement Polygon Clipping Algorithm using Sutherland - HodgmanAlgorithm.
16. Modify the Liang-Barsky line clipping algorithm to polygonclipping.
17. Write a program to implement scaling onpolygon.
18. Write a program to implement transferring onpolygon.
19. Write a program to implement rotation onpolygon.
20. Write a program to implement reflection onpolygon.
21. Write a program for displaying 3D objects as 2D display using perspective transformation.
22. Write a program for rotation of a 3D objects about arbitraryaxis.
23. Write a program for Hidden surface removal from a 3Dobjects.
24. Write a program to draw a hut or other geometricalfigures.
25. Writeaprogram to rotate a Circle around any arbitrary point or around the boundary of anothercircle.
26. Write a menu driven program to rotate, scale and translate a line point, square, triangle about theorigin.
27. Write a program to implement polygonfilling.
28. Write a program to implement transformations in threedimensions.
29. Write a program to implement set of Basic Transformations on Polygon i.e. Translation, Rotation andScaling.
30. Write a program to implement set of Composite Transformations on Polygon I.e. Reflection, Shear (X &Y), rotation about an arbitrarypoint.
31. Find a transformation of triangle (coordinates will be given) by Rotating 45 Degree about the origin and then translating one unit in X and Y direction. Program to rotate circle around anothercircle.
32. Show that transformation matrix for a reflection about the line y=x, is Equivalent to a reflection relative to the x axis followed by a counter clockwise rotation of 90 degrees.
33. Program to perform varioustransformations.

Mini project (Application Development using C and C++)

1. To draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position

and properties of the light source along with the properties of the surfaces of the solid object used in the scene.

2. Create and rotate a triangle about the origin and a fixed point.
3. Draw a color cube and spin it using OpenGL transformation matrices.
4. Draw a color cube and allow the user to move the camera suitably to experiment with
5. Clip a lines using Cohen-Sutherland algorithm
6. Design, develop and implement recursively subdivide a tetrahedron to form 3D sierpinski gasket. The number of recursive steps is to be specified by the user.
7. Develop a menu driven program to animate a flag using Bezier Curve algorithm
8. Develop a menu driven program to fill the polygon using scan line algorithm
9. Write a program to draw a moving car.
10. Write a program to design a sky consisting of moving clouds using set of ellipses and circles.
11. Write a program to design a Solar Planet System using a set of circles.

Advance Data Structure and Algorithm Analysis Lab

Course outcomes:

After successful completion of the course, students will be able to:

1. Understand basic as well as advanced data structures for efficient data storage and retrieval
2. Illustrate how the choice of data structures and the algorithm design methods impact the performance of programs.
3. Perform analysis of different complex sorting and searching algorithms.
4. Identify among tractable and intractable problems.
5. Apply graph algorithms to find shortest path to traverse graph using BFS traversal technique.

Write Programs in C/C++ for

1. Creation of a binary search tree and insertion & deletion intoit.
2. Creation of a Red Black tree and all the associated operations onit.
3. Implementing an AVL tree and all the associated operations onit.
4. Multiplication of two matrices using Strassen's Matrix Multiplicationmethod.
5. Solving Knapsackproblem.
6. Implementing shortest path algorithms (Dijkastra's and Bellman FordAlgorithm).
7. Finding the minimum cost Spanning Tree in a connectedgraph.
8. Solving 8 Queen'sproblem.
9. Finding the number of connected components in aGraph.
10. Write a program to find the minimal spanning tree of a graph using the Prim's algorithm. The program should be able to read in the weight matrix of a graph and produce the corresponding matrix of the minimal spanning tree. Generate weight matrices with a large number of nodes and estimate the time complexity of the algorithm.
11. Use a greedy algorithm to generate approximate solutions of the 0/1 knapsack problem.
12. Write a program to add two polynomials using most suitable dynamic datastructure.
13. Write a program to sort list of 50 names using Radix/Bucketsort.
14. Write a program to traverse the graph using BFS traversaltechnique.
15. Write a program to find single source shortest path using Dijkastra'salgorithm.
16. Write a program to add two sparsematrices.
17. Write a program for a given directed graph G (v, e). Find and print all the nodes reachable from

a node say J.

18. Find all distinct solutions of the n-queens problem using a backtrackingalgorithm.
19. Write a program to find the closest pair of points using a divide and conquer strategy. Use the random number generator to generate a large number of points in a unit square as input to thealgorithm.
20. Write a program to find the minimal spanning tree of a graph using the Prim's algorithm.Theprogramshouldbeabletoreadintheweightmatrixofagraphand

    produce the corresponding matrix of the minimal spanning tree. Generate weight matrices with a large number of nodes and estimate the time complexity of the algorithm.

21. Use a greedy algorithm to generate approximate solutions of the 0/1 knapsack problem.
22. Write a program to add two polynomials using most suitable dynamic datastructure.
23. Write a program to sort list of 50 names using Radix/Bucketsort.
24. Write a program to traverse the graph using BFS traversaltechnique.
25. Write a program to find single source shortest path using Dijkastra'salgorithm.
26. Write a program to add two sparsematrices.
27. Write a program for a given directed graph G (v, e). Find and print all the nodes reachable from a node say J.
28. Find all distinct solutions of the n-queens problem using a backtrackingalgorithm.
29. Write a program to find the closest pair of points using a divide and conquer strategy. Use the random number generator to generate a large number of points in a unit square as input to thealgorithm.

Semester II

Theory of Computation

Course outcomes:

After successful completion of the course students will be able to:

1. Define finite automata, regular grammars, and regular expression representations of regular languages
2. Apply the pumping lemma for regular languages to determine if a language is regular
3. Convert between grammars and push-down automata for context-free languages.
4. Determine if a language is regular or context-free.
5. Demonstrate that a grammar is ambiguous.
6. Translate a context-free grammar from one form to another.
7. Produce simple programs for a Turing Machine.
8. Explain the concept of un-decidability and list examples of un-decidable problems.

Course Contents

UNIT 1

Automata: Basic machine, FSM, Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata. Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill- Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

UNIT 2

Context –Free Grammars: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT 3

Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

UNIT 4

Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM, Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators. Properties of recursive & recursively enumerable languages, Universal Turing machine

UNIT 5

Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

Books Recommended:

1. John E. Hopcroft, Jeffery Ullman,"Introduction to Automata theory, Langauges& computation" , Narosa Publishers.

2. K.L.P Mishra &N.Chandrasekaran,"Theory of Computer Science", PHI Learning

3. Michael Sipsev,"Theory of Computation",Cenage Learning

4. John C Martin, "Introdution to languages and theory of computation", McGraw Hill

5. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.

6.Kohavi,"Switching& Finite Automata Theory",TMH

Software Engineering

Course Outcomes:

After successful completion of the course, students will be able to:

1. Learn different software engineering approaches to resolve different software crises like failure in operation, non-meeting of requirements delayed delivery, over budget.
2. Compare different software process models to find the appropriate one.
3. Apply 4 GL techniques to develop software system.
4. Develop manage software project from project initiation to project closure.
5. Develop quality software systems with latest tools and techniques.

Course Contents

Unit –I

Software Development Approaches: Introduction; Evolving Role of Software; Software Characteristics; Software Applications.

Software Design Processes: Introduction; What is meant by Software Engineering? Definitions of Software Engineering;

Unit-II

Software Requirement Specification: Analysis Principles, Water Fall Model, The Incremental Model, Prototyping, Spiral Model, Role of management in software development, Role of matrices and Measurement, Problem Analysis, Requirement specification, Monitoring and Control.

Software-Design: Design principles, problem partitioning, abstraction, top down and bottom up-design, Structured approach, functional versus object oriented approach, design specifications and verification, Monitoring and control, Cohesiveness, coupling, Fourth generation techniques, Functional independence, Software Architecture, Transaction and Transform Mapping, Component – level Design, Fourth Generation Techniques.

Unit III:

Software Reliability: Introduction; Software reliability metrics; Programming for Reliability: Fault avoidance, Fault tolerance, Software Reuse.

Software Design Principles: Introduction, System Models: Data-flow models, Semantic data models, Object models, Inheritance models, Object aggregation, Service usage models, Data Dictionaries; Software Design: The design process, Design Methods, Design description, Design strategies, Design quality; Architectural Design.

Unit-IV

Software Project Management: The Management spectrum- (The people, the product, the process, the project), cost estimation, project scheduling, staffing, software configuration management, Structured Vs. Unstructured maintenance, qualityassurance, project monitoring, riskmanagement.

Unit-V

Software Reliability & Quality Assurance: Reliability issues, Reliability metrics, Reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM.

CASE (Computer Aided Software Engineering): CASE and its Scope, CASE support in software life cycle, documentation, project management, internal interface, Reverse Software Engineering, Architecture of CASEenvironment.

Books Recommended:

1. Pressman, Roger S., "Software Engineering: A Practitioner's Approach Ed. Boston: McGraw Hill,2001
2. Jalote, Pankaj, "Software Engineering Ed.2", New Delhi: Narosa2002
3. Schaum's Series, "Software Engineering",TMH
4. Ghezzi, Carlo and Others, "Fundamentals of Software Engineering",PHI
5. Alexis, Leon and Mathews Leon, "Fundamental of Software Engineering",Vikas
6. Sommerville, Ian, "Software Engineering", AWL,2000
7. Fairly, "Software Engineering", New Delhi:TMH
8. Pfleerger, S, "Software Engineering", Macmillan,1987

Web Technology

Course outcomes:

After successful completion of the course, students will be able to:

1. Explain the core concepts to develop a dynamic webpage by the use of java script and HTML.
2. Identify and Incorporate aesthetics and formal concepts of layout and organization to design websites that effectively communicate using visual elements.
3. Apply and Select markup languages for processing, identifying, and presenting of information in web pages.
4. Interpret the fundamental computer theory to basic programming techniques and use scripting languages and web services to transfer data and add interactive components to web pages..
5. Describe the Concept and plan an internet-based business that applies appropriate business models and web technologies and multiple web technologies to create advanced web components.
6. Create and design websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations and Incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek.

Course Contents

Unit I

Introduction: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of Web 2.0. Web Design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation.

Unit II

HTML : Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5

Style sheets : Need for CSS, introduction to CSS, basic syntax and structure, usingCSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3

UnitIII

JavaScript : Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and Java Script, Events and buttons. XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT.

Unit IV

PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP.

Unit V

PHP and MySQL : Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

Books Recommended

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley,India.
2. Web Technologies, Black Book, dreamtechPress
3. HTML 5, Black Book, dreamtechPress
4. Web Design, Joel Sklar, CengageLearning
5. Developing Web Applications in PHP and AJAX, Harwani,McGraw-Hill
6. Internet and World Wide Web How to program, P.J. Deitel & H.M.Deitel, Pearson

Computer Based Optimization Techniques

Course Outcome:

After successful completion of the course, students will be able to:

1. Build a mathematical programming model of a real-life situation
2. Understand the basic theory and methods for linear programming problems
3. Understand the basic properties of the interior point method and how to use it to solve convex optimization problems
4. Apply branch and bound and/or cutting plane algorithms to solve integer programming problems
5. Use a computer package to solve a mathematical programming problem that arises in practice

Course Contents

Unit - I

Linear Programming Problems (LPP): Definition, Construction of LPP, Solution of LPP: Graphical Method, Simplex Method, Two Phase Method, Big-M Method, Sensitivity Analysis, Duality in LPP, Dual SimplexMethod.

Unit - II

Transportation Models and its Variants: Definition, Solution of TP: Determination of basic feasible solution, Iterative computation of solution. Assignment Problems**:** Definition, Hungarian Method for AP.

Unit - III

Integer Linear Programming Problems: Introduction, illustrative applications, Solution of Integer Linear Programming Problem: Cutting Plane Method, Branch and Bound Method. 0-1 integer linear programming problem.

Introduction to NLP: Definition of NLP, Convex Programming Problems, Quadratic Programming Problems: Wolfe's Method for Quadratic Programming, Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-Points etc.

Unit - IV

Queuing Systems: Introduction to Queues, Basic Elements of Queuing Models, Queue Discipline, Memory less Distribution, Role of Exponential and Poisson Distributions, Markovian Process, Erlang Distribution, Symbols and

Notations, Distribution of Arrivals, Distribution of Service Times, Definition of Steady and Transient State. Poisson Queues (M/M/1, M/M/C).

Unit - V

Inventory Models: Inventory models –various costs deterministic inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory models, Economic lot sizes-price breaks.

Books Recommended:

1. Hadley, G.,"Linear Programming, and Massachusetts",Addison-Wesley
2. Taha, H.A, "Operations Research – An Introduction", Macmillan
3. Hiller, F.S., G.J. Lieberman, " Introduction to Operations Research",Holden-Day
4. Harvey M. Wagner, "Principles of Operations Research with Applications to ManagerialDecisions",
5. Prentice Hall of India Pvt.Ltd.
6. Swarup Ketal, "Operation Research", S.Chand
7. Billey E. Gillet, "Introduction to Operation Research- A Computer oriented AlgorithmApproach"
8. Sharma S D , "OperationResearch"

Microprocessor & Assembly Language Programming

Course outcomes:

After successful completion of the course, students will be able to:

1. Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's (8085) internal architecture and its operation within the area of manufacturing and performance.
2. Compare accepted standards and guidelines to select appropriate Microprocessor (8085) and to meet specified performance requirements.
3. Analyze assembly language programs; select appropriate assemble into the machine a cross-assembler utility of a microprocessor.
4. Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
5. Learn microprocessor's (8086) internal architecture and its operation within the area of manufacturing and performance. Evaluate assembly language programs and download the machine code that will provide solutions to real-world control problems.
6. Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.

Course Contents

Unit- I

Introduction: Introduction to Microprocessors and microcomputers, Study of 8 bit
Microprocessor, Bus concept and organization, concept of multiplexing and de- multiplexing, 8085 pin configuration and signals, Internal Architecture and operations, Types of Interrupt schemes.

Unit-II

Instruction Set: Programming model of 8085, Classification of instruction and instruction Format, addressing modes, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction, Different groups of Instruction set, (Data transfer, Arithmetic, logical, Branching, Stack, I/O and Machine control group and RST instructions)

Unit- III

Programming Technique: Assembly Language Programming and Debugging, Advance Assembly Language

Programming, Counter and Time delay; Macros, subroutine; Stack- implementation and uses with examples.

Unit-IV

Microprocessor interfacing: Type of RAM and ROM, Memory Mapping schemes, Memory interfacing, Programmable Peripheral Interface 8255, USART 8251, programmable interval timer 8253, Programmable interrupt controller 8259;

Unit-V

Bus Standards: Serial bus - RS232C and RS422A, Parallel interface- Centronics and
IEEE 488, Advanced Microprocessor: Introduction of 8086, Architecture, BIU and EU, Segmentation, Pipelining, Pin Diagram, Minimum and Maximum Mode, Addressing Modes

Books Recommended:

1. Ramesh. S. Gaonkar, " Microprocessor architecture Programming and Application with 8085" Pen International Publishing, 4thEdition
2. Douglas V Hall., Microprocessors Interfacing, TMH (2ndEdition).
3. S. Girdher and Gosh," 0000 to 8085"PHI.
4. B.Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.

E-Commerce and Digital Marketing

Course outcomes:

After successful completion of the course, students will be able to:

1. Describe the ever-changing digital environment in which e-commerce exists and its impact on operational needs, capabilities, opportunities and challenges.

2. Describe digital marketing methods organizations can use in combination with other marketing methods and integrate into their international sales and marketing plan.

3. Describe the elements to consider in the design of an efficient and effective e-commerce operation, including the ability to integrate with other systems within an organization, localize for each target market and accommodate growth.

4. Assess organizational readiness to set up and support an e-commerce operation serving national or international markets.

5. Describe an e-commerce operation using components and practices that provide a storefront, a shopping cart and payment options, minimize security and privacy risks, are user friendly, and provide timely customer support and delivery

Course Contents

Unit I

Introduction to Electronic Commerce: E-Commerce Framework- Anatomy of E-Commerce Applications, E-Commerce Consumer & Organization Applications, E- Commerce and World Wide Web, Internet Service Providers, Architectural Framework for Electronic Commerce, WWW as the Architecture, Hypertext publishing

Unit II

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, Government to Citizen, Features and Benefits, Portal Vs. Website.

Other Models :-Brokerage Model, Aggregator Model, Info-Mediary Model, Community Model and value chain Model, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, e-Banking, E-Retailing

Unit III

Electronic payment system: Type of payment systems- e-cash and currency servers, e- Cheques, credit card, smart card, electronic purses and debit cards, operational, credit and legal risks of e payments, risk management options for e-payment System, order fulfillment for e-commerce

Security issues in e-commerce: Security risk of e-commerce, type and sources of threats; protecting the electronic commerce assets and intellectual property; firewalls; client server network security; data and message security; digital identification and electronic signature; encryption approach to ecommerce security.

Unit IV

Introduction of the Digital Marketing: Creating initial Digital Marketing Plan; SWOT Analysis; Target Group Analysis; Content management; Optimization of Web Sites; MS Expression; SEO Optimization, Writing the SEO content, Tools used for Search engine Marketing, Budgeting. Report generation

Unit V

Web Design: Optimization of Web sites, Google Ad Words- creating accounts , Google Ad Words-types, Introduction of Social Media Marketing, Social Media Marketing;

E-mail marketing, E-mail marketing plan, E-mail marketing campaign analysis, Bing Advertising, Mobile Marketing (SMS Marketing), GEO Marketing, YouTube Video Marketing & Advertising

Introduction to CRM: CRM platform , CRM models, CRM platform, Marketing Automation, Sales Integration Products, Integration Business Reporting, Case Studies.

Books Recommended:

1. Ravi Kalakota, “Electronic Commerce: A Manager's Guide”, Addison-Wesley Professional, Edition 2012.
2. Ian Daniel, “E-Commerce get it Right”, Neuro Digital Publication, 2011
3. Digital marketing for Dummies ,RyanDeiss and russ Hennesberry,2017
4. Epic Content Marketing, Joe Pulizzi McGraw Hill Education
5. New Rules of Marketing and PR, David Meerman ScottLatest Edition: 6th EditionPublication: John Wiley & Sons

Software Engineering Lab

Course outcomes:

On successful completion of the course students will be able to:

1. Plan a software engineering process life cycle ,includingthe specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements.
2. Analyze and specify software requirements through a productive working relationship with various stakeholders of the project
3. Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
4. Know how to develop the code from the design and effectively apply relevant standards and perform testing,and quality management and practice
5. Able to use modern engineering tools necessary for software project management, time management and software reuse.

Course Content

1. Define a generalization hierarchy containing the Student entity type, the UndStudent entity type, and the GradStudent entity type. The Student entity type is the supertype and UndStudent and GradStudent are the subtypes. The Student entity type has attributes StdNo (primary key), StdName, StdGender, StdDOB (date of birth), StdEmail, and StdAdmitDate. The UndStudent entity type has attributes UndMajor, UndMinor, and UndClass. The GradStudent entity type has attributes GradAdvisor, GradThesisTitle, and GradAsstStatus (assistantship status.) The generalization hierarchy should be completeand disjoint.
2. Draw up to 3rd – Level DFDfor
   a) Library Management System" with complete role of everyconnection.
   b) Draw up to 3rd – Level DFD for "On-Line Customer Care Management System" with complete role of everyconnection.
3. Define SRS for any field/Item and write Ten (10) Test Cases five for valid input and five for Invalid input Define SRS for any field/Item and write Ten (10) Test Cases, five for valid input and five for Invalidinput.
4. Draw an ERD containing the Patient, Physician, and the Visit entity types connected by 1-M

relationships from Patient to Visit and Physician to Visit. Choose appropriate names for the relationships. Define minimum cardinalities so that patients and physicians are mandatory for a visit, but visits are optional for patients and physicians. For the Patient entity type, add attributes PatNo (primary key), PatFirstName, PatLastName, PatStreet, PatCity, PatState, PatZip, and PatHealthPlan. ForthePhysician entity type, add attributes PhyNo (primary key), PhyFirstName, PhyLastName, PhySpecialty, PhyPhone, PhyEmail, PhyHosipital, andPhyCertification. For the Visit entity type, add attributes for the VisitNo (primary key),VisitDate, VisitPayMethod (cash, check, or credit card), and Visit Charge. If you are using the ER Assistant of another drawing tool that supports data type specification, choose appropriate data types for the attributes based on your common knowledge.

5. Use of designer tools like for making DFD/ERDs using **process analysttool**

- Laboratory experiments in use of interactive SQL and other4GLs.
- Designing and implementing fully functional informationsystem.
- Develop software for implementation of information system for the supplychain
- Develop the software module for the testing of the softwareroutines.

Note: Students are advised to use **Oracle 91, JAVA2, and Visual Basic 6**. However depending upon the availability of software's, Mini project may also be planned & carried out throughout the semester to understand the important concepts of database and testing until the end of semester.

6. Introduce the lab environment and tools used in the software engineering lab: WebCT, Rational Rose for UML, MS Project, MS Source Safe (configuration management), Rational Requisite Pro (Software requirements and prerequisite pro), and Junit (Software Testing).

The key objectives are:

Discuss the Project & learn how to write project definition.

Learn the cycle phases (project management, requirement engineering, software design, prototyping and testing software life).

Practice the software phases using aproject.

Learn a number of CASE tools and use them in a project within a team work environment.

Get familiar with UML (modeling language for analysis and design).

7. Introduction to UML, Unified Modelling Language and use case diagrams using Rational Rose :

Develop System modeling (DFD and ER) using Rational Rose.

Design Flow of events and activity diagram using Rational Rose and how to write SRS document. OO analysis: discovering Classes Interaction diagrams: sequence and collaboration diagrams using Rational Rose.

Developing State Transition Diagram using Rational Rose

Developing Component and deployment diagrams for Final Documented Project Report using Rational Rose.

8. Software testing using Junit and other testingtools.

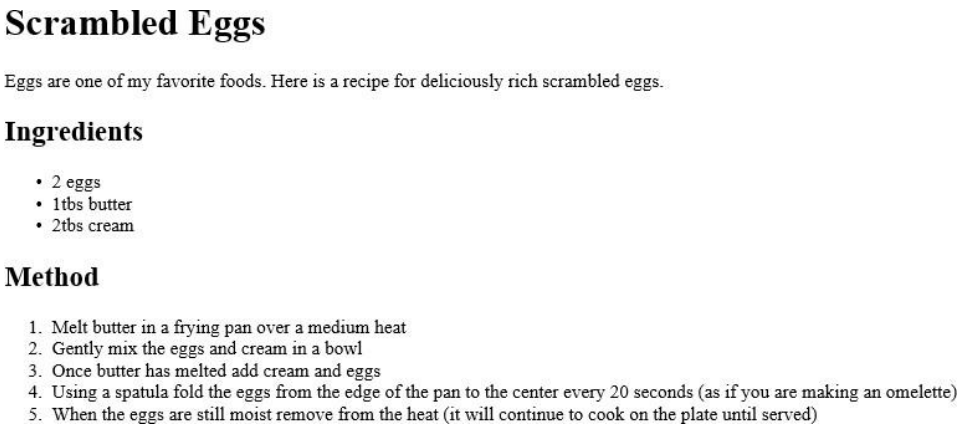
Web Technology Lab

Course outcomes:

1. On successful completion of the course students will be able to:
2. Explain the history of the internet and related internetconcepts that are vital in understanding web development.
3. Discuss the insights of internet programming and implement complete application over the web.
4. Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
5. Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.

Course Contents:

1. Write a program to make the following list using listtag



Scrambled Eggs

Eggs are one of my favorite foods. Here is a recipe for deliciously rich scrambled eggs.

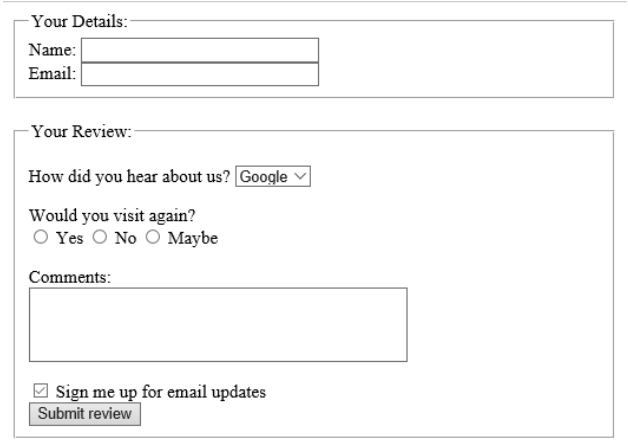
Ingredients

- 2 eggs
- 1tbs butter
- 2tbs cream

Method

1. Melt butter in a frying pan over a medium heat
2. Gently mix the eggs and cream in a bowl
3. Once butter has melted add cream and eggs
4. Using a spatula fold the eggs from the edge of the pan to the center every 20 seconds (as if you are making an omelette)
5. When the eggs are still moist remove from the heat (it will continue to cook on the plate until served)

2. Create the following form and validate it usingHTML-5



3. Write a program to make the followingstructure

	Home starter hosting	Premium business hosting
Disk space	250mb	1gb
Bandwidth	5gb per month	50gb per month
Email accounts	3	10
Server	Shared	VPS
Support	Email	Telephone and email
Setup	Free	Free
FTP accounts	1	5
	Sign up now and save 10%!	

4. Write a program to change the position of a div.
5. Write a program to showtooltip.

6. Output is shown below, write the code for it. (also use anchortag)

Film Folk

Festival Diary

Here are some of the film festivals we will be attending this year.
Please contact us if you would like more information.

January

Sundance Film Festival
Park City, Utah, USA
20 - 30 January 2011

February

Tropfest
Sydney, Australia
20 February 2011

7. Write a program to create thefollowing.

The Evolution of the Bicycle

In 1817 Baron von Drais invented a walking machine that would help him get around the royal gardens faster: two same-size in-line wheels, the front one steerable, mounted in a frame upon which you straddled. The device was propelled by pushing your feet against the ground, thus rolling yourself and the device forward in a sort of gliding walk.

"Life is like riding a bicycle. To keep your balance you must keep moving." - Albert Einstein

The machine became known as the Draisienne (or "hobby horse"). It was made entirely of wood. This enjoyed a short lived popularity as a fad, not being practical for transportation in any other place than a well maintained pathway such as in a park or garden.

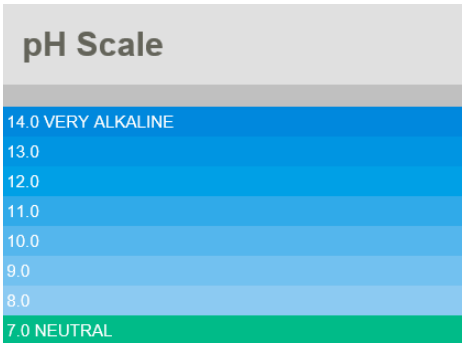
The next appearance of a two-wheeled riding machine was in 1865, when pedals were applied directly to the front wheel. This machine was known as the velocipede (meaning "fast foot") as well as the "bone shaker," since its wooden structure combined with the cobblestone roads of the day made for an extremely uncomfortable ride. They also became a fad and indoor riding academies, similar to roller rinks, could be found in large cities.

8. Write a program to show scrollingtext.

9. Write a program to create a blinkingheader.

10. Write a program to make an html file that look like thefollowing.

11. Write a program to create thefollowing.



12. Write a program to create an image gallery as shown in the imagebelow.

13. Write a program to automatically typewrite the message.

14. Write a program to convert the text into biggertext.

15. Write a program to select allcheck-boxes.

16. Write a program to change background color of abutton.

17. Write a program to change text color of abutton.
18. Write a program to insert background image to abutton.

19. Write a program to change background color of a textarea.

20. Write a program to change text color of a textarea.

21. Write a program to insert background image to a textarea.

22. Write a program to extract the domain name from the given emailId.

23. Write a program to create drop down navigation (select box)menu.

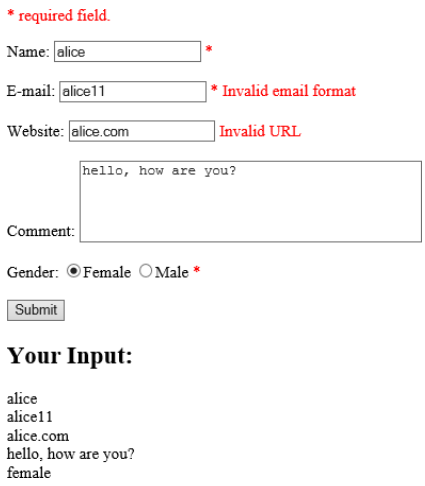
24. Write a program to create top drop downmenu.

25. Write a program to create always-on-topmenu.
26. Write a program to create inset bordersmenu.

27. Write a program to calculate the number of days between two dates. Dateshould be given by theuser.

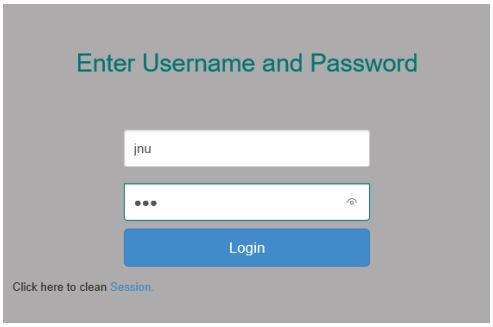
28. Write a program to read a file (use readfile ()) and write it to the outputbuffer.

29. Write a program to create the following form with propervalidations



30. Write a program to create a dynamic table. Number of rows and numberof columns should be given by theuser.

31. Write a program to clean the sessions of a loginform.

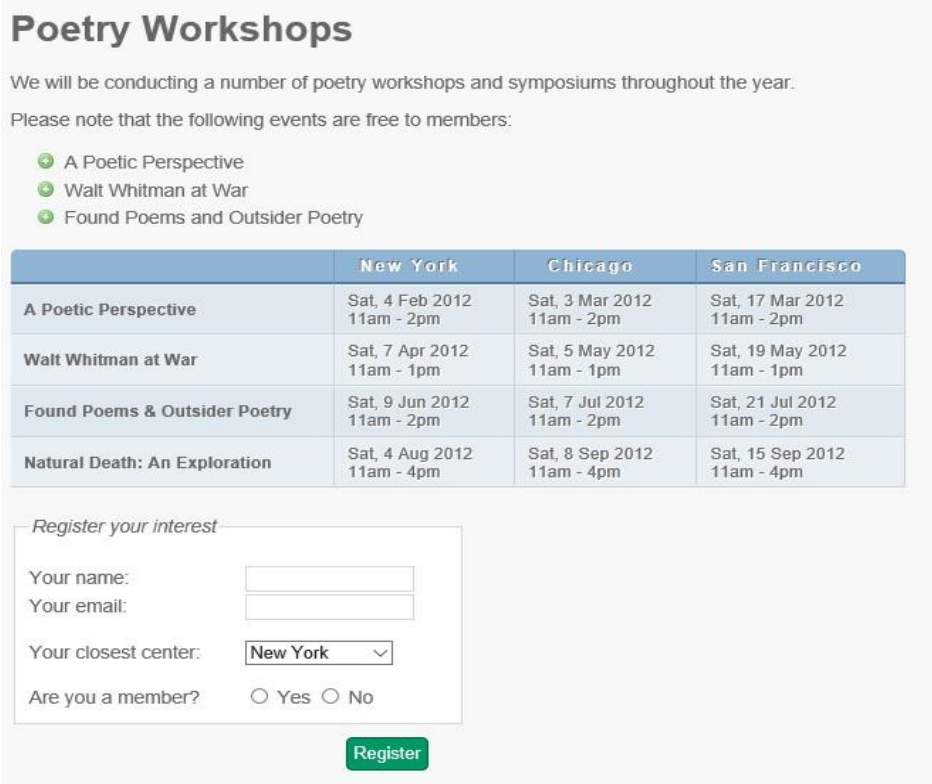


32. Create a registration form for a student and store the details in databaseusing PHP andMySql.

33. Write a program to update and delete the details from database(MySql).

34. Write a program to store and retrieve images fromdatabase.

35. Write a program to create a page for poetry workshop. The following imagecan help you to better understandit



Microprocessor Lab

Course Outcomes:

After successful completion of the course, students will be able to:

1. Explain programming based on 8086 microprocessor and 8051 microcontroller.
2. Design 8086 microprocessor based ALP using arithmetic, logical and shift operations.
3. Understand modular and Dos/Bios programming using 8086 micro processor.
4. Develop assembly level programs and providing the basics of the processors

Contents

1. Study of 8085Kit.
2. WRITEAPROGRAM to add two 16 bit numbers present in memory location & add store the result in another memorylocation.
3. Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverseorder.
4. Write a program to find the square of anumber.
5. Write a main program & a conversion subroutine to convert Binary to its equivalentBCD.
6. Write a program to multiply two 8 bit numbers whose result is 16bit.
7. Write a program of division of two 8 bitnumbers.
8. Write a program to find largest from a givenarray.
9. Write a program to find smallest number from a givenarray.
10. Write a program to Sort an array in ascendingorder.
11. Write a program to Sort an array in descendingorder.
12. To study and interface the PPI (8255) with8085.
13. To study and interface the PPI (8251) with8085.

Seminar

Each student will present a seminar on latest topics of Computer Science. (Note: Before finalizing seminar topic, students are required to consult the Seminar guide to see if the topic satisfies the requirements of the Seminar). Seminars Topic should be chosen from emerging technologies excluding the contents of Syllabus.

Each student will get a 20 + 5 minute timeslot: 20 minutes for seminar presentation and 5 minutes for questions from the audience.

No. of Copies: 2 Hard Copies +One Softcopy in CD (attached with report).

Details of limits pertaining to seminar Presentation

1. Presentation time limit (min): 20 min

2. Question &Answer (min): 5 min

3. Suggested no. of Slides: 15-20

Seminar Report Format (Page limit: 35-40)

It is mandatory to use plain A4 sized sheets. All material should be typed in double spacing, Times New Roman 12. The recommended margins are 25 mm (1inch) for top, bottom, right and left with an extra 13 mm (0.5 inch) for binding on the left. Other than page numbers, no material should intrude into these margins.

Submission

The report should be submitted within the given deadline to the designated person. Late submission may not be acceptable; if allowed, it will necessarily invite a penalty which may be reflected in your grade.

Guidelines for Summer Training after –II Semester

1. Students of MCA have to undergo Summer Training or for an in-house training for 4 to 6 weeks in an approved software Industry after completing II Semester.

2. During the Summer Training, the students will be asked by the Organization to work on a Summer Project.

3. After the completion of the training, each student will be required to submit a Project Report hard bound for evaluation. The Summer Training Project carries 200 marks, divided as follows:-

   Internal guide : 60 marks

   Presentation before external examiner : 140 marks

4. Project Report should contain annexure about the company, turnover, organizational structure, application domain, policies of the company, vision, mission etc. It should also have a mention about the standing of the company, past performance and future plans. Annexure may also contain photographs of personalities, building, infrastructure as well as other publicity materials of the organization which the student want to add as part of the project report. **The project report should consist of 50-60 pages.**

5. In case the Organization gives more than one project to a student, all such projects must be included in the Summer Training Report.

6. In case more than one student is undergoing Summer Training in the same Organization, efforts should be made to prepare separate project reports by choosing different market segments or different aspects, so that the projects can be differentiated for the purpose of evaluation. No combined project reports will be accepted.
   All students are expected to behave with proper decorum, courtesy and decency during the above training period, so that they create a good image about themselves and MERI. They must sincerely work during the training period as per the directions of the Organization. At no stage, there should be any complaint from the Organization about their work or behavior.

Semester III

Compiler Design

Course Outcomes:

After successful completion of the course, students will be able to:

1. Identify and convert any instruction of a program to convert from source language to target language and should be recognize what happens at each and every phase of a compiler.
2. Demonstrate understanding of the different types of parsing techniques and should be in a position to solve the problem.
3. Build the source code meaning and & organize it into Intermediate code .
4. Differentiate and analyze the program segment and be able to generate the intermediate code.
5. Determine the optimized code and techniques which helps in reducing the no. of instructions in a program and also the utilization of registers in an effective way.

Course Contents

Unit - I

Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler Programming Languages: High level languages, The lexical and syntactic structure of a language, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission. Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, and Finite state Machines, Implementation of Lexical Analyzer, and Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer.

Unit - II

The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG. Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent

Parsers, Predictive Parsers, Bottom–up Parsers, Shift- Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator:YACC

Unit - III

Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition.

Translation of Declaration, Assignment, and Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.

Unit - IV

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

Unit - V

Code Optimization and Code Generation: Local optimization, Loop optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.

Books Recommended:

1. Alfred V Aho , Jeffrey D. Ullman, “Principles of Compiler Design”, Narosa
2. A.V. Aho, R. Sethi and J.D Ullman, “Compiler: principle, Techniques and Tools”, AW
3. H.C. Holub “Compiler Design in C”, Prentice Hall Inc.
4. Apple, “Modern Computer Implementation in C: Basic Design”, Cambridgepress

*Elective – I

Advanced Database Concepts

Course outcomes:

After successful completion of the course, students will be able to:

1. Explain in detail DBMS architecture.
2. Illustrate in detail query processing and techniques involved in query optimization.
3. Illustrate the principles of concurrency control.
4. Examine the principles of recovery management.
5. Working successfully in a team by design and develop database application system as part of a team.

Course Contents

Unit I

ER Model - Normalization – Query Processing – Query Optimization – Transaction processing - Concurrency Control – Recovery - Database Tuning – Issues

Unit II

Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Distributed Database Features - Distributed Data Storage – Fragmentation – Distributed Query Processing – Distributed Transactions – Commit Protocols – Concurrency Control – Recovery.

Unit III

Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features inSQL/Oracle.

Unit IV

Rules – Knowledge Bases - Active and Deductive Databases – Image databases – Text/Document Databases - Multimedia Databases - Applications – XML Databases

Unit V

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases – Location and Handoff Management – Mobile Transaction Models.

Books Recommended:

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley,2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approachto Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System concepts", Fifth Edition, McGraw Hill,2006.
4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to DatabaseSystems", Eighth Edition, Pearson Education,2006.
5. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001. 6. Vijay Kumar, "Mobile Database Systems", John Wiley & Sons, 2006.

Internet of Things

Course outcomes:

After successful completion of the course, students will be able to:

1. Apply the concepts of IOT.
2. Identify the different technology.
3. Apply IOT to different applications.
4. Analysis and evaluate protocols used in IOT.
5. Design and develop smart city in IOT.
6. Analysis and evaluate the data received through sensors in IOT.

Course Contents

Unit I

Introduction to IoT: Definition and characteristics of IoT, Design of IOT: Physical & Logical Design ,Functional Blocks, communication models, communication APIs, IOT-enabling Technologies- Wireless Sensor Networks, Ecloudmbedded systems. IOT Levels and deployment templates.

Unit II

IoT Hardware and Software: Sensor and actuator, Humidity sensors, Ultrasonic sensor, Temperature Sensor, Arduino, Raspberry Pi, LiteOS, RIoTOS, Contiki OS, Tiny OS.

Unit III

Architecture and Reference Model: Introduction, Reference Model and architecture, Representational State Transfer (REST) architectural style, Uniform Resource Identifiers (URIs).

Unit IV

Challenges in IoT- Design challenges, Development challenges, Security challenges, Other challenges. Identification and Authentication of Technologies, Connectivity, Handling Unstructured Data, Data Security and Privacy.

Unit V

IoT Applications: Domain specific IOTs- Home automation, Cities, environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

Books Recommended:

1. Internet of Things- A Hands-On- Approach by Arshdeep Bahga –Vijay Medisetti
2. The Internet of Things by Samuel Greengard
3. The Fourth Industrial Revolution by Klaus Schwab
4. Getting started with Internet of Thing by Cuno Pfister
5. Learning Internet of Things" by Peter Waher
6. Precision: Principles, Practices and Solutions for the Internet of Things by Timothy Chou.
7. Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Your Industry by Maciej Kranz

Android Programming

Course outcomes:

After successful completion of the course, students will be able to:

1. Describe Android platform, Architecture and features.
2. Design User Interface and develop activity for Android App.
3. Use Intent, Broadcast receivers and Internet services in Android App.
4. Design and implement Database Application and Content providers.
5. Use multimedia, camera and Location based services in Android App.
6. Discuss various security issues in Android platform

Course Contents

Unit I

Introduction to Android Platform, Android Stack, Android Versions and Installing, Android SDK and updating SDK components, Eclipse, IDEs and ADT plug, in, Using the Emulator, Android vs. Other mobile platforms.

Unit II

Application Life Cycle ,Application Components ,Activity life cycle, Manifest File, Layout XML Code, Strings , the R File, Java Source Code, Java based layout vs. xml based layout, Eclipse Visual Layout Editor, Logging ,UI Design for Android ,Using different layouts – Linear Layout and Table Layout etc., Drawable Resources ,Resolution and density independence, Working with common widgets ,Working with List View and Adapters, Creating and using option menu, Working with preferences ,Working with Dialogs and Toasts, Working with Graphics and Animation

Unit III

Introducing Intents: Intents, Intent filters, Invoking activities by class name and URI, Sharing data using Extras Bundle and URI parameters, working with Tabs and Fragments. Files and Database: Using File System ,Introducing SQLite on Android, Database Connectivity, Cursors and content values, Using Content Provider to share data , Understanding Security model.

Unit IV

Working in background :Introducing Service and its life cycle, Creating and starting a service, Types of services ,Working multithreading and AsyncTask, Broadcast receivers , Triggering receivers with intents ,Responding to system events using Broadcast receivers, Using Alarm.

Unit V

Using System Services and Web Services: Using Location based Services, Telephony and SMS services, Bluetooth, Network and WiFi, Multimedia and Camera, Accessing Internet and Web Services from Android App.

Books Recommended:

1. Rito Meier. "Professional Android 2 Application Development." Wiley Publishing,Inc.
2. Sayed Hashimi, Satya Komatineni, Dave MacLean. "Pro Android 2."APRESS.
3. Mark Murphy. "Beginning Android 2."APRESS.

.NET Framework and ASP.NET

Course outcomes:

After successful completion of the course, students will be able to:

1. Understand the Microsoft .NET Framework and ASP.NET page structure.
2. Design web application with variety of controls.
3. Access the data using inbuilt data access tools.
4. Use Microsoft ADO.NET to access data in web Application.
5. Configure and deploy Web Application.
6. Develop secured web application.

Course Contents

Unit I

Introduction to .NET Framework: NET framework, MSIL, CLR, CLS, CTS, Namespaces, Assemblies the Common Language Implementation, Assemblies, Garbage Collection, The End to DLL Hell, Managed Execution.
C# , The Basics and Console Applications in C#: Name Spaces , Event & Delegate, Get & Post Method ,Constructor and Destructors, Function Overloading & Inheritance, Operator Overloading, Modifiers , Property and Indexers , Attributes & Reflection API, When to use Console Applications , Generating Console Output, Processing Console Input.

Unit II

C#.NET: Language Features and Creating .NET Projects, Namespaces Classes and Inheritance, Namespaces Classes and Inheritance , C, Exploring the Base Class Library, Debugging and Error Handling, Data Types, Exploring Assemblies and Namespaces, String Manipulation ,Files and I/O ,Collections. Visual Inheritance in C#.NET: Apply Inheritance techniques to Forms, Creating Base Forms, Programming Derived Forms. Mastering Windows Forms: Printing Handling Multiple Events, GDI+, Creating Windows Forms Controls.

Unit III

ADO.NET: Benefits of ADO.NET, ADO.NET compared to classic ADO, Datasets, Managed Providers , Data Binding: Introducing Data Source Controls , Reading and Write Data Using the SqlDataSource Control .Windows Forms and

Controls in details: The Windows Forms Model, Creating Windows Forms Windows Forms Properties and Events, Windows Form Controls, Menus , Dialogs – ToolTips

ASP.NET: Introduction to ASP.NET, Working with Web and HTML Controls, Using Rich Server Controls, Login controls, Overview of ASP.NETValidation Controls, Using the Simple Validations, Using the Complex Validators Accessing Data using ADO.NET, Using the Complex Validators Accessing Data using ADO.NET, Configuration Overview.

Unit IV

Themes and Master Pages: Creating a Consistent Web Site, ASP.NET 2.0 Themes Master Pages, Displaying Data with the Grid View Control Introducing the Grid View Control, Filter Data in the Grid View Control, Allow Users to Select from a Dropdown List in the Grid, Add a Hyperlink to the Grid, Deleting a Row and Handling Errors.

Unit V

Advanced in .NET: MVC3: Introduction to MVC3, The Model, View, Controller

Pattern, Differences between MVC and Web Forms Applications. Building a Simple MVC Application with Visual Studio, Working with Controllers and Actions, Creating MVC Models, Data and Business Rules in MVC. Applications, Creating a Custom Data Model, Using MVC Views, Views in ASP.NET MVC.Introduction to Windows Presentation Foundation (WPF), Window Communication Foundation and its Application.

Books Recommended:

1. Jeffrey Richter, “Applied Microsoft .Net Framework Programming”,(Microsoft)
2. Fergal Grimes, “Microsoft .Net for Programmers”,(SPD)
3. Tony Baer, Jan D. Narkiewicz, Kent Tegels, Chandu Thota, Neil Whitlow,“Understanding the .Net Framework”,(SPD)
4. Shibi Panikkar and Kumar Sanjeev, “C# with .NET Frame Work”, FirewallMedia.
5. Matthew MacDonald, “The Complete Reference – ASP.NET”, Tata McGrawHill.

Introduction to Artificial Intelligence and Machine Learning

Course outcomes:

After successful completion of the course, students will be able to:

1. Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
2. Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
3. Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
4. Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
5. Formulate and solve problems with uncertain information using Bayesian approaches.
6. Apply concept Natural Language processing to problems leading to understanding of cognitive computing

Course Contents

Unit I

Scope of AI: Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

Problem solving: State space search; Production systems, search space control: depth- first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound.

Unit II

Knowledge Representation: Predicate dependency directed backtracking rule resolution, backward reasoning: use Representation: Semantic Nets: slots, dependency, scripts.

Logic: Unification, modus pones, resolution, based Systems: Forward reasoning: conflict of no backtrack. Structured Knowledge exceptions and default frames, conceptual

Unit III

Handling uncertainty: Non-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic, Probability and Bayes learning.

Unit-IV

Learning: Concept of learning, types of learning, hypothesis space and inductive bias, evaluation, cross-validation. Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning

Neural network: Perception, multilayer network, back propagation, introduction to deep neural network. PAC learning model, Clustering: k-means, adaptive hierarchical clustering, Gaussian mixture model

Unit-V

Regression: Decision trees, over fitting. Instance based learning, Feature reduction, Collaborative filtering based recommendation. Logistic Regression, Support Vector Machine

Books Recommended:

1. Artificial Intelligence: A Modern Approach (Prentice Hall Series in Artificial Intelligence) by Stuart Russell, Peter Norvig
2. Machine Learning using Python by U Dinesh Kumar Manaranjan Pradhan, Wiley, 2019
3. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed.,1992.
4. N.J. Nilsson, "Principles of AI", Narosa Publ. House,1990.
5. D.W. Patterson, "Introduction to AI and Expert Systems", PHI,1992.
6. Peter Jackson, "Introduction to Expert Systems", AWP, M.A.,1992.
7. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int Ed., Singapore,1992.
8. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa PublishingHouse, 1994

Elective II

Big Data Analytics

Course outcomes:

After successful completion of the course, students will be able to:

1. Identify the characteristics of datasets and compare the trivial data and big data for various applications.
2. Select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
3. Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.
4. Understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
5. Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.
6. Integrate machine learning libraries and mathematical and statistical tools with modern technologies like hadoop and mapreduce.

Course Contents

Unit I

Introduction to Big Data: - Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs reporting.

Unit II

Mining Data Streams: - Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies -

Real Time Sentiment Analysis- Stock Market Predictions.

Unit III

Hadoop: - History of Hadoop- the Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works- Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce FeaturesHadoop environment.

Unit IV

Frameworks: - Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphereBigInsights and Streams.

Unit V

Predictive Analytics: Simple linear regression- Multiple linear regression- Interpretation 5 of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.

Recommended Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer,2007.
2. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media,2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing,2012.
4. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP,2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley& sons,2012.
6. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons,2007.
7. Pete Warden, "Big Data Glossary", O'Reilly,2011.
8. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", 2 ndEdition, Elsevier, Reprinted2008.
9. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, "Intelligent Data Mining",

Springer,2007.

10. Paul Zikopoulos, DirkdeRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles , David Corrigan, "Harness the Power of Big Data The IBM Big Data Platform", Tata McGraw Hill Publications,2012.

11. Arshdeep Bahga, Vijay Madisetti, "Big Data Science & Analytics: A HandsOn Approach ",VPT,2016

12. Bart Baesens "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley &Sons,2014

Mobile Computing

Course Outcomes:

After successful completion of the course, students will be able to:

1. Understand about mobile communication with their different routing algorithms.
2. Understand different data backup schemes used in mobile network to store the data.
3. Explain about location management that is much important for mobile network.
4. Build the knowledge of how transactions are done through mobile, different security issues while mobile transaction.
5. Appraise different routing protocols used for routing the path like ADDV, DSR, FSR etc.

Course Contents

Unit I

Issues in Mobile Computing, Wireless Telephony, Digital Cellular Standards, Bluetooth Technology, Wireless Multiple Access Protocols, Channel Allocation in Cellular Systems. Wireless Application Protocol, WRITE A PROGRAM technology, Mobile Information device, Mobile Computing Applications.

Unit II

Data Management Issues: Mobility, Wireless Communication and Portability, Data Replication and Replication Schemes, Basic Concept of Multihopping, Adaptive Clustering for Mobile Network, Multicluster Architecture.

Unit III

Location Management, Location Based Services, Automatically Locating Mobile Uses, Locating and Organizing Services, Issues and Future Directions, Mobile IP, Comparison of TCP andWireless.

Unit IV

Transaction Management, Data Dissemination, Cache Consistency, Mobile Transaction Processing, Mobile Database Research Directions, Security Fault Tolerance for Mobile N/W.

Unit V

What is Ad-hoc Network? , Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Routing scheme based on signal strength, Link state and Distance Vector routing protocols, Ad-hoc on Demand Distance Vector (AODV).

Books Recommended:

1. Shambhu Upadhyaya, Abhijeet Chaudhary, Kevin Kwiat, Mark Weises, "Mobile Computing", Kluwer AcademicPublishers.
2. UWE Hansmann, Lothar Merk, Martin-S-Nickious, Thomas Stohe, "Principles ofMobile Computing", Springer InternationalEdition.
3. Wireless and Mobile Networks Architectures, by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons,2001.
4. Mobile and Personal Communication systems and services, by Raj Pandya, PrenticeHall of India,2001.
5. Wireless Web Development, Ray Rischpater, Springer Publishing,2000.
6. The Wireless Application Protocol, by Sandeep Singhal, Pearson Education Asia,2000.

Cloud Computing

Course Outcomes:

After successful completion of the course, students will be able to:

1. Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the

possible applications for state-of-the-art cloud computing

2. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public

cloud, private cloud, hybrid cloud, etc.

3. Explain the core issues of cloud computing such as security, privacy, and interoperability.
4. Choose the appropriate technologies, algorithms, and approaches for the related issues.
5. Identify problems, and explain, analyze, and evaluate various cloud computing solutions.
6. Provide the appropriate cloud computing solutions and recommendations according to the applications used.

Course Contents

Unit I

Distributed Systems Models and Enabling Technologies: Scalable Computing – Technologies for Network, Based Systems – System Models for Distributed and Cloud Computing – Software Environments for Distributed and Clouds – Performance, Security and Energy Efficiency, service level agreements.

Unit II

Virtualization concepts: Implementation Levels of Virtualization – Virtualization Structures, Tools and Mechanisms – Virtualization of CPU, Memory and I/O Devices – Virtual Clusters and Resource Management – Virtualization for Data, Center Automation, and Introduction to Various Virtualization OS, Vmware, KVM, andXen.

Unit III

Service, Oriented Architecture for Distributed Computing: Services and SOA – Message Oriented Middleware – Portals and Science Gateways – Discovery, Registries, Metadata, and Workflow in SOA.

Unit IV

Cloud Computing and Service Models – Data, center Design and Interconnection Networks – Architectural Design of Compute and Storage Clouds – Public cloud Platforms – Inter, cloud Resource Management – Cloud Security and Trust Management.

Unit V

Cloud Programming and Software Environments – Features of Cloud and Grid Platforms – Parallel and Distributed Paradigms – Programming Support of Google App Engine – Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Books Recommended:

1. Kai Hwang, Geoffrey C.Fox, and Jack J. Dongarra,"Distributed andCloud Computing", Elsevier India Private Limited,2012
2. Barrie Sosinsky, "Cloud Computing Bible", Wiley Publishing Inc, ISBN: 978-1-118-02399-0
3. Foster and Kesselman, "The Grid: Blueprint for a NewComputing Infrastructure", Morgan Kauffman publishersInc.2004
4. Coulouris, Dollimore and Kindber, "Distributed System: Concept andDesign", Fifth Edition, Addison Wesley,2011
5. Michael Miller, "Cloud Computing", Dorling Kindersley India, 2009
6. AnthonyT.Velte,TobyJ.VelteandRobertElsenpeter,"Cloudcomputing:A practical Approach", McGraw Hill,2010.

Human Computer Interaction

Course Outcomes:

After successful completion of the course, students will be able to:

1. Knowledge and understanding:
2. Explain why it is important to design interactive products that are usable
3. Define key terms used in interaction design
4. Explain key theories used in the design of interactive products
5. Explain the importance of iteration, evaluation and prototyping in interaction design
6. Gather data in the context of developing a simple interactive product using suitable
7. techniques
8. Produce a low-fidelity prototype for an interactive product based upon a simple list of interaction design principles.
9. Evaluate an interactive product using suitable techniques.

Course Contents:

Unit-I

Historical evolution of the field, Interactive system design, Concept of usability -definition and elaboration, HCI and Software Engineering, GUI design and Aesthetics, Prototyping techniques.

Unit-II

Model-based Design and evaluation: Basic idea, introduction to different types of models, GOMS family of models (KLM and CMN- GOMS), Fitts' law and Hick-Hyman's law, Model-based design case studies,

Unit-III

Guidelines in HCI: Shneiderman's eight, golden rules, Norman's seven principles, Norman's model of interaction, Nielsen's ten heuristics with example of its use Heuristic evaluation, Contextual inquiry, Cognitive walkthrough

Unit-IV

Empirical research methods in HCI: Introduction (motivation, issues, research question formulation techniques), Experiment design and data analysis (with explanation of one-way ANOVA) Task modelling and analysis: Hierarchical task analysis (HTA), Engineering task models and Concur Task Tree (CTT) ,Introduction to formalism in dialog design, design using FSM (finite state machines) State charts and (classical) Petri Nets in dialog design.

Unit-V

Introduction to CA, CA types, relevance of CA in IS design Model Human Processor (MHP), OOP- Introduction OOM- Object Oriented Modeling of User Interface Design.

Books Recommended:

1. Human-Computer Interaction, Third Edition by Alan Dix et al, Prentice Hall ,2004
2. Interaction design:Beyond Human-Computer Interaction, 4/e J. Preece, Y. Rogers and H. Sharp John Wiley & Sons, 2015
3. Usability Engineering: Scenario-Based Development of Human-Computer Interaction by Rosson, M. and Carroll, J.
4. Intelligent UserInterfaces: Adaptation and Personalization Systems and Technologies Systems by C. Mourlas,P.Germanakos, IGI Global, 2008
5. Understanding Mobile Human-computer Interaction bu S. Love Amsterdam, Butterworth,Heinemann, 2005

Human Values & Professional Ethics

Course Outcomes:

After successful completion of the course, students will be able to:

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the role of a human being in ensuring harmony in society and nature.
4. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Unit I

Human Values: Morals, Values, and Ethics, Integrity, Trustworthiness, Work Ethics, Service-Learning, Living Peacefully, Honesty, Courage, Caring, Sharing, Value Time, Co-operation, Commitment, Civic Virtue, Respect for others, Self-confidence, Empathy, Spirituality, Character.

Unit II

Principles for Harmony: Truthfulness, Customs and Traditions, Human Dignity, Value Education, Human Rights, Fundamental Duties, Aspirations, and Harmony (I, We & Nature), Emotional Intelligence, Gender Bias, Mayer Model, Emotional Competencies, Conscientiousness

Unit III

Engineering Ethics and Social Experimentation: History of Ethics, Need of Engineering Ethics, Senses of Engineering Ethics, Profession, and Professionalism, Self Interest, Moral Autonomy, Utilitarianism, Uses of Ethical Theories, Virtue Theory, Types of Inquiry, Deontology, Kohlberg's Theory, Heinz's Dilemma, Gilligan's Argument, Learning from the Past, Comparison with Standard Experiments, Consultants and Leaders, Engineers as Managers, Role of Codes, Balanced Outlook on Law, Codes and Experimental Nature of Engineering.

Unit IV

Engineers' Responsibilities towards Safety and Risk : The concept of Safety, Safety and Risk, Types of Risks, Voluntary v/s Involuntary Risk, Consequences, Risk Assessment, Liability, Accountability, Reversible Effects, Delayed v/s Immediate Risk, Threshold Levels of Risk

Engineers' Duties and Rights: Professional Duties, Collegiality, Techniques for Achieving Collegiality, Senses of Loyalty, Consensus and Controversy, Confidential and Proprietary Information, Professional and Individual Rights, Conflict of Interest, Ethical egoism, Collective Bargaining, Confidentiality, Gifts and Bribes, Occupational Crimes, Problem-solving, Industrial Espionage, Price Fixing, Whistle Blowing

Unit V

Global Issues: Globalization and MNCs, Business Ethics, Cross Culture Issues, Media Ethics, Endangering Lives, Environmental Ethics, Bio-Ethics, Computer Ethics, War Ethics, Research Ethics, Intellectual Property Rights

Books Recommended:

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.
2. Engineering Ethics by Harris, Pritchard, and Rabins, Cengage Learning, New Delhi.
3. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications
4. Ethics in Engineering by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
5. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana – Maruthi Publications.
6. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman, and M. Jayakumaran – University Science Press.
8. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan, and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.
9. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill – 2013

Advanced Database Concepts Lab

Course Outcomes:

After successful completion of the course, students will be able to:

1. Explain and evaluate the fundamental theories and requirements that influence the design of modern database systems
2. Assess and apply database functions and packages suitable for enterprise database development and database management
3. Critically evaluate alternative designs and architectures for databases and data warehouses
4. Discuss and evaluate methods of storing, managing and interrogating complex data
5. Explain and critically evaluate database solutions for data exchange
6. Analyse the background processes involved in queries and transactions, and explain how these impact on database operations.

Lab Experiments:

1. A Private Nursing Home has hired you as a database expert to maintain information about Patients, Doctors, Treatments and other related details i.e. Medicine prescribed, lab tests recommended and Doctor's Remark given to the patient by the doctor. Justify your role as a responsible database designer by developing suitable ER Diagram and Data Flow Diagram. Also mention all possible assumptions which are helpful in producing correct database design. Draw a suitable layout for designing theDatabase.
2. A Librarian has hired a database designer to maintain information about its members of library, books, library rules and other related details i.e. about issue of books, returns of books etc. You have to draw a suitable ER Diagram and Data Flow Diagram and also suggest a suitable database design to maintain above mentioned data keeping in mind redundancy and consistency ofdata.
3. A Book Publishing House has to maintain data regarding Books Published, Author's of the Books, Detail of Customers asking for books and detail of order placed by customer. Draw a suitable E R

Diagram and Data Flow Diagram and also suggest a suitable database design to maintain all the above mentioned data. Make all suitable assumption for running the businessprocess.

4. Examination department of the university wants to computerized the examination process and by maintaining data about students, course, date sheet of exams, Final Grade obtained by student's semester wise. Draw a suitable E R Diagram and Data Flow Diagram to explain the examination process. Also draw a suitable layout for designing the database which is capable of maintaining above mentioneddata.

5. Implement the following based on above mention businessprocess:

   a) Apply all possible integrity constraints into the database to maintain the integrityand consistency ofdata.

   b) Perform various types of SQL queries to retrieve data from multiple tables (Two or Three)

   c) Suggest and create some suitable views based on the database from one ormore Tables.

   d) Use various oracle function including group functions through multipletable.

   e) Perform some select command on view created from one or moreTables

6 Write a trigger for overdraftfacility.

7 Write a cursor for calculating income tax for the given employee table.Emp (eid,ename, salary, incometax).

8 Create a table called Area which contains two attributes radius and area. Write a program which will calculate the area of circle for different radius. Take value of radius from user, calculate it and then insert those values in the Area tablethrough theprogram.

9. Create user defined Exceptions. Write a program in which the ACCT table recordsthe current balance for an account, which is updated whenever, any deposits or withdrawals takes place. If the withdrawal attempted is more than the current balance held in the account, a user defined exception is raised displaying an appropriate error message otherwise perform the appropriate task.

10. Write a PL/SQL program to display the number in reverseorder.

11. Write a PL/SQL program to find the factorial of a givennumber.

12. Write a PL/SQL program to generate Fibonacciseries.

13. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7.Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius & area table name: areas radius area.

14. WriteaPL/SQL cursor blockthatwillacceptanaccountnumber fromtheuser,checkif the users

balance is less than minimum balance, only then deduct rs.100/-from the balance. This process is fired on the accttable.

15. Write a Pl/SQL trigger that maintains following details such as user name, , no of records deleted inserted or updated and old value and new value in the log table , whenever any user performs update /delete or insert actions oncustomer.

16. Write a PL/SQL exception which is raised whenever a user tries to do anyinsertion /updating/deletion on weekends.

17. Write a cursor for calculating income tax for the given employeetable. Imp (aid, enamel, salary,incometax)

18 Using Object Oriented databases create the following types:

a) AddrType1 (Pin code: number, Street :char, City : char,a. state :char) b) (ii)Branch Type (address: AddrType1, phone1: integer,phone2: integer)c)

Author Type (name: char, addr AddrType1) d) Publisher Type (name: char, addr: AddrType1, branches: BranchTableType e) AuthorListType as varray, which is a reference to Author Type

Next create the following tables:

f) BranchTableType of BranchType g) authors of AuthorType h) books(title: varchar,year : date, published by ref PublisherType,authorsAuthorListType) i) Publishers of Publisher Type

Insert 10 records into the above tables and fire the following queries:

19. a) List all of the authors that have the same pin code as their publisher: b) List all books that have 2 or more authors: c) List the name of the publisher that has the most branches d) Name of authors who have not published a book e) List all authors who have published more than one book: f) Name of authors who have published books with at least two different publishers g) List all books (title) where the same author appears more than once on the list of authors (assuming that an integrity constraint requiring that the name of an author is unique in a list of authors has not beenspecified).

20. Topic: Temporal Databases 4.[A] Create a table tblEmp_Appnt, which stores the accountnumber,name,andvalidtimesay,recruitmentdateandretirementdate.Insert 10 records and fire the followingqueries

21 a)Findalltheemployeeswhojointhecompanyon2/3/2001b)Findall theemployees who will retired on2/3/2001

b) Create a table tbl_shares, which stores the, name of company, number of shares, and price per share at transaction time. Insert 10 records and fire the following queries

c) Find all the names of a company whose share price is more than Rs. 100 at 11:45 A.M.

d) Find the name of company which has highest share price at 5.00P.M.

22. Create a table tblEmp_Appnt, which stores the account number, name, and valid time say,recruitmentdateandretirementdate.Createatriggerforvalidtimetocheckthatno

two records of same employee have common employment period and does not allow the user to update the records. Trigger should also fill up the empty retirement date.

23. Topic: Active Databases 5. Create a table emp (eno, ename, hrs, pno, super_no) and project (pname, pno, thrs, head_no) where thrs is the total hours and is the derived attribute. Its value is the sum of hrs of all employees working on that project. Eno and pno are primary keys, head_no is foreign key to emp relation. Insert 10tuples

and write triggers to do the following:

a) Creating a trigger to insert a new employee tupple and display the new total hours f from project table. B) Creating a trigger to change the hrs of existing employee and display the new total hours from project table. C) Creating a trigger to change the project of an employee and display the new total hours from project table. D) Creating a trigger to deleting the project of an employee.

Internet of Things Lab

Course outcomes:

After successful completion of the course, students will be able to:

1. Apply the concepts of IOT.
2. Identify the different technology.
3. Apply IOT to different applications.
4. Analysis and evaluate protocols used in IOT.
5. Design and develop smart city in IOT.
6. Analysis and evaluate the data received through sensors in IOT.
7. Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.

Lab Experiments:

1. Start Raspberry Pi and try various Linix commands in command terminal window:

   ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo,

   cron, chown, chgrp, ping etc.

2. Run python programs on Pi like:
   a) Read your name and print Hello message with name
   b) Read two numbers and print their sum, difference, product and division.
   c) Word and character count of a given string.
   d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.
   e) Run some python programs on Pi like:
   f) Print a name 'n' times, where name and n are read from standard input, using for and while loops.
   g) Handle Divided by Zero Exception.
   h) Print current time for 10 times with an interval of 10 seconds.
   i) Read a file line by line and print the word count of each line.

3. Light an LED through Python program
4. Get input from two switches and switch on corresponding LEDs
5. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
6. Flash an LED based on cron output (acts as an alarm)
7. Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.
8. Get the status of a bulb at a remote place (on the LAN) through web.
9. To interface motor using relay with Arduino/ Raspberry Pi and write a program to turn on motor when push button is pressed.
10. To interface Bluetooth with Arduino/ Raspberry Pi and write a program to send sensor data to smart phone using Bluetooth.
11. To interface Bluetooth with Arduino/ Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
12. Write a program on Arduino/ Raspberry Pi to upload temperature and humidity data to thingspeck cloud.

Android Programming Lab

Course outcomes:

After successful completion of the course, students will be:

1. Expose to technology and business trends impacting mobile applications.
2. Competent with the characterization and architecture of mobile applications.
3. Competent with understanding enterprise scale requirements of mobile applications.
4. Competent with designing and developing mobile applications using one application development framework.

Lab Experiments:

1. Create an application that will store employee information like Employee ID, Name, Address and Designation. User can insert, update, delete and employee searchrecord.
2. Create an application that will change wall paper time bytime.
3. Create an application that will work like a calculator. It should be able to performall arithmetic operation.
4. Create“HelloWorld”application.Thatwilldisplay“HelloWorld”inthemiddleofthe screen in the red color with whitebackground.
5. To understand Activity,Intent
6. Create sample application with login module.(Check username andpassword)
7. On successful login, go to next screen. And on failing login, alert user usingToast.
8. Also pass username to nextscreen.
9. Create login application where you will have to validate EmailID(UserName). Till the username and password is not validated , login button should remaindisabled.
10. Create and Login application as above. On successful login, open browser withany URL.
11. Create an application that will pass some number to the next screen and on thenext screen that number of items should be display in thelist.
12. Understand resource folders:
13. Create spinner with strings taken from resource folder (res >> valuefolder).
14. On changing spinner value, changeimage.
15. Understand Menuoption.

16. Create an application that will change color of the screen, based onselected options from themenu.
17. Create an application that will display toast (Message) on specific interval oftime.
18. Create a background application that will open activity on specifictime.
19. Create an application that will have spinner with list of animation names. On selecting animation name, that animation should affect on the images displayedbelow.
20. Understanding of UI:
21. Create an UI such that, one screen have list of all the types ofcars.
22. On selecting of any car name, next screen should show Car details like: name,launched date company name, images (using gallery) if available, show different colors in which it isavailable.
23. Understanding content providers andpermissions:
24. Read phonebook contacts using content providers and display inlist.
25. Read messages from the mobile and display it on thescreen.
26. Create an application to call specific entered number by user in the EditText.
27. Create an application that will create database with table of Usercredential.
28. Create an application to read file from asset folder and copy it in memorycard.
29. Create an application that will play a media file from the memorycard.
30. Create an application to make Insert, update, Delete and retrieve operation onthe database.
31. Create an application to read file from the sdcard and display that file content to the screen.
32. Create an application to draw line on the screen as user drag hisfinger.
33. Create an application to send message between twoemulators.
34. Create an application to take picture using nativeapplication.
35. Create an application to pick up any image from the native application gallery and displayit on thescreen.
36. Create an application to open any URL inside the application and clicking on any linkfrom that URl should not open Native browser but that URL should open the samescreen.
37. Create an application that will store employee information like Employee ID, Name, Address and Designation. User can insert, update, delete and employee searchrecord.

38. Create an application that will change wall paper time bytime.
39. Create an application that will work like a calculator which performall arithmeticoperations.

.NET Lab

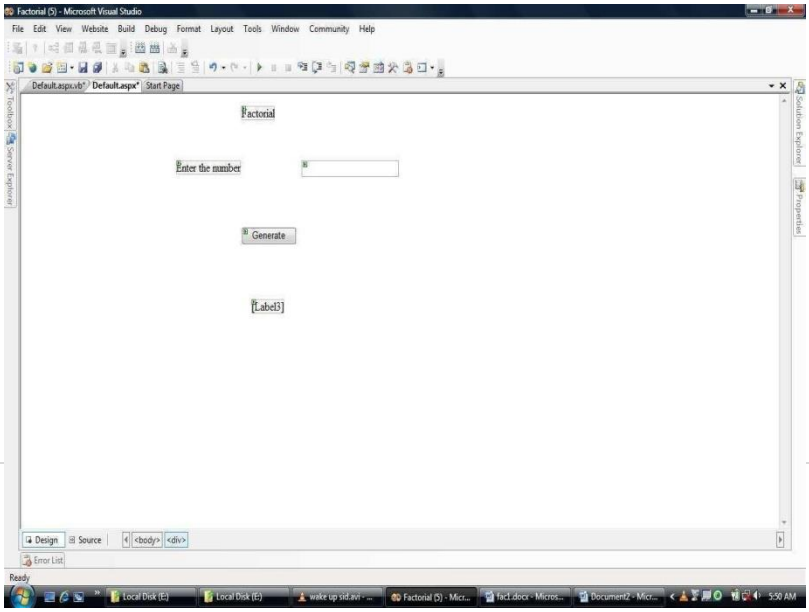
Course Outcomes:

After successful completion of the course, students will be able to:

1. Explain the programming skills and be familiar with programming environment.
2. Apply the concept so the students will be able to use ASP.NET controls in web applications.
3. Interpret the to debug and deploy ASP.NET web applications
4. Describe to create database driven ASP.NET web applications and web services
5. To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web
6. Identify Security in the .NET framework and Deployment in the .NET.
7. Create and develop Assemblies and Deployment in .NET, Application Development

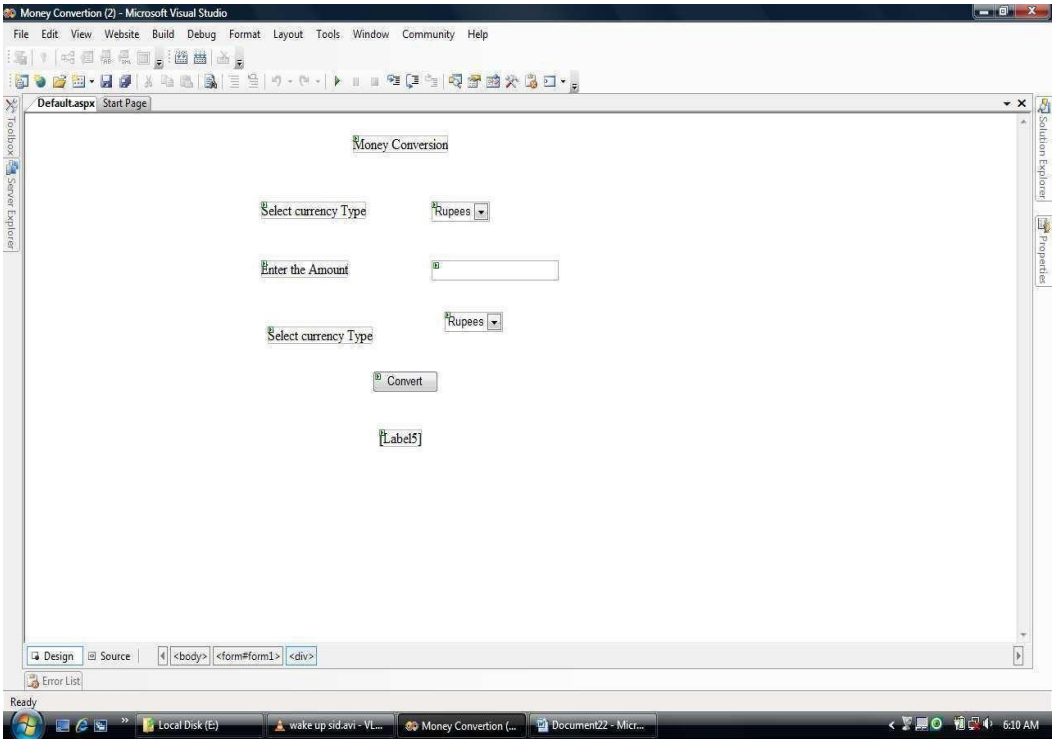
Lab Experiments:

1. Create a simple ASP.NetPage
2. To create a WebControl
3. Write a program to accept a Character and check the case ofthe Character.
4. Write a program to accept any Character and Display Vowel orNot.
5. Write a program to accept a String convert a case ofCharacter.
6. Write a program to generate the factorialoperation.



7. Write a program to implement a TextEditor
8. Write a program to perform MoneyConversion.

Design:



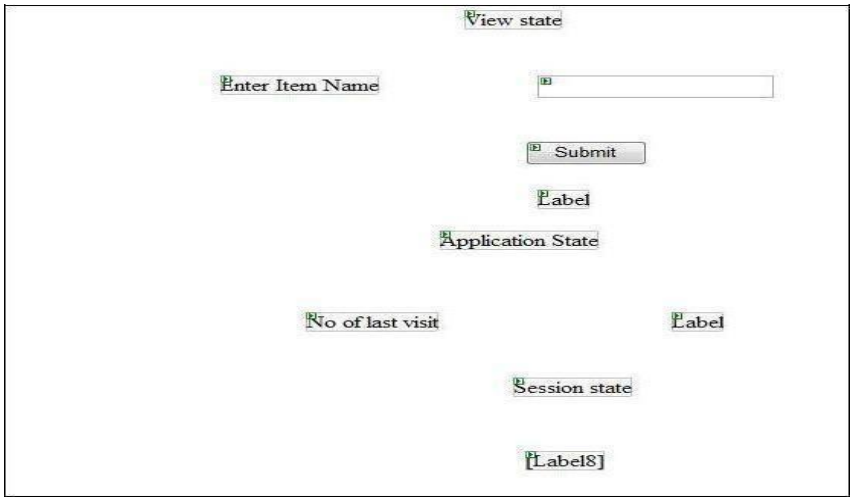
9. Write a program to implement aCalculator.
10. Write a program to implement a CalendarControl.
11. Write a program to perform a Quiz usingTimer.
12. Write a program to implement Common DialogControl.
13. Write a program to access a SQL Database usingADO.Net
14. Write a program to Store Details usingADO.Net.
15. Write a program to insert, update, and delete operation usingADO.Net.
16. Implement Data grid to display Records, Add, Edit, and ModifyRecords.

17. Write a program to generate the Logincontrol.

Design: After enter the wrong password login attempt was not successful please try again

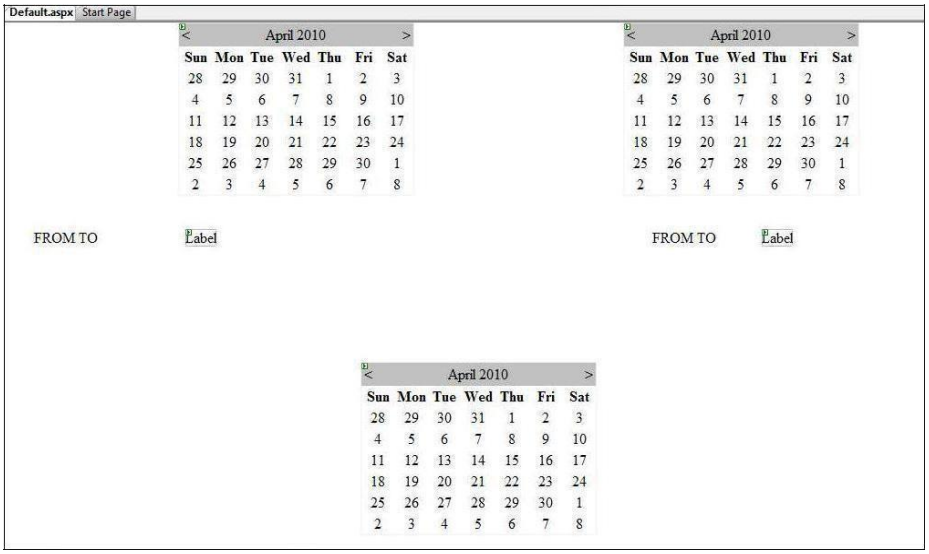
After log in three times the login will be blocked

26. Write a program to perform Asp.Netstate. Design:



18. Write a program to display the Holiday in calendar Design:

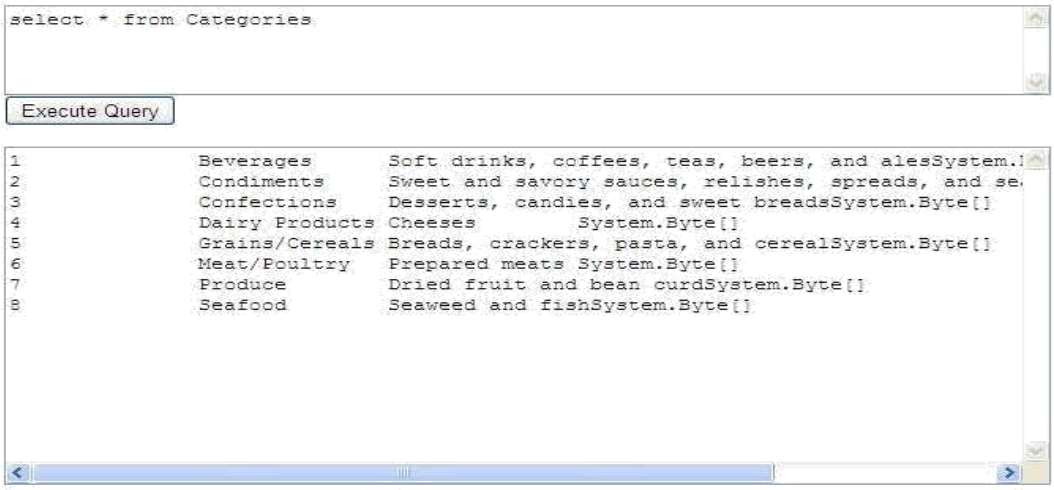
19. Write a program to display the selected date in thecalendar Design:



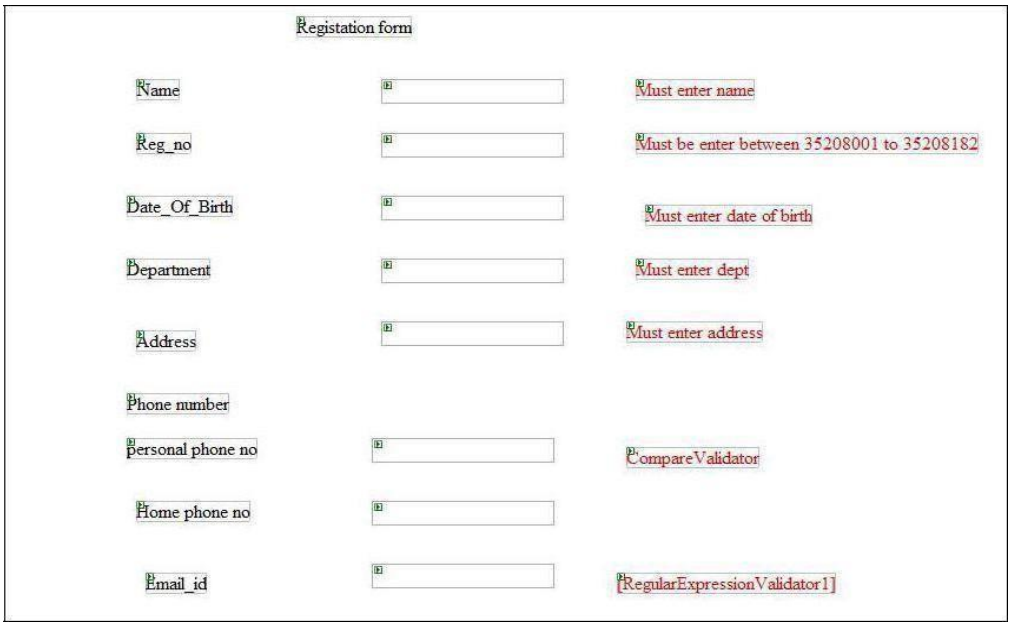
20. Write a program to display the Difference between the two dates inthe calendar.

21. Write a program to perform validationoperation.

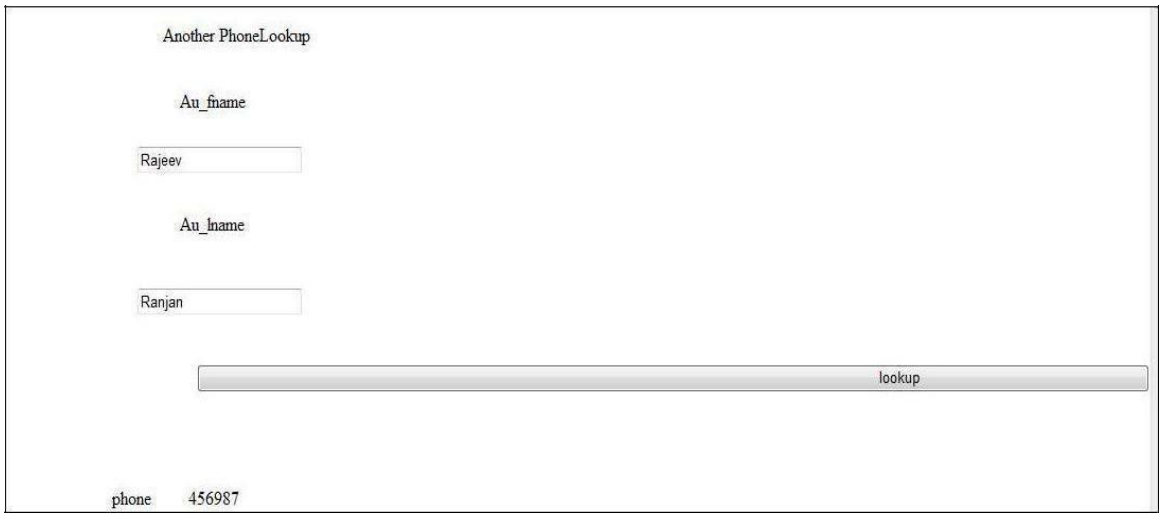
Design:



22. Write a program to bind data in a multiline textbox by querying inanother textbox.



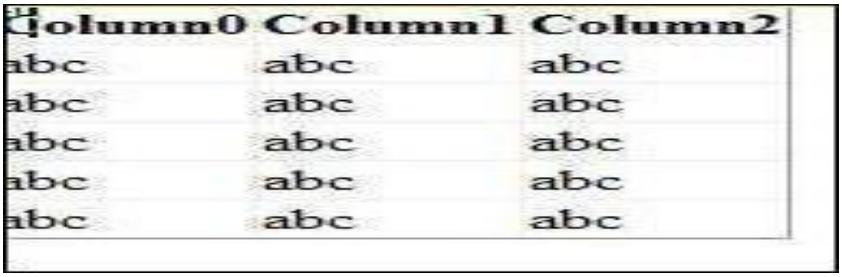
23. Write a program to display the phone no of an author using database.Design:



24. Write a program to display how data bind using dropdownlist.

Design:

25. Write a program create an own table and bind data using data grid Design:



26. Write a program to transfer the details from one page to anotherpage.
27. Write a program to fetch data throughlinks.
28. Write a program to copy the text in a label fromtextbox
29. Create a loginform
30. Write a program to add two number (use NANproperty)
31. Write a program to perform pageevents.
32. Writeaprogramtoaddtwonumbersandprinttheresultinanothertext box using auto postbackproperty.
33. Write a program to develop a form and use file uploadcontrol.
34. Write a program to implement a dropdown listcontrol.
35. Write a program using wizardcontrol.
36. Write a program to print a paragraph using panelcontrol.
37. Write a program to draw a dynamic table using tablecontrol.
38. Write a program to create animage gallery using multiviewcontrol.
39. Write a program to print multiple selected dates using calendarcontrol.
40. Write a program to implement a radiobutton list usingxmldatasource.
41. Write a program to develop a form with propervalidations.
42. Write a program to develop a registration form using compare validatorand validationsummary.
43. Write a program to implement a calculatorwebservice.
44. Write a program to implement a reversewebservice
45. Write a program to fetch data in gridview control usingADO.net.
46. Write a program to add and update data usingADO.net.

Artificial Intelligence Lab using Python Lab

Course Outcomes:

After successful completion of the course, students will be able to:

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and itsfoundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception,knowledge representation, and learning.
3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Demonstrate profciency developing applications in an 'AI language', expert system shell, or data mining tool.
5. Demonstrate profciency in applying scientifc method to models of machine learning.
6. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Lab Experiments:

1. Write a python program to print the multiplication table for the given number
2. Write a python program to check whether the given number is prime or not
3. Write a python program to find factorial of the given number
4. Write a python program to implement simple Chatbot
5. Write a python program to implement List operations (Nested List, Length,Concatenation, Membership, Iteration, Indexing and Slicing)
6. Write a python program to implement List methods (Add, Append, Extend & Delete).
7. Write a python program to Illustrate Different Set Operations
8. Write a python program to generate Calendar for the given month and year
9. Write a python program to implement Simple Calculator program
10. Write a python program to Add Two Matrices

11. Write a python program to Transpose a Matrix
12. Write a python program to implement Breadth First Search Traversal
13. Write a python program to implement Water Jug Problem
14. Write a python program to remove punctuations from the given string
15. Write a python program to sort the sentence in alphabetical order
16. Write a program to implement Hangman game using python
17. Write a program to implement Tic-Tac-Toe game using python
18. Write a python program to remove stop words for a given passage from a text fileusing NLTK
19. Write a python program to implement stemming for a given sentence using NLTK
20. Write a python program to POS (Parts of Speech) tagging for the give sentence usingNLTK
21. Write a python program to implement Lemmatization using NLTK
22. Write a python program to for Text Classification for the give sentence using NLTK

Communication & Soft Skills

Course Outcomes:
After successful completion of the course, students will be able to:

1. Learn how to fight with stage fear through various practice sessions.
2. Develop the habit of making formal presentations such as seminar and conference.
3. Identify individual differences, personality, human rights, values and ethics to develop their own personality.
4. Apply their effective communication and soft skills at their work place.

Course Contents:

1. Group/Individual Exercises based on Phonemic transcription usingIPA symbols.
   a. Transcription of words and short sentences in normal English orthography (writing) into their IPAequivalents.
   b. Transcription of words presentedorally.
   c. Conversion of words presented through IPA symbols intonormal orthography.
   d. Syllable division and stress marking (in words presented in IPAform).

2. Dynamics of ProfessionalPresentation
   a. Combating StageFright
   b. Describing Objects/ Situations/People
   c. Individual and GroupPresentation
   d. Delivering Just-a minute(JAM)

3. ImprovingConversation
   a. Tips for ImprovingConversation
   b. TelephonicConversation
   c. Debate

4. Seminars andConferences
   a. Types of DiscussionGroups

b. ConductingSeminars
c. OrganizingConferences
d. Assignments

5. WritingStyle
   a. Importance of Professionalwriting
   b. Features of WrittenCommunication
   c. Choice of Words andPhrases
   d. Sentence Structure andLength
   e. Paragraph Structure andLength
   f. FinalDraft
   g. ReadabilityFormulas

6. Individual differences &Personality:
   a. Definition&Relevance
   b. Importance of nature & nurture in PersonalityDevelopment
   c. Importance and Recognition of Individual differences inPersonality
   d. Accepting and Managing Individual differences (AdjustmentMechanisms)

7. Human Rights, Values andEthics:
   a. Meaning of humanrights
   b. Human rightsawareness
   c. Importance of human rights
   d. Values andEthics

8. InterviewTechniques
   a. Types ofInterview
   b. Overcoming StageFright
   c. Tips and Scripts That Sell aSwitch
   d. Ten Interviewer PersonalityTypes

e. Tips to Avoid WretchedReviews

(Note: Every student shall be given 10 minutes of presentation time & 5 minutes of discussion on his/ her presentation.)

The student will be evaluated on the basis of:

- His / her presentation style
- Feedback of Faculty andStudents
- GeneralEtiquette
- Proficiency in Letter Drafting / Interview Preparation

Books Recommended

1. Balasubramaniam, T. A Textbook of Phonetics for Indian Students.New Delhi: Macmillan India,2000.
2. Harris, O. Jeff and Sandra J. Hartman. Organizational Behaviour. Mumbai: Jaico Publishing House,2001.
3. Kennedy, Joyce Lain. Job Interviews For Dummies. Canada: John Wiley& Sons,2011.
4. Kumar, Sanjay & Pushpalata. Communication Skills. New Delhi:Oxford University Press,2012.
5. Krishnaswamy, N. Creative English ForCommunication. New Delhi: Macmillan,2009.
6. Mitra, Barun Kumar. Personality Development and Soft Skills. NewDelhi: Oxford University Press,2011.
7. Raman, Meenakshi & Prakash Singh. Business Communications. New Delhi: Oxford University Press,2006.

Industrial Training

Course Outcomes:

After successful completion of the Industrial Project, students will be able to:

1. Identify and align the project to the organization's strategic plans and business justification throughout its lifecycle.
2. Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.
3. Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.
4. Utilize technology tools for communication, collaboration, information management, and decision support.
5. Implement general business concepts, practices, and tools to facilitate project success.
6. Adapt project management practices to meet the needs of stakeholders from multiple sectors of the society.
7. Apply project management practices to the launch of new programs, initiatives, products, services, and events relative to the needs of stakeholders.

Guidelines

Project in IT industry / University Computer Center / Dept. of Computer Science / Research Organization , etc, as decided by the Head of the Department.

The evaluation committee will distribute these marks for seminar/viva/voce/Project report and for any other activity, which the committee thinks to be proper. Joint project will be allowed and joint project report will be also being accepted. In case of Joint Project the team should not consist of more than 3 members. Individual project will be recognized and the student should highlight their contribution in a joint projectreport.

Committee for evaluation of project report / work:

- Externalexaminer.
- CentreHead
- Internal guide (if any) faculty

Format of Project Report

Title

Certificate from organization about your stay (Project Duration) at that place and about Submission of work done under external guide at the place oftraining.

Certificate from your guide about the submission of work done under his/her guidance, Internal Supervisor.

Table of Contents,
Abstract of the project (abstract of actual workdone).
A brief overview of the organization (regarding function area, location, division in which you are working, turnover).

Profile of problems assigned. Study of existing system, if any.

System requirements

- Product Definition
  - Problem Statement Function to be
  - Provided
  - Processing Environment: H/W, S/W. Solution Strategy
- Acceptance Criteria
- Feasibility Analysis
- Project Plan
  - Team Structure Development
  - Schedule
  - Programming Languages And Development Tools System
  - Requirement Specifications
- Developing / Operating / Maintenance Environments External Interface And
- Data Flows
  - User display and report format, user command summary High level DFD and
  - data dictionary
- Functional and performance specifications Design
- Detailed DFD's and structure diagrams
- Data Structures, database and file specifications Pseudo Code
- Test Plan
- Functional, Performance, Stress tests etc.

  - Implementation / Conversion Plan Project Legacy
- Current status of project

- Remaining areas of concern Technical and managerial lessons learnt
- Future recommendations
- Implementation / Conversion Plan Project Legacy
- Current status of project
- Remaining areas of concern Technical and managerial lessons learnt Future recommendations
- Bibliography
- Source Code

All material should be typed in double spacing, Times New Roman 12. The recommended margins are 25 mm (1 inch) for top, bottom, right and left with an extra 13 mm (0.5 inch) for binding on the left. Other than page numbers, no material should intrude into these margins.

Note: - The above is meant to serve as a guideline for preparation of the project report. The students may add to, modify or omit some of the above- mentioned points depending upon their relevance to the project and with the consultation of the project guide for thesame.

Research Paper Publication

Course Outcomes:

After successful Publication of the Research paper students will be able to:

1. Understand professional writing by studying management communication contexts and genres, researching contemporary business topics, analyzing quantifiable data discovered by researching, and constructing finished professional workplace documents.
2. Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, recommendation and analytical reports, proposals, memorandums.
3. Understand how to critically analyze data from research; incorporate it into assigned writing clearly, concisely, and logically.
4. Explore different format features in both print, multimedia and html documents, and develop document design skills.
5. Develop professional work habits, including those necessary for effective collaboration and cooperation with other students, instructors and Service Learning contact representatives.

Guidelines for writing a good research paper:

Step 1. Choose a Topic

Step 2. Write a Working Thesis Statement

Step 3. Do Research on Your Topic

Step 4. Make a Good Outline

you should keep in mind a typical research paper structure that commonly includes:

- a title page;
- an abstract;
- an introduction;
- a methodology section;
- findings/results;
- discussion;

- conclusion.

Step 5. Create the First Draft

Step 6. Revise, Edit and Proofread, Revise, Edit and Proofread

How to Write an Introduction for a Research Paper

Start writing an intro. The introductory paragraph should begin with an attention grabber that may be:

- a provocative question;
- statistics;
- an anecdote;
- unusual facts, etc.

How to Write Body Paragraphs

Outline will help you to complete this part of your paper.

Provide your points and support your main idea.

How to Write a Conclusion for a Research Paper

A good idea is to provide some recommendations based on the results of your investigation or suggest some directions for further research.

Your rough draft is ready.

How to Make Your Paper Perfect

No one can write their first draft perfectly. you should revise your draft to make sure that your project is on point. Be ready that you may need to revise your project more than once because it is really worth doing.

The next stage is editing. Check and eliminate filler words and phrases, improve word choice, and correct mistakes in punctuation and grammar if you find any. You should look for:

- incomplete sentences;
- dangling modifiers;

- easily confused words (such as to, too, and two);
- spelling mistakes;
- apostrophes for possessives and plurals;
- quotation rules obeyed;
- comma use;
- eliminate contractions.

Re-read your paper several times. A good strategy is to read your paper backwards. In this way, you will feel a little disoriented and will be able to catch more mistakes

Ask your friends or family members to review your research paper and express their opinion about it. Ask them to evaluate your argument, transitions, and the balance and look for any inconsistencies with usage, grammar or mechanics. Ask your friends to provide their feedback and make suggested changes if you think they make sense. Now finally, you may print your paper and proofread it to eliminate minor mistakes or typos and ensure that your amazing research paper is flawless.

Annexure IIMandatory Documents for Admission

To be uploaded on the Admission Portal by the Prospective students

Admission Documents	Format (Jpeg/PNG/PDF)	Documents Size
Duly filled application form with student signature	Digital signature/Student signature JPEG/PNG	20 KB
Colour scan copy of all year/semester mark sheet/grade cards (for PG programs only) or consolidated mark sheet/grade cards also accepted.	PDF/JPEG	500 KB
Colour scan copy of 10th std. Mark sheet/grade card	PDF/JPEG	
Colour scan copy of 12th std./ Three-Year Polytechnic Diploma Mark sheet/grade card	PDF/JPEG	
Colour scan copy of passport size photograph	JPEG or PNG Format	50 KB
Colour scan copy of Govt. Photo id proof, Aadhar card is mandatory. (Other options: Voter's id, Driving License, Passport etc.)	PDF/JPEG	100 KB
In case of name change, Gazette notification documents for name changes For married women – marriage certificate would be accepted – provided previous maiden name is clearly mentioned in the same. In case of deferred Father name or mother name in such cases without a Gazette notification document.	PDF	500 KB
Fees submission transaction details or receipt as per University policy for respective online programs	PDF/JPEG	500 KB
Digitally Signed undertaking as per the process; where applicable	PDF	500 KB

Students can also visit the University website for the said information.

Annexure III - Academic Bank of Credit Id Creation Process

All enrolled students, particularly those of Indian nationality, are required to register with ABC (Academic Bank of Credits), a central scheme established by the Ministry of Education, Government of India, for depositing credit. ABC ID creation is mandatory for all students, ensuring their participation in this scheme.

The ABC Id can be created by students themselves using Digi-locker, UMANG application, ABC portal or Academic Institution Portal. The process for which is provided below.

Process	• Students can register by logging in at www.abc.digilocker.gov.in • Click on My Account → Login as Student • Click on "Sign up with DigiLocker" → Enter valid mobile number → An OTP is sent at the phone number via SMS → Enter the OTP and click on "Continue" button → Enter Security PIN set created during Sign Up and click "Submit" Button • You will be prompted with ABC student account creation window
Documents and proofs required	• Aadhaar Card is mandatory for ABC Id creation • Learners Name • Date of Birth • Gender • Enrolment Number • Requirements by Academic Institution: • Mobile Number

The University will extend support to the students to create ABC ID. The documents required will remain the same as stated above.

Annexure IV- Continuous Internal Assessment Pattern

Particular	A1 (Objective Type)	A2 (Objective Type)
Marks	15	15

Question Pattern for the CIA Components
A-1 1.There will be 15 Objective type Multiple Choice Questions (MCQs), each carrying mark1 mark 2. The time for the A-1 assignment will be 30 mins 3. All questions are compulsory 4. There will be NO NEGATIVE MARKING for the wrong answers. **A-2** 1. There will be 15 Objective type Multiple Choice Questions (MCQs), each carrying mark1 mark 2. The time for the A-1 assignment will be 30 mins 3. All questions are compulsory 4. There will be NO NEGATIVE MARKING for the wrong answers.

Annexure V- End Term Examination Patter

JNU

Centre for Distance and Online Education

End Term Examination

[PROGRAM NAME]

[COURSE NAME][COURSE CODE]

Time : 2 Hours	Max. Marks : 70
Note for students: The paper will comprises of 70 compulsory objective questions of 1 mark each.	
Answer all the questions. Each question carries one mark.	
Q. No. 1 to Q. No. 70 - Objective questions with four multiple choices.	

JAIPUR NATIONAL UNIVERSITY

A venture of The Seedling Group of Educational Institutions

Master of Computer Application (MCA)

Online Mode

PROGRAM PROJECT REPORT – MCA – Online Mode

Contents

MCA – Online Mode

1. Program Overview

1.1 Program's Mission and Objectives

The mission of the Master of Computer Applications program is to provide students with a comprehensive education in computer science and applications, equipping them with the knowledge, skills, and professional values necessary to excel in the dynamic and ever-expanding field of information technology. Through rigorous academic coursework, practical experience, and research opportunities, we aim to produce innovative and socially responsible leaders who can make meaningful contributions to the global IT community.

Objectives:

1. Technical Proficiency: Provide students with a strong foundation in computer science theory and practical skills, including programming languages, algorithms, data structures, and software engineering principles.
2. Application Development: Equip students with the knowledge and expertise to design, develop, and deploy software applications across a variety of platforms and domains.
3. Information Systems Management: Train students in the management of information systems, including database design, network administration, cybersecurity, and IT project management.
4. Emerging Technologies: Expose students to emerging technologies and trends in the IT industry.
5. Problem-solving and Analytical Skills: Foster students' ability to analyze complex problems, formulate innovative solutions, and evaluate the effectiveness of alternative approaches.

6. Communication and Collaboration: Develop students' communication, teamwork, and interpersonal skills, enabling them to effectively collaborate with colleagues, clients, and stakeholders in multidisciplinary settings.

7. Ethical and Professional Responsibility: Instill a sense of ethical awareness and professional responsibility in students, emphasizing the importance of integrity, honesty, and respect for intellectual property rights in their work.

8. Research and Innovation: Encourage students to engage in research activities, explore new ideas, and contribute to the advancement of knowledge in the field of computer science and applications.

9. Continuous Learning and Adaptability: Cultivate a mindset of lifelong learning and adaptability, preparing students to keep pace with rapid technological advancements and evolve as professionals throughout their careers.

1.2 Relevance of the Program with JNU's Vision and Mission

Jaipur National University (JNU) was established in 2007. JNU provides a world-class learning experience, with a highly accomplished faculty, numerous extracurricular activities, and a wide range of academic pursuits. The university fosters holistic development of students.

JNU with its vision to transform the Education Landscape of India and contribute to the maximum to improve the GER of India has plans to launch affordable and flexible education programs. Online programs is an excellent way to launch affordable and flexible education programs in sync with the vision and mission of the university stated below:

University Vision:

To be a leader in creating unique and exclusive learning opportunities in all disciplines of study that ultimately lead to the advancement of learning and creation of a sustainable society and environment.

University Mission:

- Provide global opportunities of learning through broad and balanced academic programmes.
- Explore and hone the potential of stakeholders, develop their human and intellectual capacities to the fullest.
- Create and maintain excellence with high standard driven activities, universal significance and acknowledgement.
- Inculcate and keep track of the current trends and finest practices in education for constant growing and evolving.

1.3 Nature of Prospective Target Group of Students

The curriculum of MCA is designed in such a way that it helps the students to become not only more employable but also encourage them to become entrepreneurs. Primarily the target group of learners will be:

- population living in remote areas where higher education institutes are not easily accessible.
- Learners who could not get admission in the regular mode due to limited intake capacity.
- Learners who are working and who desire to pursue higher education as a means for movement up the ladder.
- Learners who are unable to pursue Higher education due to social, financial and economic compulsions as well as demographic reasons.

1.4 Appropriateness of programs to be conducted in online mode to acquire specific skills and competence

The Master of Computer Application degree holds significant value for students aiming to excel in careers within industries, businesses, finance, or the civil service. Moreover, it is highly regarded by employers for various roles where proficiency in logical and quantitative reasoning is essential, such as software development, database administration, systems analysis, and IT consulting.

2. Procedure for Admission and Curriculum Transaction

The academic programs catered to candidates enrolled in the online mode of learning are facilitated by CDOE-JNU, with the backing of various faculties within the University. Eligibility criteria, course structure, detailed curriculum, program duration, and evaluation criteria are subject to approval by the Board of Studies and Academic Council, adhering to UGC guidelines for programs falling under the purview of online mode for degree conferment.

Below are the details of the admission procedure, eligibility criteria, fee structure, curriculum, program delivery, information about the Learning Management System (LMS), and assessments and evaluations:

2.1Procedure for Admission

Students who are seeking admission in programs offered by CDOE-JNU need to apply through https://online.jnujaipur.ac.in/ in the courses offered.

2.1.1 Minimum Eligibility Criteria for Admission

The minimum eligibility criteria for admission to the Online MCA program require candidates to hold a Bachelor's degree of a minimum duration of 3 years from a recognized University in any stream, in accordance with UGC and AICTE norms. Additionally, candidates must have secured at least 40% marks in the qualifying examination with Mathematics as a subject. Candidates who have not studied Maths at Graduation level, will have to complete Bridge Program to enrol into the MCA program.

Candidates must also fulfill all documentation requirements as specified on the program's website for admission purposes. Failure to submit proof of eligibility within the stipulated timeframe specified by CDOE-JNU will result in the cancellation of admission. Prospective candidates are encouraged to carefully review all instructions provided on the website before proceeding with the application process.

2.1.2 Online Admission Process and Instructions: Learner Communication

The online admission process for the students is provided below:

Step	**Process**	**Particulars**
Step 1	**Counselling**	Prospective students will receive guidance and counseling for their chosen program from designated and authorized counselors.
Step 2	**Registration on admission portal to get access to My Account.**	To initiate the registration process, prospective students are required to complete the application form by providing all necessary details and uploading mandatory documents.
Step 3	**Details of Document upload**	Student Uploads document as follows- <u>Personal Documents</u> Passport-size Photograph Student's Signature Aadhar Card (Back & Front) Passport (For International Student) <u>Academic Documents</u> *UG Student -*

		10th Marksheet 12th Marksheet *PG Student* - 10th Marksheet 12th Marksheet UG Marksheet Other Certificates (detailed list of documents is provided in **Annexure II**)
Step 4	**Verification of documents by the Deputy Registrar**	The Deputy Registrar is responsible for verifying all documents uploaded by prospective students on the admission portal. Within a timeframe of 48 hours, the Deputy Registrar will review and either approve or disapprove the eligibility of the prospective student for the chosen program.
Step 5	**Undertaking**	Student will sign Undertaking after Approval in Application.
Step 6	**Payment of fees**	All eligible students, duly approved by the Deputy Registrar, will get fees payment link activated in their My Account for payment. The Fee is payable through any of the following means: (a) UPI (b) Credit/Debit Card (c) Net-banking Note: Cash, bank demand draft and Cheques are not accepted
Step 7	**Enrolment**	After the payment of program fee, the eligible student will get the Enrolment number and access to the LMS within 21 days.
Step 8	**Access to Learning Management System (LMS)**	

General Instructions:

1. Prior to applying for online programs, all students are advised to thoroughly read and comprehend the eligibility conditions provided in the student handbook document and outlined on the university website.
2. It is the responsibility of prospective learners to ensure that their educational or qualifying degree has been issued by a recognized university or board only. For learners from Indian higher education institutions, recognition by the regulatory authority of the Government of India is necessary. To verify degrees from recognized boards of education, refer to www.cobse.org.in/. For Polytechnic Diploma,

check the respective State Board of Technical Education. Verification of degrees from recognized universities can be done at www.ugc.ac.in/. Foreign prospective learners should verify their institutions at www.aiu.ac.in/.

3. Prospective learners must verify their eligibility on the date of admission and ensure that they have passed the qualifying exams before the commencement of the admission batch.

Upon enrollment, students must register with the Academic Bank of Credits (ABC), a central scheme for depositing credit formulated by the Ministry of Education, Government of India. Creation of an Academic Bank of Credits (ABC) ID is mandatory for all students. (Refer to Annexure IV for details).

2.1.3 Program Fee for the Academic Session beginning July 2024

Program fees for students pursuing MCA offered by CDOE-JNU is mentioned below:

Program	Academic Total Fees (INR)	Exam fees
MCA	**95,000**	**1500 per semester**

2.1.4 Financial Assistance Policy

Students will make fee payments through the online mode available on the university website. Additionally, the University has collaborated with a third-party Non-Banking Financial Company (NBFC) to offer financial assistance to individuals who require it.

2.2 Curriculum Transactions

2.2.1 Program Delivery

The curriculum is delivered through Self Learning Materials (SLMs) in the form of e-Contents, supplemented by a variety of learning resources including audio-video aids via the Learning Management System (LMS), following the four-quadrant approach. Furthermore, the program includes online contact hours featuring discussion forums and synchronous live interactive sessions conducted through the LMS, adhering to the current UGC norms for course delivery.

2.2.2 Learning Management System to support online mode of Course delivery

The Learning Management System (LMS) is available on URL https://lms.jnujaipur.ac.in/is meticulously developed to offer students a truly global learning experience. With a user-friendly interface, the LMS simplifies the learning process and ensures it meets the highest global standards. Utilizing audio-visual teaching methods, self-learning materials, discussion forums, and evaluation patterns, the platform stands out as unique and aligns seamlessly with both industry requirements and the UGC Guidelines' four-quadrant approach.

Students can engage in uninterrupted learning 24x7 via web and mobile devices, allowing them to progress at their preferred pace. The LMS boasts a simple and intuitive user interface, facilitating easy navigation through the e-learning modules. Designed in accordance with standard norms, all learning tools are easily accessible, ensuring a perfect learning experience for all users.

2.2.3 Course Design

The Course content is designed as per the 4-quadrant approach as detailed below to facilitate seamless delivery and learning experience

Quadrant-I i.e., e-Tutorial, that contains – Faculty led Video and Audio Contents, Simulations, video demonstrations, Virtual Labs

Quadrant-II i.e., e-Content that contains – Portable Document Format or e-Books or Illustration, video demonstrations, documents as required.

Quadrant-III i.e., Discussion forums to raise and clarify doubts on real time basis by the Course Coordinator and his team.

Quadrant-IV i.e. Self-Assessment, that contains MCQs, Problems, Quizzes, Assignments with solutions and Discussion forum topics.

2.2.4 Academic Calendar for Academic Session beginning July 2024

Sr. No.	Event	Session	Month (Tentative)
1.	Commencement of semester	January	January
		July	July
2.	Enrol learner to Learning Management system	January	Within 21 working days from fee deposit and Eligibility confirmation
		July	
3.	Webinars / Interactive Live Lectures and Discussion Forum for query resolution	January	February to May
		July	August to November
4.	Assignment Submission	January	By April
		July	By October
5	Project Report Submission (Applicable during Final semester)	January	Last week of April
		July	Last week of November
6	Term End Examination	January	May onwards
		July	December onwards
7	Result Declaration of End Term Examination	January	By June
		July	By January

3. Instructional Design

3.1 Curriculum Design

The curriculum is meticulously designed by experts in the field of Computer Science, incorporating contemporary topics and fostering environmental awareness. It has received approval from the Board of Studies, the Centre for Internal Quality Assurance (CIQA), and the University Academic Council.

3.2 Program Structure and detailed Syllabus

3.2.1 Program Structure

Sem	Course Code	Course Category	Title	Credits	Contact week			Evaluation	
					L	T	P	Int	Ext
Theory									
I	OMCACO101T24	CORE	Object Oriented Programming with C++ and JAVA	3	3	0	0	30	70
	OMCACO102T24	CORE	Database Management System	3	3	0	0	30	70
	OMCACO103T24	CORE	Computer Graphics	3	3	0	0	30	70
	OMCACO104T24	CORE	Information and Network Security	3	3	0	0	30	70
	OMCAVA105T24	VAC	Management Process and Organizational behavior with Environmental Ethics	3	3	0	0	30	70
	OMCASE106T24	SEC	Advance Data Structure and Algorithm Analysis	3	3	0	0	30	70
	OE/GE*	OE/GE*	OE/GE	2	2	0	0	30	70
Practical									
I	OMCACO107P24	CORE	Object Oriented Programming with C++ and Java Lab	2	0	0	4	30	70
	OMCACO108P24	CORE	Database Management System	1	0	0	2	30	70
	OMCACO109P24	CORE	Computer Graphics Lab	1	0	0	2	30	70
	OMCASE110P24	SEC	Advance Data Structure and Algorithm Analysis Lab	2	0	0	4	30	70
TOTAL				**26**	**20**	**0**	**12**		

*Students can choose any one of the subject from the following list of subjects or can pursue a MOOC course in order to get equal credits in Semester 1.

Sr. NO.	Subject Code	Name of Subject
1.	OMCAGE101T24	Understanding Prescription, Doses and doses forms

2.	OMCAGE102T24	Dining etiquettes
3.	OMCAGE103T24	Basics of Photography
4.	OMCAGE103T24	Crime and society
5.	OMCAGE104T24	Industrial Mathematics

Sem	Course Code	Course Category	Title	Credits	Contact week			Evaluation	
					L	T	P	Int	Ext
II	OMCACO201T24	CORE	Theory of Computation	3	3	0	0	30	70
	OMCACO202T24	CORE	Software Engineering	3	3	0	0	30	70
	OMCACO203T24	CORE	Web Technology	3	3	0	0	30	70
	OMCACO204T24	CORE	Computer Based Optimization Techniques	3	3	0	0	30	70
	OMCASE205T24	SEC	Microprocessor & Assembly Language Programming	3	3	0	0	30	70
	OMCASE206T24	SEC	E-Commerce and Digital Marketing	3	3	0	0	30	70
	*OE/GE	OE/GE	OE/GE	2	2	0	0	30	70
II	OMCACO207P24	CORE	Software Engineering Lab	2	0	0	4	30	70
	OMCACO208P24	CORE	Web Technology Lab	2	0	0	4	30	70
	OMCASE209P24	SEC	Microprocessor Lab	1	0	0	2	30	70
	OMCAAE210P24	AEC	Seminar	1	0	0	2	30	70
TOTAL				**26**	**20**	**0**	**12**		

*Students can choose any one of the subject from the following list of subjects or can pursue a MOOC course in order to get equal credits in Semester 2.

Sr. NO.	Subject Code	Name of Subject
1.	OMCAGE201T24	Introduction to Epidemiology
2.	OMCAGE202T24	Basics of Baking
3.	OMCAGE203T24	Videography
4.	OMCAGE204T24	Sociology of Health
5.	OMCAGE205T24	Nanotechnology

After completion of Semester – II, students are required to undergo Summer Training.

III SEMESTER

Sem	Course Code	Course Category	Title	Credits	Contact week			Evaluation		
					L	T	P	Int	Ext	Total
Theory										
III	OMCACO301T24	CORE	Compiler Design	3	3	0	0	30	70	100
	OMCADS302.1T24	DSE1	Advanced Database Concepts	3	3	0	0	30	70	100
	OMCADS302.2T24		Internet of Things							
	OMCADS302.3T24		Android Programming							
	OMCACO303T24	CORE	.NET Framework and ASP.NET	3	3	0	0	30	70	100
	OMCACO304T24	CORE	Introduction to Artificial Intelligence and Machine Learning	3	3	0	0	30	70	100
	OMCADS305.1T24	DSE2	Big Data Analytics	3	3	0	0	30	70	100
	OMCADS305.2T24		Mobile Computing							
	OMCADS305.3T24		Cloud Computing							
	OMCADS305.4T24		Human Computer Interaction							
	OE/GE*	OE/GE*	OE/GE	2	2	0	0	30	70	100
Practical										
III	OMCADS307.1P24	DSE	Advanced Database Concepts Lab	2	0	0	4	30	70	100
	OMCADS307.2P24		Internet of Things Lab							
	OMCADS307.3P24		Android Programming Lab							
	OMCACO308P24	CORE	.NET Lab	2	0	0	4	30	70	100
	OMCACO309P24	CORE	Artificial Intelligence Lab using Python Lab	1	0	0	2	30	70	100
	OMCAAE310P24	AEC	Communication & Soft Skills	1	0	0	2	30	70	100
	OMCATP311P24	STP	Summer Training Presentation	1	0	0	1	30	70	100
TOTAL				**24**	**17**	**0**	**13**			

*Students can choose any one of the subject from the following list of subjects or can pursue a MOOC course in order to get equal credits in Semester 3.

S. No.	Subject Code	Name of Subject
1	OMCAGE301T24	Public Health Pharmacy
2	OMCAGE302T24	Rajasthan and Punjabi cuisine
3	OMCAGE303T24	Script writing for film
4	OMCAGE304T24	Sociology of Media
5	OMCAGE305T24	Research Methodology

Semester	Course Code	Course Category	Title	Credits	Contact week			Evaluation		
					L	T	P	Int	Ext	Total
Theory										
IV	OMCAIT401T24	INT	Industrial Training	20				150	350	500
	OMCAAE402T24	AEC	Research Paper Publication	5				30	70	100
TOTAL				**25**						

3.4.2 Detailed Syllabus of MCA

Detailed syllabus of MCA is attached in Annexure-I.

3.5 Duration of the Program

Program	Level	Duration	Maximum duration for completion	Credits
MCA	Master's Degree	2 years (4Semesters)	4 Years	101

3.6 Faculty and Support staff requirements (Refer Regulation Document for all Staff Details)

3.4.1 Director

The selected candidate will assume the role of a permanent, full-time Professor, bringing expertise in overseeing and coordinating online and distance learning initiatives throughout their career. They will spearhead the CDOE-JNU department, ensuring seamless coordination among faculty, the technology department, and staff. This individual will hold responsibilities encompassing both academic and administrative realms.

KRA

1. Oversee the operations of CDOE-JNU and the Learning Management System (LMS), in addition to supervising relevant staff members.
2. Foster collaboration among various faculties and supervisors to ensure the implementation of suitable pedagogical approaches and delivery of high-quality educational content.
3. Continuously assess the strengths and weaknesses of the program, offering appropriate solutions and enhancements as needed.

3.4.2 Deputy Director

The candidate is required to hold the position of Associate Professor in accordance with UGC Regulations 2018. Proficiency in Learning Management Systems (LMS) is essential, along with technical proficiency to facilitate and contribute to module development.

KRA:-

1. Collaborate with the Technical Manager to provide information manuals and documents to CDOE team members.
2. Develop the academic calendar for the academic sessions.
3. Review the timetable for live classes and interactive sessions, offering recommendations to the Program Coordinator as needed.
4. Approve the Content Matrix for each program, ensuring compliance with UGC guidelines.
5. Participate in syllabus design and updates in consultation with the Board of Studies and Academic Council of JNU to meet industry requirements.
6. Ensure academic planning, conduct academic audits, and implement academic policies.
7. Incorporate and implement changes in academic delivery as per UGC amendments.
8. Approve e-content and e-tutorials, forwarding them to the Technical Manager for upload on the LMS.
9. Monitor faculty members' live classes and interactive sessions, coordinating with the Program Coordinator to record attendance.
10. Maintain records of learner dropouts, actively minimizing dropout rates through student follow-up and support.
11. Issue academic notifications for lectures, events, content uploads, and examinations regularly.
12. Ensure adherence to the four-quadrant approach in academic practices.

13. Propose schedules for continuous internal assessments and end-term examinations, approving them for circulation.
14. Supply approved schedules to the Technical Manager for upload on the LMS.
15. Review reports on student performance and attendance in assessments periodically.
16. Ensure timely submission of internal assessment marks to the Controller of Examinations (CoE) and upload them as per schedule.
17. Monitor submission of examination forms and payment of examination fees by students within deadlines, communicating with the CoE as necessary.
18. Coordinate with the CoE for all examination-related matters at CDOE-JNU.
19. Arrange provision for industrial interface and provide assistance to students, coordinating with the Program Coordinator.
20. Organize orientation, Faculty Development Programs (FDP), and training programs for CDOE-JNU team members periodically.
21. Fulfill any other assigned functions as part of relevant committees or teams to ensure smooth functioning of CDOE-JNU.

3.4.3 Assistant Director

The candidate must hold the position of Associate Professor as per UGC Regulations 2018 and possess prior experience in overseeing online education programs.

KRA:-

1. Coordinate with different departments that offer online programs.
2. Aid the Deputy Director in fulfilling daily responsibilities associated with the Online Program.
3. Ensure that courses are conducted according to schedule and without any errors.
4. Ensure timely completion of assigned tasks as directed by the Deputy Director.

3.4.4 Program Coordinator

Each program will require the appointment of a Program Coordinator. Eligible candidates for this role must meet the qualifications outlined in the UGC Regulations 2018 for either Associate Professor or Assistant Professor.

KRA

1. Prepare the timetable for live classes and interactive sessions, ensuring accessibility for both

students and faculty, with approval from the Deputy Director.

2. Schedule or reschedule classes as needed.
3. Ensure course content aligns with the Content Matrix, coordinating with faculties and academic partners.
4. Develop a subject allocation plan in consultation with faculty members, seeking approval from the Deputy Director.
5. Maintain faculty attendance records and ensure regular participation in live classes and interactive sessions, reporting to the Deputy Director.
6. Ensure instructional delivery adheres to the Content Matrix and UGC regulations.
7. Review the quality and plagiarism of e-content and e-tutorials, coordinating with the Course Coordinator and submitting for approval to the Deputy Director.
8. Ensure timely availability of e-content, e-tutorials, and events on the LMS.
9. Assist the Deputy Director in uploading e-content and e-tutorials on the LMS in coordination with technical departments.
10. Provide technical support to faculty and students throughout the course duration.
11. Schedule and deliver live lectures punctually and without technical issues.
12. Monitor student attendance in live classes and interactive sessions, maintaining accurate records.
13. Ensure scheduled lectures are completed on time and utilize the allocated credit hours.
14. Schedule sessions with Visiting Faculty, subject to approval from the Director.
15. Coordinate with the Deputy Director for soft skill and value-added certificate programs to enhance students' career prospects.
16. Coordinate academic activities such as Discussion Forums with Course Coordinators.
17. Pace and plan continuous internal assessments, ensuring technical feasibility and effective communication.
18. Ensure assessment contents align with Quadrant-IV and are uploaded on the LMS by faculty.
19. Allocate faculty for student project work, establish completion timelines, communicate dissertation preparation guidelines, ensure plagiarism checks, and monitor topic diversity.
20. Ensure timely thesis submission and schedule viva-voce examinations for students.
21. Submit online program question papers within deadlines and communicate with the Controller of Examinations.
22. Monitor faculty evaluation and uploading of marks on the LMS.

23. Ensure timely completion of evaluations for publishing results within planned timelines, consulting with the Controller of Examinations.

3.4.5 Course Coordinator

Each course will require the appointment of a Course Coordinator possessing subject expertise and industry knowledge necessary for academic delivery. Eligible candidates for this role must meet the qualifications and experience outlined in the UGC Regulations 2018 for Professor, Associate Professor, or Assistant Professor.

KRA

1. Familiarize oneself with the LMS operations before the session begins.
2. Prepare thoroughly for daily sessions, engaging students for the entire allocated time and fostering effective communication.
3. Organize Discussion Forums for clearing doubts and promptly respond to student queries via chat, email, phone, video, or other synchronous tools, adhering to university policies and SRM directives.
4. Provide regular feedback to students on discussion board activities, assignments, tests, etc.
5. Conduct plagiarism checks on all e-tutorials and e-content according to UGC's four-quadrant framework, reporting findings to the Program Coordinator.
6. Schedule regular assessments of course modules using the LMS platform.
7. Ensure assessments are conducted with integrity, reporting any instances of academic misconduct to the Program Coordinator.

3.4.6 Course Mentor

For each batch of 250 students, the appointment of one Course Mentor is required. Eligible candidates for this role must meet the qualifications and experience outlined in the UGC Regulations 2018 for Assistant Professor.

KRA

1. Assist the Program Coordinator and Course Coordinator in sharing academic knowledge and resolving procedural queries as requested by students.

2. Supervise teacher-student interaction groups.
3. Aid the Course Coordinator in organizing and actively participating in discussion forums.
4. Develop mechanisms to improve learners' learning experiences through open dialogues, counseling, etc.
5. Ensure resolution of non-academic queries.

3.4.7 Examinations

Deputy Controller of Examination (Dy. CoE)

The Deputy Controller of Examinations (Dy. CoE) is responsible for overseeing and executing all functions related to the entire examination process.

KRA

1. Verify that students at CDOE-JNU meet examination eligibility criteria, in coordination with the Dy. Director.
2. Ensure students submit examination forms and pay fees within deadlines, in coordination with the Dy. Registrar and student cell.
3. Issue admit cards to compliant students at least 3 days before end-term examinations, coordinating with the academic team.
4. Prepare and release the Examination Time-Table.
5. Appoint qualified faculty examiners for online student assessments, whether internal or external.
6. Ensure timely receipt of question papers for online programs, adhering to guidelines, in coordination with the Dy. Director.
7. Ensure faculty examiners receive appropriate payment for paper checking fees, as per CDOE-JNU norms.
8. Ensure timely declaration of results and issuance of grade cards to students, in coordination with the given time-frame.
9. Disseminate notifications, guidelines, and regulations to promote awareness of examination policies and procedures among students and faculty members at CDOE-JNU.
10. Coordinate with CDOE-JNU for all matters concerning result declaration and grade-card issuance.

3.4.8 Technical Support Team

1. *Technical Manager* (Operations)– One Technical Manager is to be appointed.

   KRA

   a) Upload academic content for delivery after approval from the Dy. Director.
   b) Develop e-tutorials and e-contents in alignment with the four-quadrants approach, UGC plagiarism guidelines, and branding guidelines of CDOE-JNU.
   c) Collaborate with other Technical Managers, ERP, and LMS providers for ongoing maintenance and issue resolution.

2. *Technical Associate* (Audio-Video recording and editing)– One Technical Associate is to be appointed.

   KRA

   a) a) Record, edit, and execute tasks related to creating audio-video content for CDOE-JNU.
   b) b) Implement changes and develop audio-video content as directed by the Technical Manager and Director.

3.4.9 Administrative StaffStrength

The strength of the administrative staff shall constitute of:

1. *Deputy Registrar* – One individual is to be appointed with minimum Master's degree qualification and five years of experience as an Assistant Registrar or an equivalent position. The individual should have expertise in adequate technology.

   KRA

   i. Coordinate with the Admissions teams to ensure smooth functioning of the admission process at CDOE-JNU.

   ii. Ensure that Academic Bank of Credit (ABC) IDs are generated for all students after enrollment numbers are issued.

   iii. Approve and ensure regular notifications related to administration are sent to faculty and staff.

   iv. Conduct official correspondence with regulatory bodies, the Registrar's Office, and other stakeholders on behalf of CDOE-JNU.

   v. Approve and ensure regular administration-related notifications are sent to students.

vi. Maintain records of student enrolment, including all necessary documents such as bonafide letters and NOCs.

vii. Collect fees from students when applicable.

viii. Conduct official correspondence with regulatory bodies, the Registrar's Office, and stakeholders as needed.

ix. Ensure scholarship facilities are provided to students based on criteria set by JNU and other funding agencies.

x. Ensure compliance with statutory regulations as per UGC, AICTE, and other regulatory bodies.

xi. Organize induction and training programs for new recruits and staff members at CDOE-JNU.

xii. Determine the need for recruiting staff members at various positions within the CDOE-JNU department.

xiii. Determine employee salaries based on university criteria and communicate this information to the JNU accounts department.

xiv. Ensure all required documents are submitted by employees for performance appraisals and communicate this to the Registrar's office.

xv. Organize events for effective employee engagement as deemed necessary.

xvi. Efficiently address employee grievances at CDOE-JNU.

xvii. Oversee the grievance redressal process for students.

xviii. Manage and oversee other duties related to the examinations, admissions, and technical departments.

2. Student Relationship Manager (SRM)

CDOE-JNU will appoint two Student Relationship Managers (SRM), each with a minimum qualification of an undergraduate degree and at least two years of relevant experience in managing student relationships within an academic institution. Candidates should possess excellent communication skills and demonstrate the ability to collaborate effectively in teams.

KRA

1. Establish and maintain relationships with prospective learners and their parents/guardians.
2. Assist learners in understanding the various courses offered and highlight their selling points.
3. Identify opportunities and weaknesses in the SRM systems and implement necessary changes.
4. Gather feedback and efficiently resolve complaints throughout the program duration.
5. Fulfill any other duties as required.

3.5 Instructional delivery mechanisms

JNU boasts a fully dedicated team of faculty members and staff proficient in delivering online lectures through CDOE – JNU. At the commencement of each session, students will receive the academic calendar via the Learning Management System (LMS). The distribution of self-learning material, audio, and video content to students will be facilitated through the LMS via the following delivery channels:

3.5.1 Four Quadrants and Academic Delivery

No. of Credits	**Duration**	**Live Sessions**	**Quadrant – I e-Tutorial**		**Quadrant – II e-Content**	**Quadrant – III Discussion Forum**	**Quadrant – IV Assessment**
			(Recorded Lecture)	**Open Source Videos**	**e-Content(E-book/ PDF & PPT)**	**Live Session (2hrs/week)**	**CIA**
2	6 weeks	6 (1/week)	6 hrs	4 hrs	• PPT and E-book/PDF • Reading time should be mentioned for each file	Forum Topics – For raising of doubts and clarifying the same on real time basis by the Course Coordinator or his team	Multiple Choice Questions, Fill in the blanks, Practice Questions.
Total Hours= 60		**6 hrs**	**10 Hrs**		**10 Hrs**	**12 hrs**	**22 Hrs**
3	9 weeks	9 (1 session/week)	9	6	• PPT and E-book/PDF Reading time should be mentioned for each file	-same-	-same-
Total Hours = 90		**9 Hrs**	**15 Hrs**		**15 Hours**	**18 hrs**	**33 Hrs**
4	12 weeks	12 (1 session/week)	12	8	• PPT and E-book/PDF Reading time should be mentioned for each file	-same-	-same-
Total Hours = 120		**12 Hrs**	**20 Hrs**		**20 Hours**	**24 hrs**	**44 Hrs**

*Proportionate Credit wise allocation would be done.

3.6 Identification of media-print, audio, or video, online, computer aided

The Learning Management System (LMS) serves as a comprehensive digital platform, offering a multitude of features including recorded faculty video lectures, real-time discussion forums, live sessions, e-content comprising study material, open source materials, and graded assessments.

For each module within a course, there will be one live session conducted by the respective faculty member, focusing on a specific topic. CDOE-JNU has curated study material that is clear and easily comprehensible, complete with concise summaries, self-assessment questions, and case studies.

Access to these course materials is facilitated through:

- Login credentials provided in the welcome email sent by the university
- Students can also log in via the University website at https://lms.jnujaipur.ac.in/.

Online Courseware

Through the Learning Management System (LMS), students will have access to a comprehensive array of course materials, including:

- e-Books (Self Learning Materials)
- Study Guides (PowerPoint presentations)
- Tutorial Videos
- Live Interactive Online Sessions
- Frequently Asked Questions (FAQs) and Misconceptions
- Web Resources for Research Purposes
- Practice Assignments
- Online Discussion Forums
- Enriching Content such as gamified elements and Value Added Content
- The LMS is organized with semester/year-wise buckets for subjects and specializations of the respective programs as enrolled.

The Dashboard feature of the LMS serves to track and monitor students' learning progress. It includes functionalities such as:

- Monitoring progress in learning
- Comparing progress with peers
- Receiving regular notifications about upcoming webinars, virtual classes, assignments, discussion forum participations, and examinations
- Providing a platform for raising queries, which can be addressed by course coordinators, mentors, and faculty members. may be answered and conveyed by the course coordinators mentors and faculty.

3.7 Student Support Services

Students will have access to support services provided by CDOE-JNU through the Student Relationship Management (SRM) system for queries related to administration and general technical issues. A ticketing system integrated into the LMS will enable learners to connect with the CDOE-JNU technical team for support services, with resolutions handled by the appropriate authority. Notifications will also be sent to the Deputy Registrar to ensure queries are addressed within 24 hours or sooner.

For academic course-related queries, students can raise queries directly through an open discussion forum, which will notify the Course Coordinator, Program Coordinator, and Deputy Director. Queries should be resolved within 48 hours of being raised, with the Program Coordinator responsible for managing and resolving any unresolved matters. The Deputy Director will ensure the timely resolution of academic queries.

In addition to academic excellence, CDOE-JNU prioritizes the holistic development of its students. The department supports various initiatives to broaden students' opportunities and shape them into future leaders.

4. Assessment and Evaluation

4.1 Overview

The evaluation of students' learning will encompass internal assignments, quizzes, learner response sheets, and end-of-term examinations. CDOE-JNU follows a rigorous process in the development of question papers, creation of question and quiz banks, preparation and moderation of assignments, administration of examinations, analysis of answer scripts by qualified academics, and declaration of results. Question papers are meticulously framed to ensure comprehensive coverage of the syllabus.

The evaluation process will include two types of assessments:

Examination Name	Marks Division
Continuous internal assessment	30%
Summative assessment in the form of end-term examination. End-term examination will be held with proctored examination tool technology (follow **Annexure V** for guidelines and pre-requisites for Proctored Examination)	70%

The examinations are designed to evaluate the knowledge acquired during the study period.

For theory courses, internal evaluation will be conducted through Continuous Internal Assessment (CIA), which includes assignments and quizzes. The internal assessment will contribute a maximum of 30 marks for each course.

At the end of each semester, an end-of-semester online examination will be held for each course, lasting two hours.

Guidelines issued by the Regulatory Bodies from time-to-time about conduct of examinations shall be considered and new guidelines if any will be implemented.

4.2 Question Paper Pattern

Online Exam Time: 2 Hours

Max. Marks: 70

Exam will be comprising of 70 Multiple-Choice Questions (1 Mark Each) – 70 Marks

4.3 Distribution of Marks in Continuous Internal Assessments

The following procedure shall be followed for internal marks for theory courses. Weightage for Assignment is provided below:

Particular	A1 (MCQ Type)	A2 (MCQ Type)
Marks	15	15

Note: Refer to **Annexure VI** and **VII** for reference to the question paper pattern and formats of documents accepted.

Students may re-appear for CIA up to next two semesters and has to follow the same procedure. For the last semester the academic rules shall apply.

4.4 Statistical Method for the Award of Relative Grades

Letter Grade	Grade point	Range of Marks(%)
O (Outstanding)	10	90-100
A+ (Excellent)	9	80-89
A (Very good)	8	70-79

B+ (Good)	7	60-69
B (Above average)	6	50-59
C (Average)	5	40-49
P (Pass)	4	35-39
F (Fail)	0	0-34
Ab (Absent)	0	Absent

Abbreviations:

CO	Core Course	MM	Maximum Marks
DS	Discipline Specific Course	MO	Marks Obtained
GE	Generic Elective Course	SE	Skill Enhancement
AE	Ability Enhancement		

4.4.1 Cumulative Grade Point Average (CGPA) and Semester Grade Point Average

Semester Grade Point Average (SGPA):

It is the summation of product of Credit Points and Grade Points divided by the summation of Credits of all Courses taught in a semester.

SGPA = $\Sigma C_i G_i / \Sigma C$

Where, G is grade and C. is credit for a Course.

Cumulative Grade Point Average (CGPA): $CGPA = \Sigma(C_i \times Si)/\Sigma c.$

Where, Si is the SGPA of the semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Note:

- In case of any mistake being detected in the preparation of the Grade Statement at any stage or when it is brought to the notice of the concerned authority the University shall have the right to make necessary corrections.

4.4.2 Cumulative Grade Point Average (CGPA)

CGPA will be used to describe the overall performance of a student in all courses in which letter grades are awarded since his entry into the University or transferred from other University upto the latest semester as per the procedure provided in JNU Academic Regulations. It is the weighted average of the grade points of all the letter grades received by the student from his entry into the University or transferred from other University. Since multiple performance in a course in which the student has already received a grade is possible, whenever through such a process a new grade is obtained, it will replace the earlier one in the calculation of CGPA. On the other hand, if through this process merely a report emerges, this event by itself will not alter the CGPA.

A student's grades, reports, CGPA, etc. at the end of every semester/term will be recorded on a grade card, a copy of which will be issued to him. The grade card will be withheld if a student has not paid his dues or when there is a pending case of breach of discipline or a case of unfair means against him.

The faculty members also responsible for maintaining the complete records of each student's attendance, performance in different components of evaluation. If a scrutiny or statistical analysis becomes necessary, the above records and any other pertinent information should be made available by the faculty member of the course.

4.4.3 Conversion Factor

Formula for Conversion of CGPA to Percentage:

Percentage of marks = CGPA ^{x} 10

4.5 Grade card

All grades and reports and other pertinent information for a semester are given in a grade card which is a complete record of the outcome of what was intended in the original registration. The various grades and reports would be appropriately used to tally the grade card with the original registration.

Chronologically organized information from the grade cards of a student with the necessary explanation constitutes is transcript which is issued at the time the student leaves the University or at an intermediate point on request.

4.5.1 Grade cards and Certification – Student Communication

- The student can get soft copy of grade cards through the University website, the hard copy grade card would be provided only after successfully completion of full program along with degree certificate.

- Once the student completes all the mandated assignments, examinations and projects (if applicable) the final mark sheet/grade card and certificate would be dispatched by the University to the student registered address.
- All pending payments/dues need to be cleared by the student, before the final certification.
- If required, the University may request the mandatory documents from student as submitted during admission time, the students may have to re-submit the same if required during final degree certification.
- Students need to apply for degree by filling the degree application form and submit all the required documents and the applicable degree processing application fees as mentioned in this document.

4.5.2 Online Results, grade card and Degree Logistics–Internal Process

- After verification of all data by the Controller of Examination, the results would be published on the CDOE-JNU website.
- Students need to download and save the copy of semester / year wise results.

CDOE-JNU would provide hard copy grade cards and degree certificate at the end of the program to students who have successfully completed the program. Students who successfully completed the program will receive hard copy mark sheet/grade cards and a degree certificate from the University at the end of the program. A provision for On Demand Mark Sheets can be provided wherein student would have to fill the requisition and pay postal charges enabling university to dispatch the hard copy marksheets as requested by the student; prior to completion of the overall program.

5. Requirement of the Laboratory Support and Library Resources

5.1 Laboratory Support

Jaipur National University offers access to state-of-the-art laboratories equipped with the latest tools and resources necessary for research and analytical work. The laboratory support at JNU aims to foster a robust research environment, encouraging students to develop essential skills required for their academic and professional growth.

5.*2 Library Resources*

The Central Library at CDOE-JNU offers a comprehensive range of sections, including reference, circulation, audio-visual, periodical, book-bank, digital library, and reprographic sections. With a collection exceeding

1,00,000 books, the library also provides access to e-journals, online databases such as Scopus and Web of Science, and institutional repositories featuring rare book collections. University has 449 subscriptions of online and offline Journals. Equipped with modern facilities like reading rooms, computer labs, and quiet study areas, the library fosters a conducive environment for learning and intellectual growth. Additionally, the library frequently organizes workshops, seminars, and exhibitions to enhance academic engagement and promote a culture of continuous learning.

All electronic resources can be accessed seamlessly through the Local Area Network (LAN) on campus, as well as remotely via login credentials. This ensures convenient access to resources for students, faculty, and researchers both on-site and off-site.

6. Cost Estimate of the Program and the Provisions

The Estimate of Cost & Budget could be as follows (all figures on Annual basis) :

Sl. No.	Expenditure Heads	Approx. Amount
1	Program Development (Single Time Investment)	71,00,000 INR
2	Program Delivery (Per Year)	14,00,000 INR
3	Program Maintenance (Per Year)	48,00,000 INR

7. Quality Assurance Mechanism

The quality of a program hinges upon the course curriculum, syllabus, and academic delivery, all of which are meticulously designed to bridge the gap between industry standards and academia. To uphold this standard, the Centre for Internal Quality Assurance (CIQA) and the Academic Council play crucial roles.

The Academic Council is entrusted with ratifying the curriculum and any proposed changes recommended by CIQA to ensure the continual enhancement and maintenance of quality in online education at CDOE-JNU.

The Centre for Internal Quality Assurance (CIQA) is tasked with several responsibilities:

(i) Conducting periodic assessments of online learning course materials and audio-video tutorials to maintain the quality of learning.

(ii) Soliciting stakeholder feedback and implementing recommended changes to meet the evolving needs of course delivery and industry requirements.

(iii) Evaluating the quality of assignments, quizzes, and end-term assessments and providing suggestions for enhancements to sustain the learning program's standards.

(iv) Ensuring that the learning experience is truly global, aligning with program outcomes and reflecting the vision and mission of JNU.

The Chief Operating Officer (CoE) of the University oversees examinations and the evaluation system to ensure fairness and integrity in the assessment process.

CDOE-JNU is committed to continual improvement, striving to enhance processes, assessments, teaching methodologies, and e-learning materials in line with the four-quadrant approach and the implementation of the New Education Policy (NEP). The University is dedicated to delivering exceptional education across all learning modes while adhering to NEP, UGC, and other regulatory guidelines, fostering a truly global educational environment.

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Master of Computer Application

Semester – I

Object Oriented Programming with C++ and JAVA

Course Outcomes:

After completion of the course, students will be able to:

7. Gain the basic knowledge on Object Oriented concepts and describe the differences between traditional imperative design and Object-oriented design.
8. Create & design applications using Object Oriented Programming Concepts
9. Explain class structures as fundamental, modular building blocks and explain the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code.
10. Write small/medium scale C++ / java programs with simple graphical user interface
11. Describe the file handling and error handling mechanisms in C++ and Create simple data structures like arrays in a Java program.
12. Describe to access database through Java programs, using Java Data Base Connectivity (JDBC).

Course Contents

Unit I

Introduction: Object oriented paradigm, elements of object oriented programming Merits and demerits of OO methodology , C++ fundamentals , data types, operators and expressions, control flow, arrays, strings, pointers and functions, Classes and objects, constructors and destructors, operator overloading, inheritance, virtual functions and polymorphism

UNIT II

File Handling: C++ streams , console streams , console stream classes, formatted and unformatted console I/O operations, manipulators , File streams , classes file modes file pointers and manipulations file I/O , Exception handling.

UNIT III

Java Introduction: An overview of Java, data types, variables and arrays, operators, control statements, classes,

objects, methods, Inheritance, Packages and Interfaces, Exception handling, Multithreaded programming, Strings, Input /Output

UNIT IV

Introduction to Threads: Non-Threaded Applications, Threaded Applications, Creating Threads, Thread States, Runnable Threads, Coordinating Threads, Interrupting Threads

Runnable Interface

UNIT V

Introduction to JDBC: JDBC Architecture, Common JDBC Components, JDBC Packages

Books Recommended:

9. K.R.Venugopal,RajkumarBuyya,T.Ravishankar,"MasteringC++",TMH,2003.
10. Herbert Schildt, "the Java 2: Complete Reference", Fourth edition, TMH,2002.
11. Ira Pohl, "Object oriented programming using C++", Pearson EducationAsia, 2003.
12. Bjarne Stroustrup, "The C++ programming language", Addison Wesley,2000.
13. John R.Hubbard, "Programming with C++", Shamus outlines series, TMH,2003.
14. H.M.Deitel, P.J.Deitel, "Java: how to program", Fifth edition, Prentice Hall of India private limited.
15. Programming in Java: E. Balagurusamy; TMH.
16. Core Java Fundamentals – Volume I and II; Cay Horstmann, GaryCornell; Pearson Education.

Database Management System

Course Outcomes:

After completion of the course students will be able to:

6. Describe the fundamental elements of relational database management systems
7. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
8. Design ER-models to represent simple database application scenarios.
9. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
10. Improve the database design by normalization and will be familiar with basic recovery and concurrency control scheme.

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT - IV

Transaction Concept: Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition

2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

REFERENCES:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education

3. Introduction to Database Systems, C. J. Date, Pearson Education

4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.

5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, PHI.

6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

Computer Graphics

Course Outcomes:

After completion of the course, students will be able to:

6. Explain the core concepts of computer graphics, including viewing, projection, perspective, modeling and transformation in two and three dimensions.
7. Interpret the mathematical foundation of the concepts of computer graphics and Describe the fundamentals of animation, parametric curves and surfaces, and spotlighting.
8. Identify a typical graphics pipeline and apply graphics programming techniques to design and create computer graphics.
9. Apply the concepts of color models, lighting and shading models, textures, ray tracing, hidden surface elimination, anti-aliasing, and rendering.
10. Create effective OpenGL programs to solve graphics programming issues, including 3D transformation, objects modelling, colour modelling, lighting, textures, and ray tracing.

Course Contents

Unit - I

Components of Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan systems , Input devices, Graphics Software Coordinate Representations, Fundamental Problems in Geometry.

Unit –II

Algorithms: Line drawing algorithms- DDA Algorithm, Bresenham's Line Algorithm, Frame buffers, Circle and Eclipse generating algorithms, Midpoint Circle Algorithm and Sean-line polygon fill algorithm. Inside-Outside tests. Sean- Line fill of curved Boundary Areas, Boundary fill Algorithm, and Flood fill Algorithm, Character generation, Attributes of lines, curves, filling, and characters.etc.

Unit –III

Graphics Primitives: Primitive Operations, The display file interpreter-Normalized Device Coordinates. Display- File structure. Display – file algorithm. Display control and Polygons. Polygon Representation Attributes of output primitives: Line attributes - Line type. Line width, Pen and Brush options, and Line Color, Color and gray scale levels. Area- Fill Attributes- Fill styles. Pattern fill, Soft fill, Character Attributes and Text attributes.

Unit-IV

Geometric Transformations: Matrices. Scaling Transformations. Sin and Cos Rotation. Homogeneous Co-ordinates and Translation. Co-ordinate Translations. Rotation about an arbitrary point. Inverse Transformations, Transformations

Routines. 2-D Viewing- The viewing pipeline. Viewing co-ordinate, Reference Frame. Windows to view ports . co-ordinate transformation 2-D Viewing functions. Clipping operations point clipping. Line clipping. Cohen- Sutherland. Line Clipping, Polygon clipping, Sutherland Hodge man clipping.

Unit-V

Advance Concepts: Three dimensional Display Methods Parallel projection. Perspective projection. Visible line and surface identification. Surface rendering. Three Dimensional Object representations. Bezier curves and surfaces. B-Spline curves and surfaces. Visibility , Image and object precision Z- buffer algorithm. Floating horizons. Computer Animation: Design of Animation Sequences. General Computer Animation Functions- Raster Animations. Key Frame Systems. Morphing Simulating Accelerations. Motion Specifications. Kinematics andDynamics.

Books Recommended:

11. Donald Hearn and M. Pauline Baker, “Computer Graphics”,PHI.
12. Steven Harrington, “Computer Graphics: A ProgrammingApproach”, TMH.
13. Prajapati A. K, “Computer Graphics”, PPM Ed2.
14. Foley James D,”Computer Graphics”, AW Ed2.
15. Newman and Sproul, “Principle of to Interactive Computer Graphics”, McGrawHill
16. Rogers, “Procedural Elements of Computer Graphics”, McGrawHill
17. Rogers and Adams, “Mathematical Elements of Computer Graphics”, McGrawHill
18. Tay Vaughan “Multimedia, Making IT Work” Osborne McGrawHill.
19. Buford “Multimedia Systems” AddisonWesley.
20. David Hillman “Multimedia technology and Applications” GalgotiaPublications.

Information and Network Security

Course Outcomes:

After completion of the course, students will be able to:

1. Describe network security services and mechanisms.
2. Apply Symmetrical and Asymmetrical cryptography.
3. Implement Data integrity, Authentication, Digital Signatures.
4. Implement various network security applications, IPSec, Firewall, IDS, Web security, Email security, and Malicious software etc.
5. Understand how to deploy encryption techniques to secure data in transit across data networks.
6. Design security applications in the field of Information technology

Course Contents

UNIT-I

Introduction to security attacks: Services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard(DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

UNIT-II

Introduction to groupfield, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA.

UNIT-III

Message Authentication Codes: Authentication requirements, authentication functions,

message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA).

Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm.

UNIT-IV

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure.

Authentication Applications: Kerberos Electronic mail security: pretty good privacy (PGP), S/MIME.

UNIT-V

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic, transaction (SET).

System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls

Recommended Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, TMH.
3. Bruce Schiener, "Applied Cryptography". John Wiley & Sons.
4. Bernard Menezes," Network Security and Cryptography", Cengage Learning.
5. Atul Kahate, "Cryptography and Network Security", TMH .

Management Process and Organizational behavior with Environmental Ethics

Course Outcomes:

7. Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
8. Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
9. Analyze the complexities associated with management of the group behavior in the organization.
10. Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.
11. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
12. Articulate the basic structure, functions, and processes of key social systems affecting the environment

Course Contents

Unit- I

Principles of Management: Management: Introduction, Definition of management, Nature, Purpose and Functions, Levels and types of managers, managerial roles, skills for managers, evolution of management thought, Fayol's fourteen principles of management.

Unit – II

Planning: Meaning, Nature of Planning, Planning Process, Objectives, MBO, Strategies, level of strategies, policies, methods and programs, Planning Premises, Decision-making

Organizing: Organization structure, Formal and informal organizations, Principles of organizations

Controlling: Meaning, importance of controlling, controlling process, types of control, factors influencing control effectiveness.

Unit-III

Organizational Behaviour: Organizational Introduction, definition, fundamental principles of OB, contributing disciplines, challenges and opportunities. Evolution and Organizational Behavior in India.

Individual Behaviour: Foundations of individual behaviour. Ability: Intellectual abilities, Physical ability, the role of disabilities, Personality, Attitude, Motivation, Leadership

Unit-IV

Environmental Science: Definition, scope and importance, need for public awareness. Natural Resources: renewable and non-renewable resources, natural resources and associated problems, biodiversity, Threats to biodiversity, poaching of wildlife, man- wildlife conflicts. Endangered and endemic species of India, Environmental Pollution

Unit V

Social Issues and the Environment: Role of an individual in conservation of natural resources, Role of an individual in prevention of pollution. Disaster management: floods, earthquake, cyclone and landslides, resettlement and rehabilitation of people, Case Study

Books Recommended:

8. Organizational Behavior, Stephen P. Robbins, Pearson Education.
9. Organizational Behaviour, S.S.Khanka, S.Chand
10. Organizational Behavior , Mishra .M.N ,Vikas
11. Principles of Management, Koonz, Weihrich and Aryasri, Tata Mcgraw Hill.
12. Environmental Studies-Benny Joseph-Tata McgrawHill-2005
13. Environmental Studies -Dr. D.L. Manjunath, PearsonEducation-2006.
14. Text book of Environmental Science &Technology -M. Anji Reddy-BS Publication

Advance Data Structure and Algorithm Analysis

Course Outcomes:

Course Contents

Unit - I

Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Review ofStacks, Queues, Linked list, Binary Search Tree, Hash Table

Unit - II

Advanced Data Structure: BTree, 2-3 tree, 2-3-4 Tree, Splay Tree, Interval Tree, Red Black Tree, Data Structure for Disjoint Sets Union-find Algorithm, Dictionaries and priority Queues.

Unit - III

Advanced Design and Analysis Techniques: Greedy Algorithm (Knapsack Problem, Job Sequencing with Deadlines), Dynamic programming (0/1 Knapsack, TSP, Multistage Graphs), Backtracking (N Queen Problem, Sum of Subsets, Hamiltonian Cycles), Branch-and-Bound (TSP, Assignment Problem)

Unit - IV

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single source Shortest Path, Allpair Shortest Path, Maximum flow, Max Flow Min Cut Theorem, Ford Fulkerson Algorithm.

Unit – V

Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms, Vertex Cover Problem, Set Cover Problem, Hamiltonian Cycle, Clique Problem

Books Recommended

6. Horowitz Sahani, "Fundamentals of Computer Algorithms",Golgotia
7. CoremenLeisersonetal, "Introduction to Algorithms",PHI
8. Brassard Bratley, "Fundamental of Algorithms",PHI
9. M T Goodrich etal, "Algorithms Design", JohnWiley
10. A V Aho etal, "The Design and analysis of Algorithms", PearsonEducation

Object Oriented Programming with C++ and Java Lab

Course Outcomes:

After successful completion of the course students will be able to:

1. Acquire profound knowledge of object oriented programming.
2. Demonstrate the difference between the solutions offered by traditional imperative problem solving method and object-oriented method by class inheritance, data encapsulation, polymorphism as fundamental building blocks to generate reusable code.
3. Understand and implement error handling and file handling routines.
4. Explain the Internet Programming, using Java Applets.

8. Create and design a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT).
9. Describe to access database through Java programs, using Java Data Base Connectivity (JDBC)
10. Develop Mini Projects using constructs of OOPs and Java.

Course Contents:

27. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
28. Write a C++ program to declare Struct. Initialize and display contents of member variables.
29. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
30. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
31. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).
32. Write a C++ to illustrate the concepts of console I/O operations. 18
33. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
34. Write a C++ program to allocate memory using new operator.
35. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
10. Write a C++ program to create an array of pointers. Invoke functions using array objects.
36. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

37. Write a Java Program to sort a list of names selection sort technique.

38. Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object.

39. Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object.

40. Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.

41. Write a Java Program to demonstrate use of sub class.

42. Write a Java Program to demonstrate use of nested class.

43. Write a Java program to practice – using String class and its methods. – using String Buffer class and its methods.

44. Write a Java Program to implement Vector class and its methods.

45. Write a Java Program to implement Wrapper classes and their methods.

46. Write a Java Program to implement inheritance and demonstrate use of method overriding.

47. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.

48. Write a program to demonstrate -use of implementing interfaces. – use of extending interfaces.

49. Write a Java program to implement the concept of importing classes from user defined package and creating packages.

50. Write a program to implement the concept of threading. -by extending Thread Class -by implementing Runnable Interface.

51. Write a program to implement the concept of Exception Handling – using predefined exception – by creating user defined exceptions.

52. Write a program to execute select query using JDBC.

Mini Project (Application Development using C++ and Java)

13. Employee Record System

14. Hangman Game

15. Hospital Management System

16. Library Management System

17. Medical Store Management System

18. Modern Periodic Table

19. Pacman Game

20. Personal Diary Management System

21. Phonebook Application

22. Quiz Game
23. School Billing System
24. Snake Game

Database Management System Lab

Course Outcomes:

21. After completion of the course students will be able to:
22. Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS.
23. Develop a clear understanding of the conceptual frameworks and definitions of specific terms that are integral to the Relational Database Management
24. Attain a good practical understanding of the SQL.
25. Develop clear concepts about Relational Model.
26. Examine techniques pertaining to Database design practices
27. Prepare various database tables and joins them using SQL commands
28. Understand the basic concepts of Concurrency Control & database security
29. Understand the basic concept how storage techniques are used to backup data and maintain data access performance in peak hours
30. Evaluate options to make informed decisions that meet data storage, processing, and retrieval needs.

Lab Experiments:

31. Creation of a database and writing SQL queries to retrieve information from the database.
32. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
33. Creation of Views, Synonyms, Sequence, Indexes, Save point.
34. Creating an Employee database to set various constraints.
35. Creating relationship between the databases.
36. Study of PL/SQL block.
37. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
38. Write a PL/SQL block that handles all types of exceptions.
39. Creation of Procedures.
40. Creation of database triggers and functions

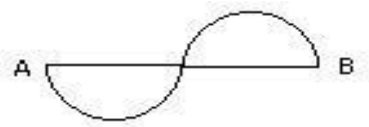
Mini project (Application Development using Oracle/ MySQL)

9. Inventory Control System.
10. Material Requirement Processing.
11. Hospital Management System.
12. Railway Reservation System.
13. Personal Information System.
14. Web Based User Identification System.
15. Timetable Management System.
16. Hotel Management System.

Computer Graphics Lab

Lab Experiments:

34. Write a program to implement DDAalgorithm.
35. Write a program to implement Bresenham's linealgorithm.
36. Modify the Bresenham's line algorithm so that it will produce a dashed-line pattern. Dash length should be independent ofslope.
37. Write a program to implement Midpoint circle generatingalgorithm.
38. Write a program to implement Bresenham's circle generatingalgorithm.
39. Write a program to draw the followingfigure:-



Point A and B is input.

40. Write a program to implement outlinecharacter.
41. Write a program to implement bitmapcharacter.
42. Write a program to implement ellipse generatingalgorithm.
43. Write a program for 2D line drawing as Raster GraphicsDisplay.
44. Write a program for circle drawing as Raster GraphicsDisplay.
45. Write a program for Polygon filling as Raster GraphicsDisplay.
46. Write a program to implement Line Clipping Algorithm using Cohen

SutherlandAlgorithm.

47. Write a program to implement Line Clipping Algorithm using Liang Barsky Algorithm.
48. Write a program to Implement Polygon Clipping Algorithm using Sutherland - HodgmanAlgorithm.
49. Modify the Liang-Barsky line clipping algorithm to polygonclipping.
50. Write a program to implement scaling onpolygon.
51. Write a program to implement transferring onpolygon.
52. Write a program to implement rotation onpolygon.
53. Write a program to implement reflection onpolygon.
54. Write a program for displaying 3D objects as 2D display using perspective transformation.
55. Write a program for rotation of a 3D objects about arbitraryaxis.
56. Write a program for Hidden surface removal from a 3Dobjects.
57. Write a program to draw a hut or other geometricalfigures.
58. Writeaprogram to rotate a Circle around any arbitrary point or around the boundary of anothercircle.
59. Write a menu driven program to rotate, scale and translate a line point, square, triangle about theorigin.
60. Write a program to implement polygonfilling.
61. Write a program to implement transformations in threedimensions.
62. Write a program to implement set of Basic Transformations on Polygon i.e. Translation, Rotation andScaling.
63. Write a program to implement set of Composite Transformations on Polygon I.e. Reflection, Shear (X &Y), rotation about an arbitrarypoint.
64. Find a transformation of triangle (coordinates will be given) by Rotating 45 Degree about the origin and then translating one unit in X and Y direction. Program to rotate circle around anothercircle.
65. Show that transformation matrix for a reflection about the line y=x, is Equivalent to a reflection relative to the x axis followed by a counter clockwise rotation of 90 degrees.
66. Program to perform varioustransformations.

Mini project (Application Development using C and C++)

12. To draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position

and properties of the light source along with the properties of the surfaces of the solid object used in the scene.

13. Create and rotate a triangle about the origin and a fixed point.
14. Draw a color cube and spin it using OpenGL transformation matrices.
15. Draw a color cube and allow the user to move the camera suitably to experiment with
16. Clip a lines using Cohen-Sutherland algorithm
17. Design, develop and implement recursively subdivide a tetrahedron to form 3D sierpinski gasket. The number of recursive steps is to be specified by the user.
18. Develop a menu driven program to animate a flag using Bezier Curve algorithm
19. Develop a menu driven program to fill the polygon using scan line algorithm
20. Write a program to draw a moving car.
21. Write a program to design a sky consisting of moving clouds using set of ellipses and circles.
22. Write a program to design a Solar Planet System using a set of circles.

Advance Data Structure and Algorithm Analysis Lab

Course outcomes:

After successful completion of the course, students will be able to:

1. Understand basic as well as advanced data structures for efficient data storage and retrieval
2. Illustrate how the choice of data structures and the algorithm design methods impact the performance of programs.
3. Perform analysis of different complex sorting and searching algorithms.
4. Identify among tractable and intractable problems.
5. Apply graph algorithms to find shortest path to traverse graph using BFS traversal technique.

Write Programs in C/C++ for

30. Creation of a binary search tree and insertion & deletion intoit.
31. Creation of a Red Black tree and all the associated operations onit.
32. Implementing an AVL tree and all the associated operations onit.
33. Multiplication of two matrices using Strassen's Matrix Multiplicationmethod.
34. Solving Knapsackproblem.
35. Implementing shortest path algorithms (Dijkastra's and Bellman FordAlgorithm).
36. Finding the minimum cost Spanning Tree in a connectedgraph.
37. Solving 8 Queen'sproblem.
38. Finding the number of connected components in aGraph.
39. Write a program to find the minimal spanning tree of a graph using the Prim's algorithm. The program should be able to read in the weight matrix of a graph and produce the corresponding matrix of the minimal spanning tree. Generate weight matrices with a large number of nodes and estimate the time complexity of the algorithm.
40. Use a greedy algorithm to generate approximate solutions of the 0/1 knapsack problem.
41. Write a program to add two polynomials using most suitable dynamic datastructure.
42. Write a program to sort list of 50 names using Radix/Bucketsort.
43. Write a program to traverse the graph using BFS traversaltechnique.
44. Write a program to find single source shortest path using Dijkastra'salgorithm.
45. Write a program to add two sparsematrices.
46. Write a program for a given directed graph G (v, e). Find and print all the nodes reachable from

a node say J.

47. Find all distinct solutions of the n-queens problem using a backtrackingalgorithm.

48. Write a program to find the closest pair of points using a divide and conquer strategy. Use the random number generator to generate a large number of points in a unit square as input to thealgorithm.
49. Write a program to find the minimal spanning tree of a graph using the Prim's algorithm.Theprogramshouldbeabletoreadintheweightmatrixofagraphand

    produce the corresponding matrix of the minimal spanning tree. Generate weight matrices with a large number of nodes and estimate the time complexity of the algorithm.

50. Use a greedy algorithm to generate approximate solutions of the 0/1 knapsack problem.
51. Write a program to add two polynomials using most suitable dynamic datastructure.
52. Write a program to sort list of 50 names using Radix/Bucketsort.
53. Write a program to traverse the graph using BFS traversaltechnique.
54. Write a program to find single source shortest path using Dijkastra'salgorithm.
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56. Write a program for a given directed graph G (v, e). Find and print all the nodes reachable from a node say J.
57. Find all distinct solutions of the n-queens problem using a backtrackingalgorithm.
58. Write a program to find the closest pair of points using a divide and conquer strategy. Use the random number generator to generate a large number of points in a unit square as input to thealgorithm.

Semester II

Theory of Computation

Course outcomes:

After successful completion of the course students will be able to:

1. Define finite automata, regular grammars, and regular expression representations of regular languages
2. Apply the pumping lemma for regular languages to determine if a language is regular
3. Convert between grammars and push-down automata for context-free languages.
4. Determine if a language is regular or context-free.
5. Demonstrate that a grammar is ambiguous.
6. Translate a context-free grammar from one form to another.
7. Produce simple programs for a Turing Machine.
8. Explain the concept of un-decidability and list examples of un-decidable problems.

Course Contents

UNIT 1

Automata: Basic machine, FSM, Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata. Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill- Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

UNIT 2

Context –Free Grammars: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT 3

Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

UNIT 4

Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM, Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators. Properties of recursive & recursively enumerable languages, Universal Turing machine

UNIT 5

Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

Books Recommended:

1. John E. Hopcroft, Jeffery Ullman,"Introduction to Automata theory, Langauges& computation" , Narosa Publishers.

2. K.L.P Mishra &N.Chandrasekaran,"Theory of Computer Science", PHI Learning

3. Michael Sipsev,"Theory of Computation",Cenage Learning

4. John C Martin, "Introdution to languages and theory of computation", McGraw Hill

5. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.

6.Kohavi,"Switching& Finite Automata Theory",TMH

Software Engineering

Course Outcomes:

After successful completion of the course, students will be able to:

6. Learn different software engineering approaches to resolve different software crises like failure in operation, non-meeting of requirements delayed delivery, over budget.
7. Compare different software process models to find the appropriate one.
8. Apply 4 GL techniques to develop software system.
9. Develop manage software project from project initiation to project closure.
10. Develop quality software systems with latest tools and techniques.

Course Contents

Unit –I

Software Development Approaches: Introduction; Evolving Role of Software; Software Characteristics; Software Applications.

Software Design Processes: Introduction; What is meant by Software Engineering? Definitions of Software Engineering;

Unit-II

Software Requirement Specification: Analysis Principles, Water Fall Model, The Incremental Model, Prototyping, Spiral Model, Role of management in software development, Role of matrices and Measurement, Problem Analysis, Requirement specification, Monitoring and Control.

Software-Design: Design principles, problem partitioning, abstraction, top down and bottom up-design, Structured approach, functional versus object oriented approach, design specifications and verification, Monitoring and control, Cohesiveness, coupling, Fourth generation techniques, Functional independence, Software Architecture, Transaction and Transform Mapping, Component – level Design, Fourth Generation Techniques.

Unit III:

Software Reliability: Introduction; Software reliability metrics; Programming for Reliability: Fault avoidance, Fault tolerance, Software Reuse.

Software Design Principles: Introduction, System Models: Data-flow models, Semantic data models, Object models, Inheritance models, Object aggregation, Service usage models, Data Dictionaries; Software Design: The design process, Design Methods, Design description, Design strategies, Design quality; Architectural Design.

Unit-IV

Software Project Management: The Management spectrum- (The people, the product, the process, the project), cost estimation, project scheduling, staffing, software configuration management, Structured Vs. Unstructured maintenance, qualityassurance, project monitoring, riskmanagement.

Unit-V

Software Reliability & Quality Assurance: Reliability issues, Reliability metrics, Reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM.

CASE (Computer Aided Software Engineering): CASE and its Scope, CASE support in software life cycle, documentation, project management, internal interface, Reverse Software Engineering, Architecture of CASEenvironment.

Books Recommended:

9. Pressman, Roger S., "Software Engineering: A Practitioner's Approach Ed. Boston: McGraw Hill,2001
10. Jalote, Pankaj, "Software Engineering Ed.2", New Delhi: Narosa2002
11. Schaum's Series, "Software Engineering",TMH
12. Ghezzi, Carlo and Others, "Fundamentals of Software Engineering",PHI
13. Alexis, Leon and Mathews Leon, "Fundamental of Software Engineering",Vikas
14. Sommerville, Ian, "Software Engineering", AWL,2000
15. Fairly, "Software Engineering", New Delhi:TMH
16. Pfleerger, S, "Software Engineering", Macmillan,1987

Web Technology

Course outcomes:

After successful completion of the course, students will be able to:

7. Explain the core concepts to develop a dynamic webpage by the use of java script and HTML.
8. Identify and Incorporate aesthetics and formal concepts of layout and organization to design websites that effectively communicate using visual elements.
9. Apply and Select markup languages for processing, identifying, and presenting of information in web pages.
10. Interpret the fundamental computer theory to basic programming techniques and use scripting languages and web services to transfer data and add interactive components to web pages..
11. Describe the Concept and plan an internet-based business that applies appropriate business models and web technologies and multiple web technologies to create advanced web components.
12. Create and design websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations and Incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek.

Course Contents

Unit I

Introduction: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of Web 2.0. Web Design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation.

Unit II

HTML : Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5

Style sheets : Need for CSS, introduction to CSS, basic syntax and structure, usingCSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3

UnitIII

JavaScript : Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and Java Script, Events and buttons. XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT.

Unit IV

PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP.

Unit V

PHP and MySQL : Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

Books Recommended

7. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley,India.
8. Web Technologies, Black Book, dreamtechPress
9. HTML 5, Black Book, dreamtechPress
10. Web Design, Joel Sklar, CengageLearning
11. Developing Web Applications in PHP and AJAX, Harwani,McGraw-Hill
12. Internet and World Wide Web How to program, P.J. Deitel & H.M.Deitel, Pearson

Computer Based Optimization Techniques

Course Outcome:

After successful completion of the course, students will be able to:

6. Build a mathematical programming model of a real-life situation
7. Understand the basic theory and methods for linear programming problems
8. Understand the basic properties of the interior point method and how to use it to solve convex optimization problems
9. Apply branch and bound and/or cutting plane algorithms to solve integer programming problems
10. Use a computer package to solve a mathematical programming problem that arises in practice

Course Contents

Unit - I

Linear Programming Problems (LPP): Definition, Construction of LPP, Solution of LPP: Graphical Method, Simplex Method, Two Phase Method, Big-M Method, Sensitivity Analysis, Duality in LPP, Dual SimplexMethod.

Unit - II

Transportation Models and its Variants: Definition, Solution of TP: Determination of basic feasible solution, Iterative computation of solution. Assignment Problems**:** Definition, Hungarian Method for AP.

Unit - III

Integer Linear Programming Problems: Introduction, illustrative applications, Solution of Integer Linear Programming Problem: Cutting Plane Method, Branch and Bound Method. 0-1 integer linear programming problem.

Introduction to NLP: Definition of NLP, Convex Programming Problems, Quadratic Programming Problems: Wolfe's Method for Quadratic Programming, Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-Points etc.

Unit - IV

Queuing Systems: Introduction to Queues, Basic Elements of Queuing Models, Queue Discipline, Memory less Distribution, Role of Exponential and Poisson Distributions, Markovian Process, Erlang Distribution, Symbols and

Notations, Distribution of Arrivals, Distribution of Service Times, Definition of Steady and Transient State. Poisson Queues (M/M/1, M/M/C).

Unit - V

Inventory Models: Inventory models –various costs deterministic inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory models, Economic lot sizes-price breaks.

Books Recommended:

1. Hadley, G.,"Linear Programming, and Massachusetts",Addison-Wesley
2. Taha, H.A, "Operations Research – An Introduction", Macmillan
3. Hiller, F.S., G.J. Lieberman, " Introduction to Operations Research",Holden-Day
4. Harvey M. Wagner, "Principles of Operations Research with Applications to ManagerialDecisions",
5. Prentice Hall of India Pvt.Ltd.
6. Swarup Ketal, "Operation Research", S.Chand
7. Billey E. Gillet, "Introduction to Operation Research- A Computer oriented AlgorithmApproach"
8. Sharma S D , "OperationResearch"

Microprocessor & Assembly Language Programming

Course outcomes:

After successful completion of the course, students will be able to:

1. Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's (8085) internal architecture and its operation within the area of manufacturing and performance.
2. Compare accepted standards and guidelines to select appropriate Microprocessor (8085) and to meet specified performance requirements.
3. Analyze assembly language programs; select appropriate assemble into the machine a cross-assembler utility of a microprocessor.
4. Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
5. Learn microprocessor's (8086) internal architecture and its operation within the area of manufacturing and performance. Evaluate assembly language programs and download the machine code that will provide solutions to real-world control problems.
6. Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.

Course Contents

Unit- I

Introduction: Introduction to Microprocessors and microcomputers, Study of 8 bit
Microprocessor, Bus concept and organization, concept of multiplexing and de- multiplexing, 8085 pin configuration and signals, Internal Architecture and operations, Types of Interrupt schemes.

Unit-II

Instruction Set: Programming model of 8085, Classification of instruction and instruction Format, addressing modes, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction, Different groups of Instruction set, (Data transfer, Arithmetic, logical, Branching, Stack, I/O and Machine control group and RST instructions)

Unit- III

Programming Technique: Assembly Language Programming and Debugging, Advance Assembly Language

Programming, Counter and Time delay; Macros, subroutine; Stack- implementation and uses with examples.

Unit-IV

Microprocessor interfacing: Type of RAM and ROM, Memory Mapping schemes, Memory interfacing, Programmable Peripheral Interface 8255, USART 8251, programmable interval timer 8253, Programmable interrupt controller 8259;

Unit-V

Bus Standards: Serial bus - RS232C and RS422A, Parallel interface- Centronics and
IEEE 488, Advanced Microprocessor: Introduction of 8086, Architecture, BIU and EU, Segmentation, Pipelining, Pin Diagram, Minimum and Maximum Mode, Addressing Modes

Books Recommended:

5. Ramesh. S. Gaonkar, " Microprocessor architecture Programming and Application with 8085" Pen International Publishing, 4thEdition
6. Douglas V Hall., Microprocessors Interfacing, TMH (2ndEdition).
7. S. Girdher and Gosh," 0000 to 8085"PHI.
8. B.Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.

E-Commerce and Digital Marketing

Course outcomes:

After successful completion of the course, students will be able to:

1. Describe the ever-changing digital environment in which e-commerce exists and its impact on operational needs, capabilities, opportunities and challenges.

2. Describe digital marketing methods organizations can use in combination with other marketing methods and integrate into their international sales and marketing plan.

3. Describe the elements to consider in the design of an efficient and effective e-commerce operation, including the ability to integrate with other systems within an organization, localize for each target market and accommodate growth.

4. Assess organizational readiness to set up and support an e-commerce operation serving national or international markets.

5. Describe an e-commerce operation using components and practices that provide a storefront, a shopping cart and payment options, minimize security and privacy risks, are user friendly, and provide timely customer support and delivery

Course Contents

Unit I

Introduction to Electronic Commerce: E-Commerce Framework- Anatomy of E-Commerce Applications, E-Commerce Consumer & Organization Applications, E- Commerce and World Wide Web, Internet Service Providers, Architectural Framework for Electronic Commerce, WWW as the Architecture, Hypertext publishing

Unit II

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, Government to Citizen, Features and Benefits, Portal Vs. Website.

Other Models :-Brokerage Model, Aggregator Model, Info-Mediary Model, Community Model and value chain Model, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, e-Banking, E-Retailing

Unit III

Electronic payment system: Type of payment systems- e-cash and currency servers, e- Cheques, credit card, smart card, electronic purses and debit cards, operational, credit and legal risks of e payments, risk management options for e-payment System, order fulfillment for e-commerce

Security issues in e-commerce: Security risk of e-commerce, type and sources of threats; protecting the electronic commerce assets and intellectual property; firewalls; client server network security; data and message security; digital identification and electronic signature; encryption approach to ecommerce security.

Unit IV

Introduction of the Digital Marketing: Creating initial Digital Marketing Plan; SWOT Analysis; Target Group Analysis; Content management; Optimization of Web Sites; MS Expression; SEO Optimization, Writing the SEO content, Tools used for Search engine Marketing, Budgeting. Report generation

Unit V

Web Design: Optimization of Web sites, Google Ad Words- creating accounts , Google Ad Words- types, Introduction of Social Media Marketing, Social Media Marketing;

E-mail marketing, E-mail marketing plan, E-mail marketing campaign analysis, Bing Advertising, Mobile Marketing (SMS Marketing), GEO Marketing, YouTube Video Marketing & Advertising

Introduction to CRM: CRM platform , CRM models, CRM platform, Marketing Automation, Sales Integration Products, Integration Business Reporting, Case Studies.

Books Recommended:

6. Ravi Kalakota, “Electronic Commerce: A Manager's Guide”, Addison-Wesley Professional, Edition 2012.
7. Ian Daniel, “E-Commerce get it Right”, Neuro Digital Publication, 2011
8. Digital marketing for Dummies ,RyanDeiss and russ Hennesberry,2017
9. Epic Content Marketing, Joe Pulizzi McGraw Hill Education
10. New Rules of Marketing and PR, David Meerman ScottLatest Edition: 6th EditionPublication: John Wiley & Sons

Software Engineering Lab

Course outcomes:

On successful completion of the course students will be able to:

6. Plan a software engineering process life cycle ,includingthe specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements.
7. Analyze and specify software requirements through a productive working relationship with various stakeholders of the project
8. Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
9. Know how to develop the code from the design and effectively apply relevant standards and perform testing,and quality management and practice
10. Able to use modern engineering tools necessary for software project management, time management and software reuse.

Course Content

9. Define a generalization hierarchy containing the Student entity type, the UndStudent entity type, and the GradStudent entity type. The Student entity type is the supertype and UndStudent and GradStudent are the subtypes. The Student entity type has attributes StdNo (primary key), StdName, StdGender, StdDOB (date of birth), StdEmail, and StdAdmitDate. The UndStudent entity type has attributes UndMajor, UndMinor, and UndClass. The GradStudent entity type has attributes GradAdvisor, GradThesisTitle, and GradAsstStatus (assistantship status.) The generalization hierarchy should be completeand disjoint.
10. Draw up to 3rd – Level DFDfor
    a) Library Management System" with complete role of everyconnection.
    b) Draw up to 3rd – Level DFD for "On-Line Customer Care Management System" with complete role of everyconnection.
11. Define SRS for any field/Item and write Ten (10) Test Cases five for valid input and five for Invalid input Define SRS for any field/Item and write Ten (10) Test Cases, five for valid input and five for Invalidinput.
12. Draw an ERD containing the Patient, Physician, and the Visit entity types connected by 1-

M relationships from Patient to Visit and Physician to Visit. Choose appropriate names for the relationships. Define minimum cardinalities so that patients and physicians are mandatory for a visit, but visits are optional for patients and physicians. For the Patient entity type, add attributes PatNo (primary key), PatFirstName, PatLastName, PatStreet, PatCity, PatState, PatZip, and PatHealthPlan. ForthePhysician entity type, add attributes PhyNo (primary key), PhyFirstName, PhyLastName, PhySpecialty, PhyPhone, PhyEmail, PhyHosipital, and PhyCertification. For the Visit entity type, add attributes for the VisitNo (primary key),VisitDate, VisitPayMethod (cash, check, or credit card), and Visit Charge. If you are using the ER Assistant of another drawing tool that supports data type specification, choose appropriate data types for the attributes based on your common knowledge.

13. Use of designer tools like for making DFD/ERDs using **process analysttool**

- Laboratory experiments in use of interactive SQL and other4GLs.
- Designing and implementing fully functional informationsystem.
- Develop software for implementation of information system for the supplychain
- Develop the software module for the testing of the softwareroutines.

Note: Students are advised to use **Oracle 91, JAVA2, and Visual Basic 6**. However depending upon the availability of software's, Mini project may also be planned & carried out throughout the semester to understand the important concepts of database and testing until the end of semester.

14. Introduce the lab environment and tools used in the software engineering lab: WebCT, Rational Rose for UML, MS Project, MS Source Safe (configuration management), Rational Requisite Pro (Software requirements and prerequisite pro), and Junit (Software Testing).

The key objectives are:

Discuss the Project & learn how to write project definition.

Learn the cycle phases (project management, requirement engineering, software design, prototyping and testing software life).

Practice the software phases using aproject.

Learn a number of CASE tools and use them in a project within a team work environment.

Get familiar with UML (modeling language for analysis and design).

15. Introduction to UML, Unified Modelling Language and use case diagrams using Rational Rose :

Develop System modeling (DFD and ER) using Rational Rose.

Design Flow of events and activity diagram using Rational Rose and how to write SRS document. OO analysis: discovering Classes Interaction diagrams: sequence and collaboration diagrams using Rational Rose.

Developing State Transition Diagram using Rational Rose

Developing Component and deployment diagrams for Final Documented Project Report using Rational Rose.

16. Software testing using Junit and other testingtools.

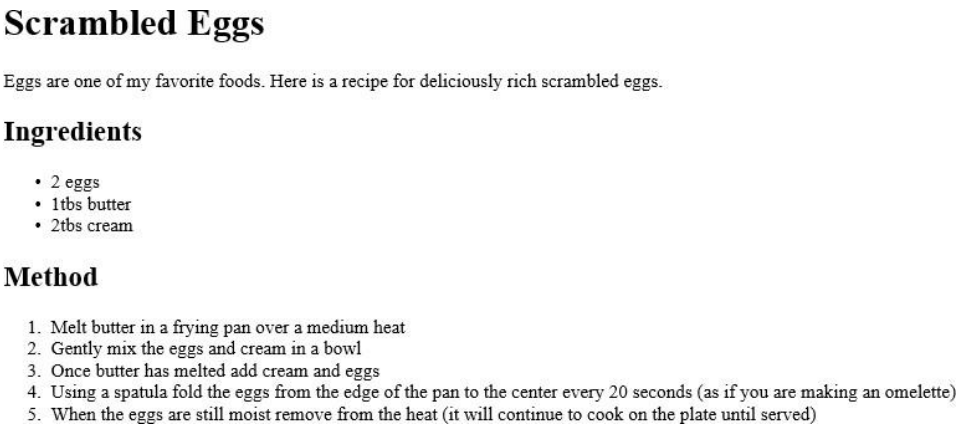
Web Technology Lab

Course outcomes:

6. On successful completion of the course students will be able to:
7. Explain the history of the internet and related internetconcepts that are vital in understanding web development.
8. Discuss the insights of internet programming and implement complete application over the web.
9. Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
10. Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.

Course Contents:

36. Write a program to make the following list using listtag



Scrambled Eggs

Eggs are one of my favorite foods. Here is a recipe for deliciously rich scrambled eggs.

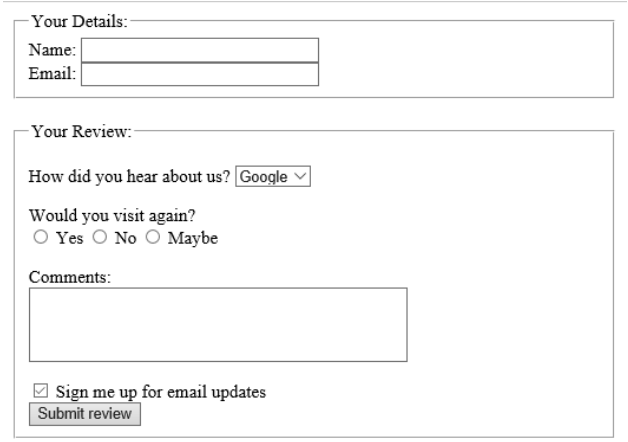
Ingredients

- 2 eggs
- 1tbs butter
- 2tbs cream

Method

1. Melt butter in a frying pan over a medium heat
2. Gently mix the eggs and cream in a bowl
3. Once butter has melted add cream and eggs
4. Using a spatula fold the eggs from the edge of the pan to the center every 20 seconds (as if you are making an omelette)
5. When the eggs are still moist remove from the heat (it will continue to cook on the plate until served)

37. Create the following form and validate it usingHTML-5



38. Write a program to make the followingstructure

	Home starter hosting	Premium business hosting
Disk space	250mb	1gb
Bandwidth	5gb per month	50gb per month
Email accounts	3	10
Server	Shared	VPS
Support	Email	Telephone and email
Setup	Free	Free
FTP accounts	1	5
	Sign up now and save 10%!	

39. Write a program to change the position of a div.
40. Write a program to showtooltip.

41. Output is shown below, write the code for it. (also use anchortag)

Film Folk

Festival Diary

Here are some of the film festivals we will be attending this year.
Please contact us if you would like more information.

January

Sundance Film Festival
Park City, Utah, USA
20 - 30 January 2011

February

Tropfest
Sydney, Australia
20 February 2011

42. Write a program to create thefollowing.

The Evolution of the Bicycle

In 1817 Baron von Drais invented a walking machine that would help him get around the royal gardens faster: two same-size in-line wheels, the front one steerable, mounted in a frame upon which you straddled. The device was propelled by pushing your feet against the ground, thus rolling yourself and the device forward in a sort of gliding walk.

"Life is like riding a bicycle. To keep your balance you must keep moving." - Albert Einstein

The machine became known as the Draisienne (or "hobby horse"). It was made entirely of wood. This enjoyed a short lived popularity as a fad, not being practical for transportation in any other place than a well maintained pathway such as in a park or garden.

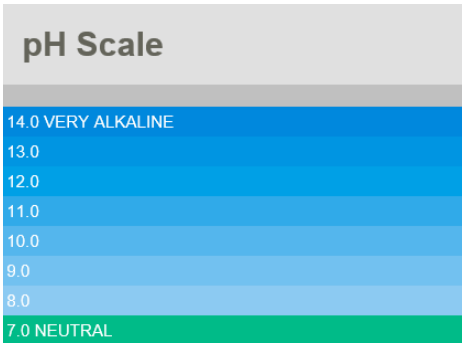
The next appearance of a two-wheeled riding machine was in 1865, when pedals were applied directly to the front wheel. This machine was known as the velocipede (meaning "fast foot") as well as the "bone shaker," since its wooden structure combined with the cobblestone roads of the day made for an extremely uncomfortable ride. They also became a fad and indoor riding academies, similar to roller rinks, could be found in large cities.

43. Write a program to show scrollingtext.

44. Write a program to create a blinkingheader.

45. Write a program to make an html file that look like thefollowing.

46. Write a program to create thefollowing.



47. Write a program to create an image gallery as shown in the imagebelow.

48. Write a program to automatically typewrite the message.

49. Write a program to convert the text into biggertext.

50. Write a program to select allcheck-boxes.

51. Write a program to change background color of abutton.

52. Write a program to change text color of abutton.
53. Write a program to insert background image to abutton.

54. Write a program to change background color of a textarea.

55. Write a program to change text color of a textarea.

56. Write a program to insert background image to a textarea.

57. Write a program to extract the domain name from the given emailId.

58. Write a program to create drop down navigation (select box)menu.

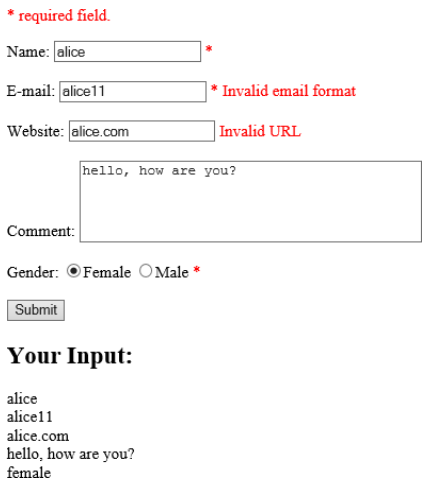
59. Write a program to create top drop downmenu.

60. Write a program to create always-on-topmenu.
61. Write a program to create inset bordersmenu.

62. Write a program to calculate the number of days between two dates. Dateshould be given by theuser.

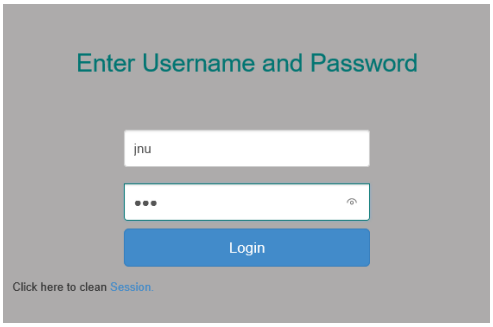
63. Write a program to read a file (use readfile ()) and write it to the outputbuffer.

64. Write a program to create the following form with propervalidations



65. Write a program to create a dynamic table. Number of rows and numberof columns should be given by theuser.

66. Write a program to clean the sessions of a loginform.

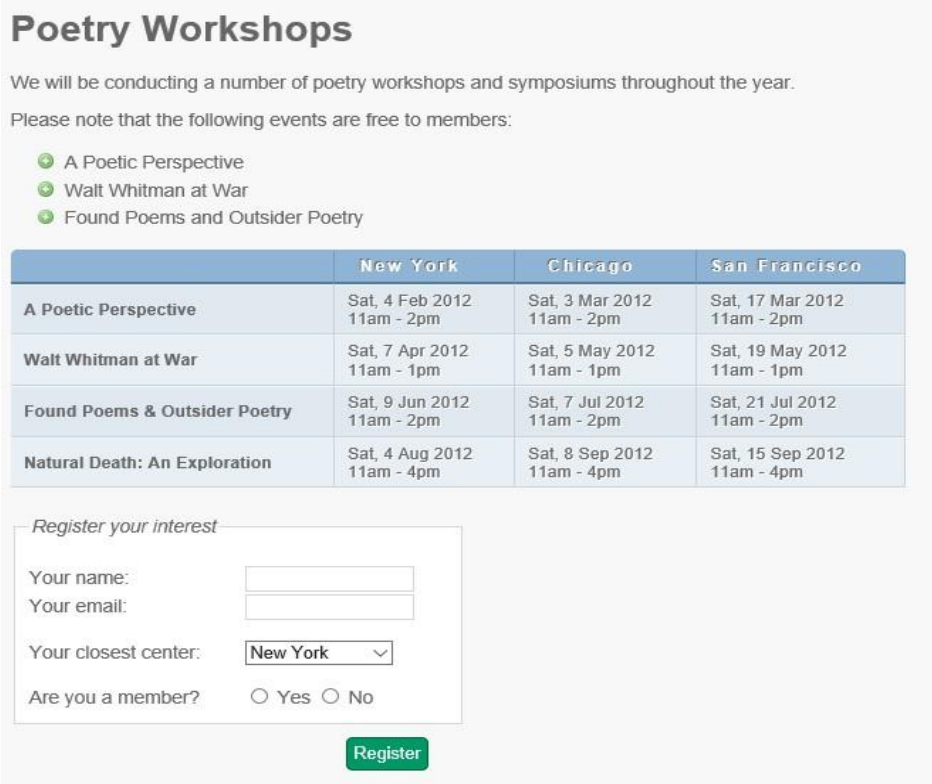


67. Create a registration form for a student and store the details in databaseusing PHP andMySql.

68. Write a program to update and delete the details from database(MySql).

69. Write a program to store and retrieve images fromdatabase.

70. Write a program to create a page for poetry workshop. The following imagecan help you to better understandit



Microprocessor Lab

Course Outcomes:

After successful completion of the course, students will be able to:

5. Explain programming based on 8086 microprocessor and 8051 microcontroller.
6. Design 8086 microprocessor based ALP using arithmetic, logical and shift operations.
7. Understand modular and Dos/Bios programming using 8086 micro processor.
8. Develop assembly level programs and providing the basics of the processors

Contents

14. Study of 8085Kit.
15. WRITEAPROGRAM to add two 16 bit numbers present in memory location & add store the result in another memorylocation.
16. Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverseorder.
17. Write a program to find the square of anumber.
18. Write a main program & a conversion subroutine to convert Binary to its equivalentBCD.
19. Write a program to multiply two 8 bit numbers whose result is 16bit.
20. Write a program of division of two 8 bitnumbers.
21. Write a program to find largest from a givenarray.
22. Write a program to find smallest number from a givenarray.
23. Write a program to Sort an array in ascendingorder.
24. Write a program to Sort an array in descendingorder.
25. To study and interface the PPI (8255) with8085.
26. To study and interface the PPI (8251) with8085.

Seminar

Each student will present a seminar on latest topics of Computer Science. (Note: Before finalizing seminar topic, students are required to consult the Seminar guide to see if the topic satisfies the requirements of the Seminar). Seminars Topic should be chosen from emerging technologies excluding the contents of Syllabus.

Each student will get a 20 + 5 minute timeslot: 20 minutes for seminar presentation and 5 minutes for questions from the audience.

No. of Copies: 2 Hard Copies +One Softcopy in CD (attached with report).

Details of limits pertaining to seminar Presentation

1. Presentation time limit (min): 20 min

2. Question &Answer (min): 5 min

3. Suggested no. of Slides: 15-20

Seminar Report Format (Page limit: 35-40)

It is mandatory to use plain A4 sized sheets. All material should be typed in double spacing, Times New Roman 12. The recommended margins are 25 mm (1inch) for top, bottom, right and left with an extra 13 mm (0.5 inch) for binding on the left. Other than page numbers, no material should intrude into these margins.

Submission

The report should be submitted within the given deadline to the designated person. Late submission may not be acceptable; if allowed, it will necessarily invite a penalty which may be reflected in your grade.

Guidelines for Summer Training after –II Semester

7. Students of MCA have to undergo Summer Training or for an in-house training for 4 to 6 weeks in an approved software Industry after completing II Semester.

8. During the Summer Training, the students will be asked by the Organization to work on a Summer Project.

9. After the completion of the training, each student will be required to submit a Project Report hard bound for evaluation. The Summer Training Project carries 200 marks, divided as follows:-

   Internal guide : 60 marks

   Presentation before external examiner : 140 marks

10. Project Report should contain annexure about the company, turnover, organizational structure, application domain, policies of the company, vision, mission etc. It should also have a mention about the standing of the company, past performance and future plans. Annexure may also contain photographs of personalities, building, infrastructure as well as other publicity materials of the organization which the student want to add as part of the project report. **The project report should consist of 50-60 pages.**

11. In case the Organization gives more than one project to a student, all such projects must be included in the Summer Training Report.

12. In case more than one student is undergoing Summer Training in the same Organization, efforts should be made to prepare separate project reports by choosing different market segments or different aspects, so that the projects can be differentiated for the purpose of evaluation. No combined project reports will be accepted.
    All students are expected to behave with proper decorum, courtesy and decency during the above training period, so that they create a good image about themselves and MERI. They must sincerely work during the training period as per the directions of the Organization. At no stage, there should be any complaint from the Organization about their work or behavior.

Semester III

Compiler Design

Course Outcomes:

After successful completion of the course, students will be able to:

6. Identify and convert any instruction of a program to convert from source language to target language and should be recognize what happens at each and every phase of a compiler.
7. Demonstrate understanding of the different types of parsing techniques and should be in a position to solve the problem.
8. Build the source code meaning and & organize it into Intermediate code .
9. Differentiate and analyze the program segment and be able to generate the intermediate code.
10. Determine the optimized code and techniques which helps in reducing the no. of instructions in a program and also the utilization of registers in an effective way.

Course Contents

Unit - I

Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler Programming Languages: High level languages, The lexical and syntactic structure of a language, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission. Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, and Finite state Machines, Implementation of Lexical Analyzer, and Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer.

Unit - II

The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG. Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent

Parsers, Predictive Parsers, Bottom–up Parsers, Shift- Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator:YACC

Unit - III

Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition.

Translation of Declaration, Assignment, and Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.

Unit - IV

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

Unit - V

Code Optimization and Code Generation: Local optimization, Loop optimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.

Books Recommended:

5. Alfred V Aho , Jeffrey D. Ullman, “Principles of Compiler Design”, Narosa
6. A.V. Aho, R. Sethi and J.D Ullman, “Compiler: principle, Techniques and Tools”, AW
7. H.C. Holub “Compiler Design in C”, Prentice Hall Inc.
8. Apple, “Modern Computer Implementation in C: Basic Design”, Cambridgepress

*Elective – I

Advanced Database Concepts

Course outcomes:

After successful completion of the course, students will be able to:

6. Explain in detail DBMS architecture.
7. Illustrate in detail query processing and techniques involved in query optimization.
8. Illustrate the principles of concurrency control.
9. Examine the principles of recovery management.
10. Working successfully in a team by design and develop database application system as part of a team.

Course Contents

Unit I

ER Model - Normalization – Query Processing – Query Optimization – Transaction processing - Concurrency Control – Recovery - Database Tuning – Issues

Unit II

Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Distributed Database Features - Distributed Data Storage – Fragmentation – Distributed Query Processing – Distributed Transactions – Commit Protocols – Concurrency Control – Recovery.

Unit III

Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features inSQL/Oracle.

Unit IV

Rules – Knowledge Bases - Active and Deductive Databases – Image databases – Text/Document Databases - Multimedia Databases - Applications – XML Databases

Unit V

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases – Location and Handoff Management – Mobile Transaction Models.

Books Recommended:

6. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley,2007.
7. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approachto Design, Implementation and Management", Third Edition, Pearson Education, 2007.
8. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System concepts", Fifth Edition, McGraw Hill,2006.
9. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to DatabaseSystems", Eighth Edition, Pearson Education,2006.
10. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001. 6. Vijay Kumar, "Mobile Database Systems", John Wiley & Sons, 2006.

Internet of Things

Course outcomes:

After successful completion of the course, students will be able to:

1. Apply the concepts of IOT.
2. Identify the different technology.
3. Apply IOT to different applications.
4. Analysis and evaluate protocols used in IOT.
5. Design and develop smart city in IOT.
6. Analysis and evaluate the data received through sensors in IOT.

Course Contents

Unit I

Introduction to IoT: Definition and characteristics of IoT, Design of IOT: Physical & Logical Design ,Functional Blocks, communication models, communication APIs, IOT-enabling Technologies- Wireless Sensor Networks, Ecloudmbedded systems. IOT Levels and deployment templates.

Unit II

IoT Hardware and Software: Sensor and actuator, Humidity sensors, Ultrasonic sensor, Temperature Sensor, Arduino, Raspberry Pi, LiteOS, RIoTOS, Contiki OS, Tiny OS.

Unit III

Architecture and Reference Model: Introduction, Reference Model and architecture, Representational State Transfer (REST) architectural style, Uniform Resource Identifiers (URIs).

Unit IV

Challenges in IoT- Design challenges, Development challenges, Security challenges, Other challenges. Identification and Authentication of Technologies, Connectivity, Handling Unstructured Data, Data Security and Privacy.

Unit V

IoT Applications: Domain specific IOTs- Home automation, Cities, environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

Books Recommended:

8. Internet of Things- A Hands-On- Approach by Arshdeep Bahga –Vijay Medisetti
9. The Internet of Things by Samuel Greengard
10. The Fourth Industrial Revolution by Klaus Schwab
11. Getting started with Internet of Thing by Cuno Pfister
12. Learning Internet of Things" by Peter Waher
13. Precision: Principles, Practices and Solutions for the Internet of Things by Timothy Chou.
14. Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Your Industry by Maciej Kranz

Android Programming

Course outcomes:

After successful completion of the course, students will be able to:

7. Describe Android platform, Architecture and features.
8. Design User Interface and develop activity for Android App.
9. Use Intent, Broadcast receivers and Internet services in Android App.
10. Design and implement Database Application and Content providers.
11. Use multimedia, camera and Location based services in Android App.
12. Discuss various security issues in Android platform

Course Contents

Unit I

Introduction to Android Platform, Android Stack, Android Versions and Installing, Android SDK and updating SDK components, Eclipse, IDEs and ADT plug, in, Using the Emulator, Android vs. Other mobile platforms.

Unit II

Application Life Cycle ,Application Components ,Activity life cycle, Manifest File, Layout XML Code, Strings , the R File, Java Source Code, Java based layout vs. xml based layout, Eclipse Visual Layout Editor, Logging ,UI Design for Android ,Using different layouts – Linear Layout and Table Layout etc., Drawable Resources ,Resolution and density independence, Working with common widgets ,Working with List View and Adapters, Creating and using option menu, Working with preferences ,Working with Dialogs and Toasts, Working with Graphics and Animation

Unit III

Introducing Intents: Intents, Intent filters, Invoking activities by class name and URI, Sharing data using Extras Bundle and URI parameters, working with Tabs and Fragments. Files and Database: Using File System ,Introducing SQLite on Android, Database Connectivity, Cursors and content values, Using Content Provider to share data , Understanding Security model.

Unit IV

Working in background :Introducing Service and its life cycle, Creating and starting a service, Types of services ,Working multithreading and AsyncTask, Broadcast receivers , Triggering receivers with intents ,Responding to system events using Broadcast receivers, Using Alarm.

Unit V

Using System Services and Web Services: Using Location based Services, Telephony and SMS services, Bluetooth, Network and WiFi, Multimedia and Camera, Accessing Internet and Web Services from Android App.

Books Recommended:

4. Rito Meier. "Professional Android 2 Application Development." Wiley Publishing,Inc.
5. Sayed Hashimi, Satya Komatineni, Dave MacLean. "Pro Android 2."APRESS.
6. Mark Murphy. "Beginning Android 2."APRESS.

.NET Framework and ASP.NET

Course outcomes:

After successful completion of the course, students will be able to:

7. Understand the Microsoft .NET Framework and ASP.NET page structure.
8. Design web application with variety of controls.
9. Access the data using inbuilt data access tools.
10. Use Microsoft ADO.NET to access data in web Application.
11. Configure and deploy Web Application.
12. Develop secured web application.

Course Contents

Unit I

Introduction to .NET Framework: NET framework, MSIL, CLR, CLS, CTS, Namespaces, Assemblies the Common Language Implementation, Assemblies, Garbage Collection, The End to DLL Hell, Managed Execution.
C# , The Basics and Console Applications in C#: Name Spaces , Event & Delegate, Get & Post Method ,Constructor and Destructors, Function Overloading & Inheritance, Operator Overloading, Modifiers , Property and Indexers , Attributes & Reflection API, When to use Console Applications , Generating Console Output, Processing Console Input.

Unit II

C#.NET: Language Features and Creating .NET Projects, Namespaces Classes and Inheritance, Namespaces Classes and Inheritance , C, Exploring the Base Class Library, Debugging and Error Handling, Data Types, Exploring Assemblies and Namespaces, String Manipulation ,Files and I/O ,Collections. Visual Inheritance in C#.NET: Apply Inheritance techniques to Forms, Creating Base Forms, Programming Derived Forms. Mastering Windows Forms: Printing Handling Multiple Events, GDI+, Creating Windows Forms Controls.

Unit III

ADO.NET: Benefits of ADO.NET, ADO.NET compared to classic ADO, Datasets, Managed Providers , Data Binding: Introducing Data Source Controls , Reading and Write Data Using the SqlDataSource Control .Windows Forms and

Controls in details: The Windows Forms Model, Creating Windows Forms Windows Forms Properties and Events, Windows Form Controls, Menus , Dialogs – ToolTips

ASP.NET: Introduction to ASP.NET, Working with Web and HTML Controls, Using Rich Server Controls, Login controls, Overview of ASP.NETValidation Controls, Using the Simple Validations, Using the Complex Validators Accessing Data using ADO.NET, Using the Complex Validators Accessing Data using ADO.NET, Configuration Overview.

Unit IV

Themes and Master Pages: Creating a Consistent Web Site, ASP.NET 2.0 Themes Master Pages, Displaying Data with the Grid View Control Introducing the Grid View Control, Filter Data in the Grid View Control, Allow Users to Select from a Dropdown List in the Grid, Add a Hyperlink to the Grid, Deleting a Row and Handling Errors.

Unit V

Advanced in .NET: MVC3: Introduction to MVC3, The Model, View, Controller

Pattern, Differences between MVC and Web Forms Applications. Building a Simple MVC Application with Visual Studio, Working with Controllers and Actions, Creating MVC Models, Data and Business Rules in MVC. Applications, Creating a Custom Data Model, Using MVC Views, Views in ASP.NET MVC.Introduction to Windows Presentation Foundation (WPF), Window Communication Foundation and its Application.

Books Recommended:

6. Jeffrey Richter, “Applied Microsoft .Net Framework Programming”,(Microsoft)
7. Fergal Grimes, “Microsoft .Net for Programmers”,(SPD)
8. Tony Baer, Jan D. Narkiewicz, Kent Tegels, Chandu Thota, Neil Whitlow,“Understanding the .Net Framework”,(SPD)
9. Shibi Panikkar and Kumar Sanjeev, “C# with .NET Frame Work”, FirewallMedia.
10. Matthew MacDonald, “The Complete Reference – ASP.NET”, Tata McGrawHill.

Introduction to Artificial Intelligence and Machine Learning

Course outcomes:

After successful completion of the course, students will be able to:

7. Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
8. Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
9. Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
10. Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
11. Formulate and solve problems with uncertain information using Bayesian approaches.
12. Apply concept Natural Language processing to problems leading to understanding of cognitive computing

Course Contents

Unit I

Scope of AI: Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

Problem solving: State space search; Production systems, search space control: depth- first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound.

UnitII

Knowledge Representation: Predicate dependency directed backtracking rule resolution, backward reasoning: use Representation: Semantic Nets: slots, dependency, scripts.

Logic: Unification, modus pones, resolution, based Systems: Forward reasoning: conflict of no backtrack. Structured Knowledge exceptions and default frames, conceptual

Unit III

Handling uncertainty: Non-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic, Probability and Bayes learning.

Unit-IV

Learning: Concept of learning, types of learning, hypothesis space and inductive bias, evaluation, cross-validation. Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning

Neural network: Perception, multilayer network, back propagation, introduction to deep neural network. PAC learning model, Clustering: k-means, adaptive hierarchical clustering, Gaussian mixture model

Unit-V

Regression: Decision trees, over fitting. Instance based learning, Feature reduction, Collaborative filtering based recommendation. Logistic Regression, Support Vector Machine

Books Recommended:

9. Artificial Intelligence: A Modern Approach (Prentice Hall Series in Artificial Intelligence) by Stuart Russell, Peter Norvig
10. Machine Learning using Python by U Dinesh Kumar Manaranjan Pradhan, Wiley, 2019
11. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed.,1992.
12. N.J. Nilsson, "Principles of AI", Narosa Publ. House,1990.
13. D.W. Patterson, "Introduction to AI and Expert Systems", PHI,1992.
14. Peter Jackson, "Introduction to Expert Systems", AWP, M.A.,1992.
15. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int Ed., Singapore,1992.
16. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa PublishingHouse, 1994

Elective II

Big Data Analytics

Course outcomes:

After successful completion of the course, students will be able to:

7. Identify the characteristics of datasets and compare the trivial data and big data for various applications.
8. Select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
9. Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.
10. Understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
11. Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.
12. Integrate machine learning libraries and mathematical and statistical tools with modern technologies like hadoop and mapreduce.

Course Contents

Unit I

Introduction to Big Data: - Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs reporting.

Unit II

Mining Data Streams: - Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies -

Real Time Sentiment Analysis- Stock Market Predictions.

Unit III

Hadoop: - History of Hadoop- the Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works- Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce FeaturesHadoop environment.

Unit IV

Frameworks: - Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphereBigInsights and Streams.

Unit V

Predictive Analytics: Simple linear regression- Multiple linear regression- Interpretation 5 of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.

Recommended Books:

13. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer,2007.

14. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media,2012.

15. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing,2012.

16. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP,2012.

17. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley& sons,2012.

18. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons,2007.

19. Pete Warden, "Big Data Glossary", O'Reilly,2011.

20. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", 2 ndEdition, Elsevier, Reprinted2008.

21. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, "Intelligent Data Mining",

Springer,2007.

22. Paul Zikopoulos, DirkdeRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles , David Corrigan, “Harness the Power of Big Data The IBM Big Data Platform”, Tata McGraw Hill Publications,2012.

23. Arshdeep Bahga, Vijay Madisetti, “Big Data Science & Analytics: A HandsOn Approach “,VPT,2016

24. Bart Baesens “Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)”, John Wiley &Sons,2014

Mobile Computing

Course Outcomes:

After successful completion of the course, students will be able to:

6. Understand about mobile communication with their different routing algorithms.
7. Understand different data backup schemes used in mobile network to store the data.
8. Explain about location management that is much important for mobile network.
9. Build the knowledge of how transactions are done through mobile, different security issues while mobile transaction.
10. Appraise different routing protocols used for routing the path like ADDV, DSR, FSR etc.

Course

ContentsUnit I

Issues in Mobile Computing, Wireless Telephony, Digital Cellular Standards, Bluetooth Technology, Wireless Multiple Access Protocols, Channel Allocation in Cellular Systems. Wireless Application Protocol, WRITE A PROGRAM technology, Mobile Information device, Mobile Computing Applications.

Unit II

Data Management Issues: Mobility, Wireless Communication and Portability, Data Replication and Replication Schemes, Basic Concept of Multihopping, Adaptive Clustering for Mobile Network, Multicluster Architecture.

Unit III

Location Management, Location Based Services, Automatically Locating Mobile Uses, Locating and Organizing Services, Issues and Future Directions, Mobile IP, Comparison of TCP andWireless.

Unit IV

Transaction Management, Data Dissemination, Cache Consistency, Mobile Transaction Processing, Mobile Database Research Directions, Security Fault Tolerance for Mobile N/W.

Unit V

What is Ad-hoc Network? , Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Routing scheme based on signal strength, Link state and Distance Vector routing protocols, Ad-hoc on Demand Distance Vector (AODV).

Books Recommended:

7. Shambhu Upadhyaya, Abhijeet Chaudhary, Kevin Kwiat, Mark Weises, "Mobile Computing", Kluwer AcademicPublishers.
8. UWE Hansmann, Lothar Merk, Martin-S-Nickious, Thomas Stohe, "Principles ofMobile Computing", Springer InternationalEdition.
9. Wireless and Mobile Networks Architectures, by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons,2001.
10. Mobile and Personal Communication systems and services, by Raj Pandya, PrenticeHall of India,2001.
11. Wireless Web Development, Ray Rischpater, Springer Publishing,2000.
12. The Wireless Application Protocol, by Sandeep Singhal, Pearson Education Asia,2000.

Cloud Computing

Course Outcomes:

After successful completion of the course, students will be able to:

7. Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the

possible applications for state-of-the-art cloud computing

8. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public

cloud, private cloud, hybrid cloud, etc.

9. Explain the core issues of cloud computing such as security, privacy, and interoperability.
10. Choose the appropriate technologies, algorithms, and approaches for the related issues.
11. Identify problems, and explain, analyze, and evaluate various cloud computing solutions.
12. Provide the appropriate cloud computing solutions and recommendations according to the applications used.

Course Contents

Unit I

Distributed Systems Models and Enabling Technologies: Scalable Computing – Technologies for Network, Based Systems – System Models for Distributed and Cloud Computing – Software Environments for Distributed and Clouds – Performance, Security and Energy Efficiency, service level agreements.

Unit II

Virtualization concepts: Implementation Levels of Virtualization – Virtualization Structures, Tools and Mechanisms – Virtualization of CPU, Memory and I/O Devices – Virtual Clusters and Resource Management – Virtualization for Data, Center Automation, and Introduction to Various Virtualization OS, Vmware, KVM, andXen.

Unit III

Service, Oriented Architecture for Distributed Computing: Services and SOA – Message Oriented Middleware – Portals and Science Gateways – Discovery, Registries, Metadata, and Workflow in SOA.

Unit IV

Cloud Computing and Service Models – Data, center Design and Interconnection Networks – Architectural Design of Compute and Storage Clouds – Public cloud Platforms – Inter, cloud Resource Management – Cloud Security and Trust Management.

Unit V

Cloud Programming and Software Environments – Features of Cloud and Grid Platforms – Parallel and Distributed Paradigms – Programming Support of Google App Engine – Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Books Recommended:

7. Kai Hwang, Geoffrey C.Fox, and Jack J. Dongarra,"Distributed andCloud Computing", Elsevier India Private Limited,2012
8. Barrie Sosinsky, "Cloud Computing Bible", Wiley Publishing Inc, ISBN: 978-1-118-02399-0
9. Foster and Kesselman, "The Grid: Blueprint for a NewComputing Infrastructure", Morgan Kauffman publishersInc.2004
10. Coulouris, Dollimore and Kindber, "Distributed System: Concept andDesign", Fifth Edition, Addison Wesley,2011
11. Michael Miller, "Cloud Computing", Dorling Kindersley India, 2009
12. AnthonyT.Velte,TobyJ.VelteandRobertElsenpeter,"Cloudcomputing:A practical Approach", McGraw Hill,2010.

Human Computer Interaction

Course Outcomes:

After successful completion of the course, students will be able to:

10. Knowledge and understanding:
11. Explain why it is important to design interactive products that are usable
12. Define key terms used in interaction design
13. Explain key theories used in the design of interactive products
14. Explain the importance of iteration, evaluation and prototyping in interaction design
15. Gather data in the context of developing a simple interactive product using suitable
16. techniques
17. Produce a low-fidelity prototype for an interactive product based upon a simple list of interaction design principles.
18. Evaluate an interactive product using suitable techniques.

Course Contents:

Unit-I

Historical evolution of the field, Interactive system design, Concept of usability -definition and elaboration, HCI and Software Engineering, GUI design and Aesthetics, Prototyping techniques.

Unit-II

Model-based Design and evaluation: Basic idea, introduction to different types of models, GOMS family of models (KLM and CMN- GOMS), Fitts' law and Hick-Hyman's law, Model-based design case studies,

Unit-III

Guidelines in HCI: Shneiderman's eight, golden rules, Norman's seven principles, Norman's model of interaction, Nielsen's ten heuristics with example of its use Heuristic evaluation, Contextual inquiry, Cognitive walkthrough

Unit-IV

Empirical research methods in HCI: Introduction (motivation, issues, research question formulation techniques), Experiment design and data analysis (with explanation of one-way ANOVA) Task modelling and analysis: Hierarchical task analysis (HTA), Engineering task models and Concur Task Tree (CTT) ,Introduction to formalism in dialog design, design using FSM (finite state machines) State charts and (classical) Petri Nets in dialog design.

Unit-V

Introduction to CA, CA types, relevance of CA in IS design Model Human Processor (MHP), OOP- Introduction OOM-Object Oriented Modeling of User Interface Design.

Books Recommended:

6. Human-Computer Interaction, Third Edition by Alan Dix et al, Prentice Hall ,2004
7. Interaction design:Beyond Human-Computer Interaction, 4/e J. Preece, Y. Rogers and H. Sharp John Wiley & Sons, 2015
8. Usability Engineering: Scenario-Based Development of Human-Computer Interaction by Rosson, M. and Carroll, J.
9. Intelligent UserInterfaces: Adaptation and Personalization Systems and Technologies Systems by C. Mourlas,P.Germanakos, IGI Global, 2008
10. Understanding Mobile Human-computer Interaction bu S. Love Amsterdam, Butterworth,Heinemann, 2005

Human Values & Professional Ethics

Course Outcomes:

After successful completion of the course, students will be able to:

5. Understand the significance of value inputs in a classroom and start applying them in their life and profession
6. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
7. Understand the role of a human being in ensuring harmony in society and nature.
8. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Unit I

Human Values: Morals, Values, and Ethics, Integrity, Trustworthiness, Work Ethics, Service-Learning, Living Peacefully, Honesty, Courage, Caring, Sharing, Value Time, Co-operation, Commitment, Civic Virtue, Respect for others, Self-confidence, Empathy, Spirituality, Character.

Unit II

Principles for Harmony: Truthfulness, Customs and Traditions, Human Dignity, Value Education, Human Rights, Fundamental Duties, Aspirations, and Harmony (I, We & Nature), Emotional Intelligence, Gender Bias, Mayer Model, Emotional Competencies, Conscientiousness

Unit III

Engineering Ethics and Social Experimentation: History of Ethics, Need of Engineering Ethics, Senses of Engineering Ethics, Profession, and Professionalism, Self Interest, Moral Autonomy, Utilitarianism, Uses of Ethical Theories, Virtue Theory, Types of Inquiry, Deontology, Kohlberg's Theory, Heinz's Dilemma, Gilligan's Argument, Learning from the Past, Comparison with Standard Experiments, Consultants and Leaders, Engineers as Managers, Role of Codes, Balanced Outlook on Law, Codes and Experimental Nature of Engineering.

Unit IV

Engineers' Responsibilities towards Safety and Risk : The concept of Safety, Safety and Risk, Types of Risks, Voluntary v/s Involuntary Risk, Consequences, Risk Assessment, Liability, Accountability, Reversible Effects, Delayed v/s Immediate Risk, Threshold Levels of Risk

Engineers' Duties and Rights: Professional Duties, Collegiality, Techniques for Achieving Collegiality, Senses of Loyalty, Consensus and Controversy, Confidential and Proprietary Information, Professional and Individual Rights, Conflict of Interest, Ethical egoism, Collective Bargaining, Confidentiality, Gifts and Bribes, Occupational Crimes, Problem-solving, Industrial Espionage, Price Fixing, Whistle Blowing

Unit V

Global Issues: Globalization and MNCs, Business Ethics, Cross Culture Issues, Media Ethics, Endangering Lives, Environmental Ethics, Bio-Ethics, Computer Ethics, War Ethics, Research Ethics, Intellectual Property Rights

Books Recommended:

10. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.
11. Engineering Ethics by Harris, Pritchard, and Rabins, Cengage Learning, New Delhi.
12. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications
13. Ethics in Engineering by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
14. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana – Maruthi Publications.
15. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
16. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman, and M. Jayakumaran – University Science Press.
17. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan, and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.
18. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill – 2013

Advanced Database Concepts Lab

Course Outcomes:

After successful completion of the course, students will be able to:

7. Explain and evaluate the fundamental theories and requirements that influence the design of modern database systems
8. Assess and apply database functions and packages suitable for enterprise database development and database management
9. Critically evaluate alternative designs and architectures for databases and data warehouses
10. Discuss and evaluate methods of storing, managing and interrogating complex data
11. Explain and critically evaluate database solutions for data exchange
12. Analyse the background processes involved in queries and transactions, and explain how these impact on database operations.

Lab Experiments:

6. A Private Nursing Home has hired you as a database expert to maintain information about Patients, Doctors, Treatments and other related details i.e. Medicine prescribed, lab tests recommended and Doctor's Remark given to the patient by the doctor. Justify your role as a responsible database designer by developing suitable ER Diagram and Data Flow Diagram. Also mention all possible assumptions which are helpful in producing correct database design. Draw a suitable layout for designing theDatabase.
7. A Librarian has hired a database designer to maintain information about its members of library, books, library rules and other related details i.e. about issue of books, returns of books etc. You have to draw a suitable ER Diagram and Data Flow Diagram and also suggest a suitable database design to maintain above mentioned data keeping in mind redundancy and consistency ofdata.
8. A Book Publishing House has to maintain data regarding Books Published, Author's of the Books, Detail of Customers asking for books and detail of order placed by customer. Draw a suitable E R

Diagram and Data Flow Diagram and also suggest a suitable database design to maintain all the above mentioned data. Make all suitable assumption for running the businessprocess.

9. Examination department of the university wants to computerized the examination process and by maintaining data about students, course, date sheet of exams, Final Grade obtained by student's semester wise. Draw a suitable E R Diagram and Data Flow Diagram to explain the examination process. Also draw a suitable layout for designing the database which is capable of maintaining above mentioneddata.

10. Implement the following based on above mention businessprocess:

a) Apply all possible integrity constraints into the database to maintain the integrityand consistency ofdata.

b) Perform various types of SQL queries to retrieve data from multiple tables (Two or Three)

c) Suggest and create some suitable views based on the database from one ormore Tables.

d) Use various oracle function including group functions through multipletable.

e) Perform some select command on view created from one or moreTables

9 Write a trigger for overdraftfacility.

10 Write a cursor for calculating income tax for the given employee table.Emp (eid,ename, salary, incometax).

11 Create a table called Area which contains two attributes radius and area. Write a program which will calculate the area of circle for different radius. Take value of radius from user, calculate it and then insert those values in the Area tablethrough theprogram.

18. Create user defined Exceptions. Write a program in which the ACCT table recordsthe current balance for an account, which is updated whenever, any deposits or withdrawals takes place. If the withdrawal attempted is more than the current balance held in the account, a user defined exception is raised displaying an appropriate error message otherwise perform the appropriate task.

19. Write a PL/SQL program to display the number in reverseorder.

20. Write a PL/SQL program to find the factorial of a givennumber.

21. Write a PL/SQL program to generate Fibonacciseries.

22. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7.Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius & area table name: areas radius area.

23. WriteaPL/SQL cursor blockthatwillacceptanaccountnumber fromtheuser,checkif the users

balance is less than minimum balance, only then deduct rs.100/-from the balance. This process is fired on the accttable.

24. Write a Pl/SQL trigger that maintains following details such as user name, , no of records deleted inserted or updated and old value and new value in the log table , whenever any user performs update /delete or insert actions oncustomer.

25. Write a PL/SQL exception which is raised whenever a user tries to do anyinsertion /updating/deletion on weekends.

26. Write a cursor for calculating income tax for the given employeetable. Imp (aid, enamel, salary,incometax)

18 Using Object Oriented databases create the following types:

b) AddrType1 (Pin code: number, Street :char, City : char,a. state :char) b) (ii)Branch Type (address: AddrType1, phone1: integer,phone2: integer)c)

Author Type (name: char, addr AddrType1) d) Publisher Type (name: char, addr: AddrType1, branches: BranchTableType e) AuthorListType as varray, which is a reference to Author Type

Next create the following tables:

g) BranchTableType of BranchType g) authors of AuthorType h) books(title: varchar,year : date, published by ref PublisherType,authorsAuthorListType) i) Publishers of Publisher Type

Insert 10 records into the above tables and fire the following queries:

21. a) List all of the authors that have the same pin code as their publisher: b) List all books that have 2 or more authors: c) List the name of the publisher that has the most branches d) Name of authors who have not published a book e) List all authors who have published more than one book: f) Name of authors who have published books with at least two different publishers g) List all books (title) where the same author appears more than once on the list of authors (assuming that an integrity constraint requiring that the name of an author is unique in a list of authors has not beenspecified).

22. Topic: Temporal Databases 4.[A] Create a table tblEmp_Appnt, which stores the accountnumber,name,andvalidtimesay,recruitmentdateandretirementdate.Insert 10 records and fire the followingqueries

21 a)Findalltheemployeeswhojointhecompanyon2/3/2001b)Findall theemployees who will retired on2/3/2001

b) Create a table tbl_shares, which stores the, name of company, number of shares, and price per share at transaction time. Insert 10 records and fire the following queries

c) Find all the names of a company whose share price is more than Rs. 100 at 11:45 A.M.

d) Find the name of company which has highest share price at 5.00P.M.

24. Create a table tblEmp_Appnt, which stores the account number, name, and valid time say,recruitmentdateandretirementdate.Createatriggerforvalidtimetocheckthatno

two records of same employee have common employment period and does not allow the user to update the records. Trigger should also fill up the empty retirement date.

25. Topic: Active Databases 5. Create a table emp (eno, ename, hrs, pno, super_no) and project (pname, pno, thrs, head_no) where thrs is the total hours and is the derived attribute. Its value is the sum of hrs of all employees working on that project. Eno and pno are primary keys, head_no is foreign key to emp relation. Insert 10tuples

and write triggers to do the following:

a) Creating a trigger to insert a new employee tupple and display the new total hours f from project table. B) Creating a trigger to change the hrs of existing employee and display the new total hours from project table. C) Creating a trigger to change the project of an employee and display the new total hours from project table. D) Creating a trigger to deleting the project of an employee.

Internet of Things Lab

Course outcomes:

After successful completion of the course, students will be able to:

8. Apply the concepts of IOT.
9. Identify the different technology.
10. Apply IOT to different applications.
11. Analysis and evaluate protocols used in IOT.
12. Design and develop smart city in IOT.
13. Analysis and evaluate the data received through sensors in IOT.
14. Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.

Lab Experiments:

13. Start Raspberry Pi and try various Linix commands in command terminal window:

    ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo,

    cron, chown, chgrp, ping etc.

14. Run python programs on Pi like:

    a) Read your name and print Hello message with name

    b) Read two numbers and print their sum, difference, product and division.

    c) Word and character count of a given string.

    d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.

    e) Run some python programs on Pi like:

    f) Print a name 'n' times, where name and n are read from standard input, using for and while loops.

    g) Handle Divided by Zero Exception.

    h) Print current time for 10 times with an interval of 10 seconds.

    i) Read a file line by line and print the word count of each line.

15. Light an LED through Python program
16. Get input from two switches and switch on corresponding LEDs
17. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
18. Flash an LED based on cron output (acts as an alarm)
19. Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.
20. Get the status of a bulb at a remote place (on the LAN) through web.
21. To interface motor using relay with Arduino/ Raspberry Pi and write a program to turn on motor when push button is pressed.
22. To interface Bluetooth with Arduino/ Raspberry Pi and write a program to send sensor data to smart phone using Bluetooth.
23. To interface Bluetooth with Arduino/ Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
24. Write a program on Arduino/ Raspberry Pi to upload temperature and humidity data to thingspeck cloud.

Android Programming Lab

Course outcomes:

After successful completion of the course, students will be:

5. Expose to technology and business trends impacting mobile applications.
6. Competent with the characterization and architecture of mobile applications.
7. Competent with understanding enterprise scale requirements of mobile applications.
8. Competent with designing and developing mobile applications using one application development framework.

Lab Experiments:

40. Create an application that will store employee information like Employee ID, Name, Address and Designation. User can insert, update, delete and employee searchrecord.
41. Create an application that will change wall paper time bytime.
42. Create an application that will work like a calculator. It should be able to performall arithmetic operation.
43. Create“HelloWorld”application.Thatwilldisplay“HelloWorld”inthemiddleofthe screen in the red color with whitebackground.
44. To understand Activity,Intent
45. Create sample application with login module.(Check username andpassword)
46. On successful login, go to next screen. And on failing login, alert user usingToast.
47. Also pass username to nextscreen.
48. Create login application where you will have to validate EmailID(UserName). Till the username and password is not validated , login button should remaindisabled.
49. Create and Login application as above. On successful login, open browser withany URL.
50. Create an application that will pass some number to the next screen and on thenext screen that number of items should be display in thelist.
51. Understand resource folders:
52. Create spinner with strings taken from resource folder (res >> valuefolder).
53. On changing spinner value, changeimage.
54. Understand Menuoption.

55. Create an application that will change color of the screen, based onselected options from themenu.
56. Create an application that will display toast (Message) on specific interval oftime.
57. Create a background application that will open activity on specifictime.
58. Create an application that will have spinner with list of animation names. On selecting animation name, that animation should affect on the images displayedbelow.
59. Understanding of UI:
60. Create an UI such that, one screen have list of all the types ofcars.
61. On selecting of any car name, next screen should show Car details like: name,launched date company name, images (using gallery) if available, show different colors in which it isavailable.
62. Understanding content providers andpermissions:
63. Read phonebook contacts using content providers and display inlist.
64. Read messages from the mobile and display it on thescreen.
65. Create an application to call specific entered number by user in the EditText.
66. Create an application that will create database with table of Usercredential.
67. Create an application to read file from asset folder and copy it in memorycard.
68. Create an application that will play a media file from the memorycard.
69. Create an application to make Insert, update, Delete and retrieve operation onthe database.
70. Create an application to read file from the sdcard and display that file content to the screen.
71. Create an application to draw line on the screen as user drag hisfinger.
72. Create an application to send message between twoemulators.
73. Create an application to take picture using nativeapplication.
74. Create an application to pick up any image from the native application gallery and displayit on thescreen.
75. Create an application to open any URL inside the application and clicking on any linkfrom that URl should not open Native browser but that URL should open the samescreen.
76. Create an application that will store employee information like Employee ID, Name, Address and Designation. User can insert, update, delete and employee searchrecord.

77. Create an application that will change wall paper time bytime.
78. Create an application that will work like a calculator which performall arithmeticoperations.

.NET Lab

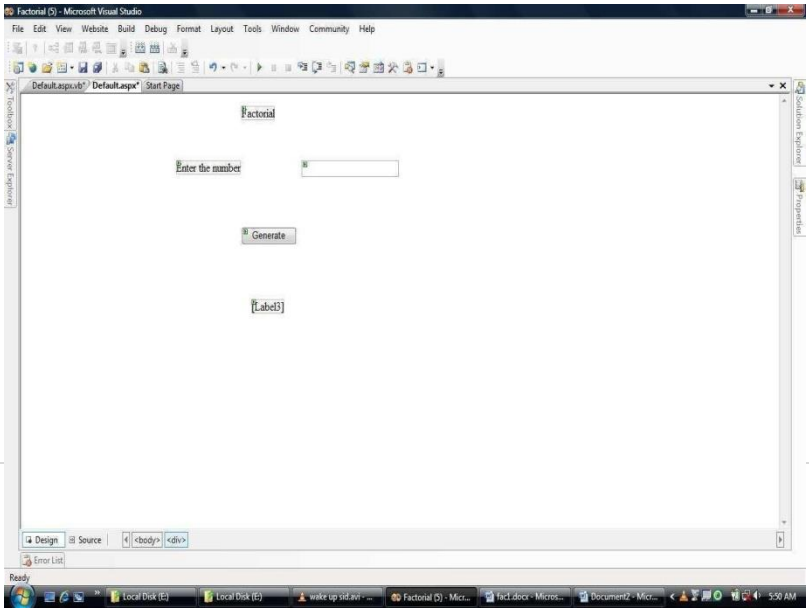
Course Outcomes:

After successful completion of the course, students will be able to:

8. Explain the programming skills and be familiar with programming environment.
9. Apply the concept so the students will be able to use ASP.NET controls in web applications.
10. Interpret the to debug and deploy ASP.NET web applications
11. Describe to create database driven ASP.NET web applications and web services
12. To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web
13. Identify Security in the .NET framework and Deployment in the .NET.
14. Create and develop Assemblies and Deployment in .NET, Application Development

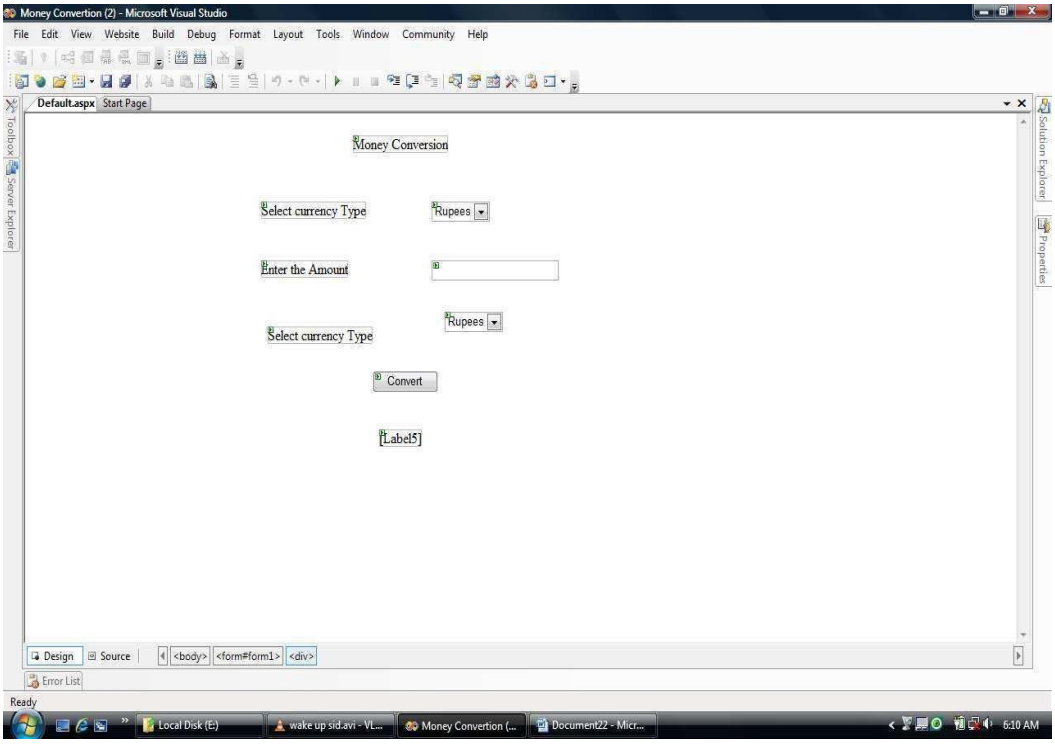
Lab Experiments:

1. Create a simple ASP.NetPage
2. To create a WebControl
3. Write a program to accept a Character and check the case ofthe Character.
4. Write a program to accept any Character and Display Vowel orNot.
5. Write a program to accept a String convert a case ofCharacter.
6. Write a program to generate the factorialoperation.



7. Write a program to implement a TextEditor
8. Write a program to perform MoneyConversion.

Design:



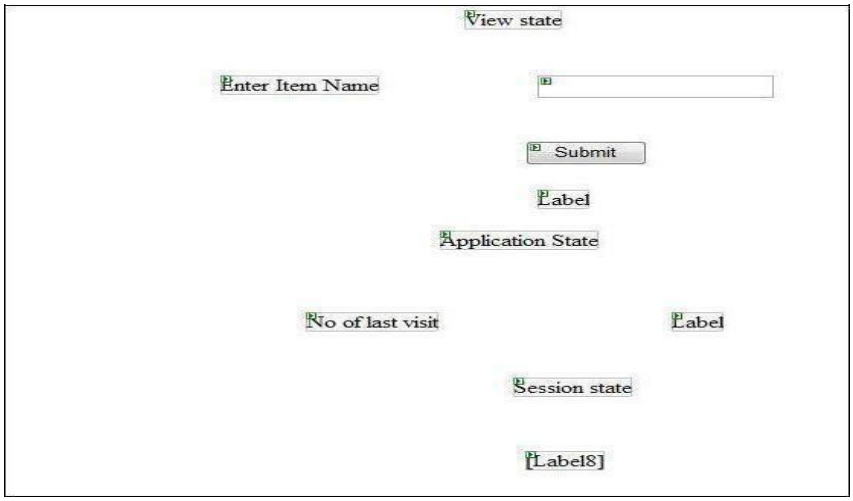
9. Write a program to implement aCalculator.
10. Write a program to implement a CalendarControl.
11. Write a program to perform a Quiz usingTimer.
12. Write a program to implement Common DialogControl.
13. Write a program to access a SQL Database usingADO.Net
14. Write a program to Store Details usingADO.Net.
15. Write a program to insert, update, and delete operation usingADO.Net.
16. Implement Data grid to display Records, Add, Edit, and ModifyRecords.

17. Write a program to generate the Logincontrol.

Design: After enter the wrong password login attempt was not successful please try again

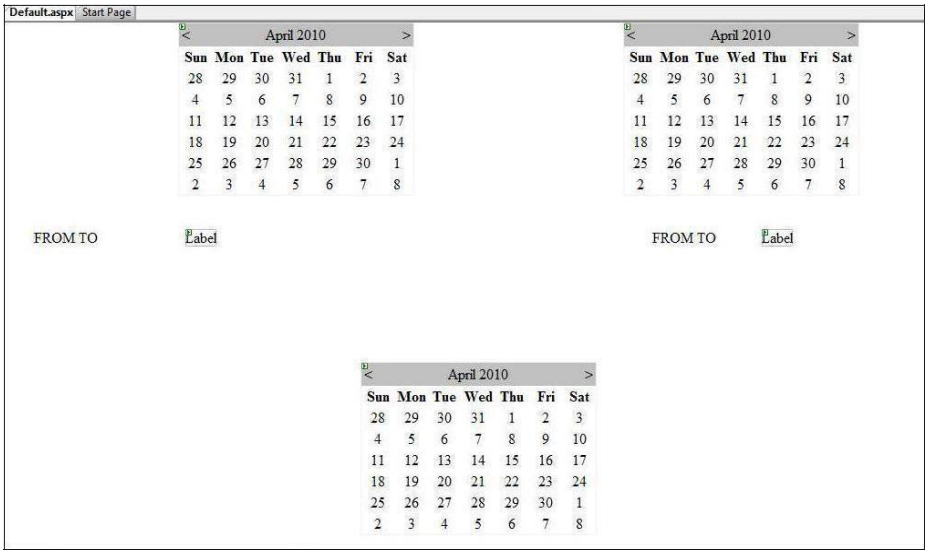
After log in three times the login will be blocked

26. Write a program to perform Asp.Netstate. Design:



18. Write a program to display the Holiday in calendar Design:

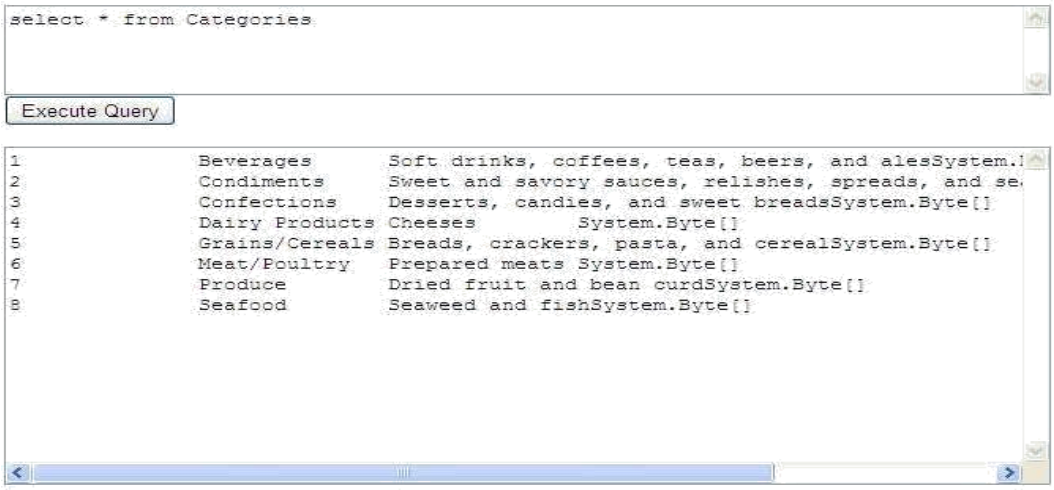
19. Write a program to display the selected date in thecalendar Design:



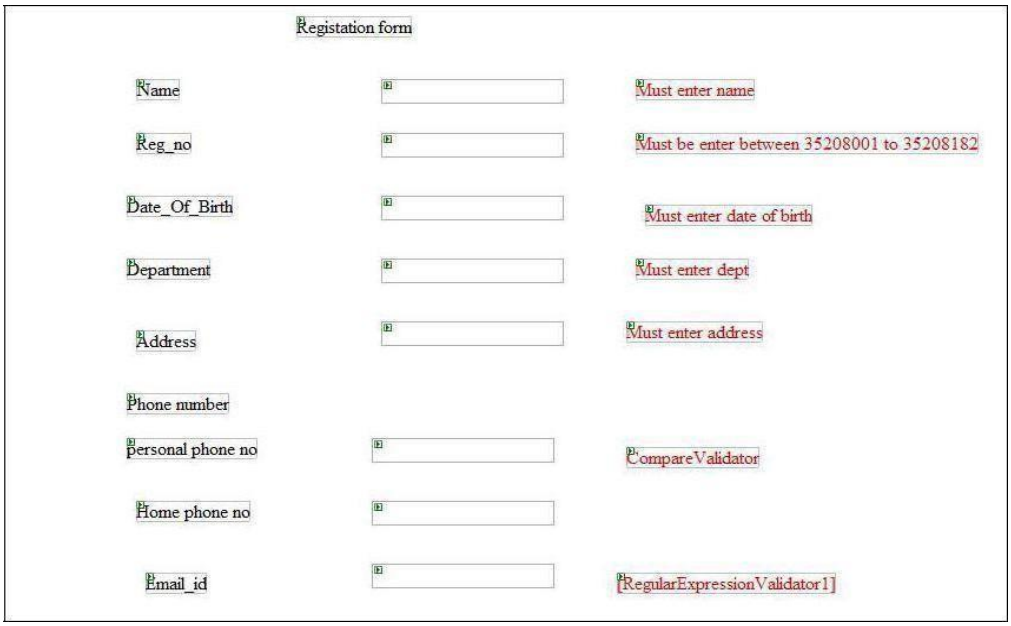
20. Write a program to display the Difference between the two dates inthe calendar.

21. Write a program to perform validationoperation.

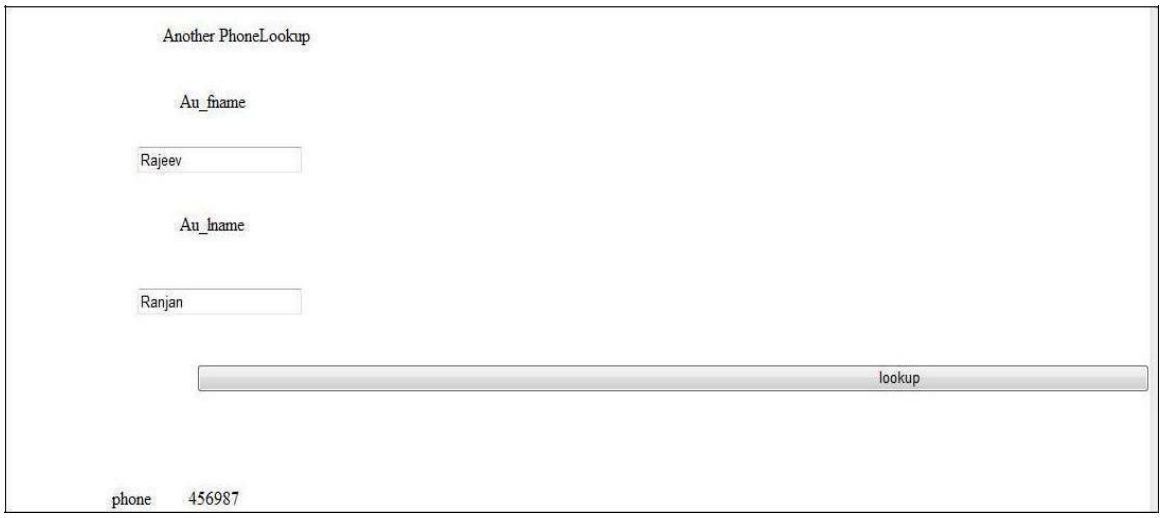
Design:



22. Write a program to bind data in a multiline textbox by querying inanother textbox.



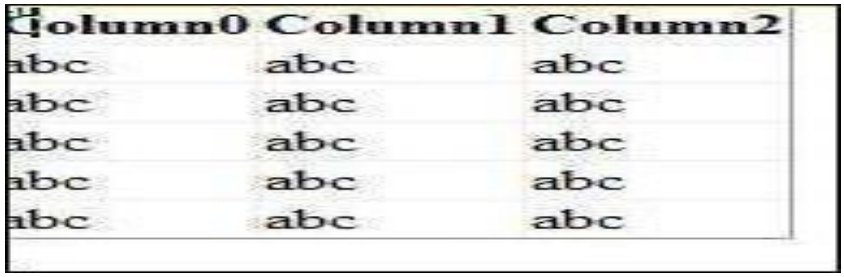
23. Write a program to display the phone no of an author using database.Design:



24. Write a program to display how data bind using dropdownlist.

Design:

25. Write a program create an own table and bind data using data grid Design:



26. Write a program to transfer the details from one page to anotherpage.
27. Write a program to fetch data throughlinks.
28. Write a program to copy the text in a label fromtextbox
29. Create a loginform
30. Write a program to add two number (use NANproperty)
31. Write a program to perform pageevents.
32. Writeaprogramtoaddtwonumbersandprinttheresultinanothertext box using auto postbackproperty.
33. Write a program to develop a form and use file uploadcontrol.
34. Write a program to implement a dropdown listcontrol.
35. Write a program using wizardcontrol.
36. Write a program to print a paragraph using panelcontrol.
37. Write a program to draw a dynamic table using tablecontrol.
38. Write a program to create animage gallery using multiviewcontrol.
39. Write a program to print multiple selected dates using calendarcontrol.
40. Write a program to implement a radiobutton list usingxmldatasource.
41. Write a program to develop a form with propervalidations.
42. Write a program to develop a registration form using compare validatorand validationsummary.
43. Write a program to implement a calculatorwebservice.
44. Write a program to implement a reversewebservice
45. Write a program to fetch data in gridview control usingADO.net.
46. Write a program to add and update data usingADO.net.

Artificial Intelligence Lab using Python Lab

Course Outcomes:

After successful completion of the course, students will be able to:

7. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and itsfoundations.
8. Apply basic principles of AI in solutions that require problem solving, inference, perception,knowledge representation, and learning.
9. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
10. Demonstrate profciency developing applications in an 'AI language', expert system shell, or data mining tool.
11. Demonstrate profciency in applying scientifc method to models of machine learning.
12. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Lab Experiments:

23. Write a python program to print the multiplication table for the given number
24. Write a python program to check whether the given number is prime or not
25. Write a python program to find factorial of the given number
26. Write a python program to implement simple Chatbot
27. Write a python program to implement List operations (Nested List, Length,Concatenation, Membership, Iteration, Indexing and Slicing)
28. Write a python program to implement List methods (Add, Append, Extend & Delete).
29. Write a python program to Illustrate Different Set Operations
30. Write a python program to generate Calendar for the given month and year
31. Write a python program to implement Simple Calculator program
32. Write a python program to Add Two Matrices

33. Write a python program to Transpose a Matrix
34. Write a python program to implement Breadth First Search Traversal
35. Write a python program to implement Water Jug Problem
36. Write a python program to remove punctuations from the given string
37. Write a python program to sort the sentence in alphabetical order
38. Write a program to implement Hangman game using python
39. Write a program to implement Tic-Tac-Toe game using python
40. Write a python program to remove stop words for a given passage from a text fileusing NLTK
41. Write a python program to implement stemming for a given sentence using NLTK
42. Write a python program to POS (Parts of Speech) tagging for the give sentence usingNLTK
43. Write a python program to implement Lemmatization using NLTK
44. Write a python program to for Text Classification for the give sentence using NLTK

Communication & Soft Skills

Course Outcomes:
After successful completion of the course, students will be able to:

5. Learn how to fight with stage fear through various practice sessions.
6. Develop the habit of making formal presentations such as seminar and conference.
7. Identify individual differences, personality, human rights, values and ethics to develop their own personality.
8. Apply their effective communication and soft skills at their work place.

Course Contents:

9. Group/Individual Exercises based on Phonemic transcription usingIPA symbols.
   a. Transcription of words and short sentences in normal English orthography (writing) into their IPAequivalents.
   b. Transcription of words presentedorally.
   c. Conversion of words presented through IPA symbols intonormal orthography.
   d. Syllable division and stress marking (in words presented in IPAform).

10. Dynamics of ProfessionalPresentation
    a. Combating StageFright
    b. Describing Objects/ Situations/People
    c. Individual and GroupPresentation
    d. Delivering Just-a minute(JAM)

11. ImprovingConversation
    a. Tips for ImprovingConversation
    b. TelephonicConversation
    c. Debate

12. Seminars andConferences
    a. Types of DiscussionGroups

b. ConductingSeminars

c. OrganizingConferences

d. Assignments

13. WritingStyle

a. Importance of Professionalwriting

b. Features of WrittenCommunication

c. Choice of Words andPhrases

d. Sentence Structure andLength

e. Paragraph Structure andLength

f. FinalDraft

g. ReadabilityFormulas

14. Individual differences &Personality:

a. Definition&Relevance

b. Importance of nature & nurture in PersonalityDevelopment

c. Importance and Recognition of Individual differences inPersonality

d. Accepting and Managing Individual differences (AdjustmentMechanisms)

15. Human Rights, Values andEthics:

a. Meaning of humanrights

b. Human rightsawareness

c. Importance of human rights

d. Values andEthics

16. InterviewTechniques

a. Types ofInterview

b. Overcoming StageFright

c. Tips and Scripts That Sell aSwitch

d. Ten Interviewer PersonalityTypes

e. Tips to Avoid WretchedReviews

(Note: Every student shall be given 10 minutes of presentation time & 5 minutes of discussion on his/ her presentation.)

The student will be evaluated on the basis of:

- His / her presentation style
- Feedback of Faculty andStudents
- GeneralEtiquette
- Proficiency in Letter Drafting / Interview Preparation

Books Recommended

8. Balasubramaniam, T. A Textbook of Phonetics for Indian Students.New Delhi: Macmillan India,2000.
9. Harris, O. Jeff and Sandra J. Hartman. Organizational Behaviour. Mumbai: Jaico Publishing House,2001.
10. Kennedy, Joyce Lain. Job Interviews For Dummies. Canada: John Wiley& Sons,2011.
11. Kumar, Sanjay & Pushpalata. Communication Skills. New Delhi:Oxford University Press,2012.
12. Krishnaswamy, N. Creative English ForCommunication. New Delhi: Macmillan,2009.
13. Mitra, Barun Kumar. Personality Development and Soft Skills. NewDelhi: Oxford University Press,2011.
14. Raman, Meenakshi & Prakash Singh. Business Communications. New Delhi: Oxford University Press,2006.

Industrial Training

Course Outcomes:

After successful completion of the Industrial Project, students will be able to:

8. Identify and align the project to the organization's strategic plans and business justification throughout its lifecycle.
9. Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.
10. Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.
11. Utilize technology tools for communication, collaboration, information management, and decision support.
12. Implement general business concepts, practices, and tools to facilitate project success.
13. Adapt project management practices to meet the needs of stakeholders from multiple sectors of the society.
14. Apply project management practices to the launch of new programs, initiatives, products, services, and events relative to the needs of stakeholders.

Guidelines

Project in IT industry / University Computer Center / Dept. of Computer Science / Research Organization , etc, as decided by the Head of the Department.

The evaluation committee will distribute these marks for seminar/viva/voce/Project report and for any other activity, which the committee thinks to be proper. Joint project will be allowed and joint project report will be also being accepted. In case of Joint Project the team should not consist of more than 3 members. Individual project will be recognized and the student should highlight their contribution in a joint projectreport.

Committee for evaluation of project report / work:

- Externalexaminer.
- CentreHead
- Internal guide (if any) faculty

Format of Project Report

Title

Certificate from organization about your stay (Project Duration) at that place and about Submission of work done under external guide at the place oftraining.

Certificate from your guide about the submission of work done under his/her guidance, Internal Supervisor.

Table of Contents,
Abstract of the project (abstract of actual workdone).
A brief overview of the organization (regarding function area, location, division in which you are working, turnover).

Profile of problems assigned. Study of existing system, if any.

System requirements

- Product Definition
  - Problem Statement Function to be
  - Provided
  - Processing Environment: H/W, S/W. Solution Strategy
- Acceptance Criteria
- Feasibility Analysis
- Project Plan
  - Team Structure Development
  - Schedule
  - Programming Languages And Development Tools System
  - Requirement Specifications
- Developing / Operating / Maintenance Environments External Interface And
- Data Flows
  - User display and report format, user command summary High level DFD and
  - data dictionary
- Functional and performance specifications Design
- Detailed DFD's and structure diagrams
- Data Structures, database and file specifications Pseudo Code
- Test Plan
- Functional, Performance, Stress tests etc.

  - Implementation / Conversion Plan Project Legacy
- Current status of project

- Remaining areas of concern Technical and managerial lessons learnt
- Future recommendations
- Implementation / Conversion Plan Project Legacy
- Current status of project
- Remaining areas of concern Technical and managerial lessons learnt Future recommendations
- Bibliography
- Source Code

All material should be typed in double spacing, Times New Roman 12. The recommended margins are 25 mm (1 inch) for top, bottom, right and left with an extra 13 mm (0.5 inch) for binding on the left. Other than page numbers, no material should intrude into these margins.

Note: - The above is meant to serve as a guideline for preparation of the project report. The students may add to, modify or omit some of the above- mentioned points depending upon their relevance to the project and with the consultation of the project guide for thesame.

Research Paper Publication

Course Outcomes:

After successful Publication of the Research paper students will be able to:

6. Understand professional writing by studying management communication contexts and genres, researching contemporary business topics, analyzing quantifiable data discovered by researching, and constructing finished professional workplace documents.
7. Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, recommendation and analytical reports, proposals, memorandums.
8. Understand how to critically analyze data from research; incorporate it into assigned writing clearly, concisely, and logically.
9. Explore different format features in both print, multimedia and html documents, and develop document design skills.
10. Develop professional work habits, including those necessary for effective collaboration and cooperation with other students, instructors and Service Learning contact representatives.

Guidelines for writing a good research paper:

Step 1. Choose a Topic

Step 2. Write a Working Thesis Statement

Step 3. Do Research on Your Topic

Step 4. Make a Good Outline

you should keep in mind a typical research paper structure that commonly includes:

- a title page;
- an abstract;
- an introduction;

- a methodology section;
- findings/results;
- discussion;
- conclusion.

Step 5. Create the First Draft

Step 6. Revise, Edit and Proofread, Revise, Edit and Proofread

How to Write an Introduction for a Research Paper

Start writing an intro. The introductory paragraph should begin with an attention grabber that may be:

- a provocative question;
- statistics;
- an anecdote;
- unusual facts, etc.

How to Write Body Paragraphs

Outline will help you to complete this part of your paper.

Provide your points and support your main idea.

How to Write a Conclusion for a Research Paper

A good idea is to provide some recommendations based on the results of your investigation or suggest some directions for further research.

Your rough draft is ready.

How to Make Your Paper Perfect

No one can write their first draft perfectly. you should revise your draft to make sure that your project is on point. Be ready that you may need to revise your project more than once because it is really worth doing.

The next stage is editing. Check and eliminate filler words and phrases, improve word choice, and correct mistakes in punctuation and grammar if you find any. You should look for:

- incomplete sentences;
- dangling modifiers;
- easily confused words (such as to, too, and two);
- spelling mistakes;
- apostrophes for possessives and plurals;
- quotation rules obeyed;
- comma use;
- eliminate contractions.

Re-read your paper several times. A good strategy is to read your paper backwards. In this way, you will feel a little disoriented and will be able to catch more mistakes

Ask your friends or family members to review your research paper and express their opinion about it. Ask them to evaluate your argument, transitions, and the balance and look for any inconsistencies with usage, grammar or mechanics. Ask your friends to provide their feedback and make suggested changes if you think they make sense. Now finally, you may print your paper and proofread it to eliminate minor mistakes or typos and ensure that your amazing research paper is flawless.

Annexure II– Mandatory Documents For Admission

To be uploaded on the Online Admission Portal by the Prospective students

Admission Documents	Format (Jpeg/PNG/PDF)	Documents Size
Duly filled online application form with student signature	Digital signature/Student signature JPEG/PNG	20 KB
Colour scan copy of all year/semester mark sheet/grade cards (for PG programs only) or consolidated mark sheet/grade cards also accepted.	PDF/JPEG	500 KB
Colour scan copy of 10th std. Mark sheet/grade card	PDF/JPEG	
Colour scan copy of 12th std./ Three-Year Polytechnic Diploma Mark sheet/grade card	PDF/JPEG	
Colour scan copy of passport size photograph	JPEG or PNG Format	50 KB
Colour scan copy of Govt. Photo id proof, Aadhar card is mandatory. (Other options: Voter's id, Driving License, Passport etc.)	PDF/JPEG	100 KB
In case of name change, Gazette notification documents for name changes For married women – marriage certificate would be accepted – provided previous maiden name is clearly mentioned in the same. In case of deferred Father name or mother name in such cases without a Gazette notification document.	PDF	500 KB
If foreign student: colour scan copy of passport	PDF/JPEG	500 KB
Fees submission transaction details or receipt as per University policy for respective online programs	PDF/JPEG	500 KB
Digitally Signed undertaking as per the process; where applicable	PDF	500 KB

Students can also visit the University website for the said information.

Annexure III– Content uploading protocol : Internal Process

The step-by-step breakdown of the process is as follows:

1) **Organizing Academic Content:**

- Create a separate sub-folder for each module of a subject within the Course Folder named after the Course Code.
- Each module sub-folder should contain PDFs (e-books, practical assignments, plagiarism reports, etc.), 1 PowerPoint presentation (ppt), and 1 recorded lecture video.
- Compile all module study material PDFs into one combined PDF for each subject for plagiarism check.

2) **Google Drive Link Creation and Sharing:**

- Create a Google Drive link for content sharing.
- Upload the folders onto the drive.
- Share the drive link with the Deputy Director and Program Coordinator for review.

3) **Review Process:**Program Coordinator will provide suggestions and reviews.

4) **Revised Content Sharing:**After revisions, follow Step 1 and Step 2 again, but rename the files to indicate corrections (e.g., MBM101_corrected).

5) **Final Approval:** Deputy Director communicates final approval to upload the contents on LMS to the Technical Manager.

6) **Content Upload on LMS:**Once approved, Program Coordinator ensures the contents are uploaded under the correct subject name and program on the LMS.

7) **Student Notification:**Notify students of the availability of approved content on the LMS.

This process ensures organized content creation, thorough review, and proper dissemination to students via the Learning Management System.

Annexure IV– Academic Bank of Credit ID Creation Process

All enrolled students, particularly those of Indian nationality, are required to register with ABC (Academic Bank of Credits), a central scheme established by the Ministry of Education, Government of India, for depositing credit. ABC ID creation is mandatory for all students, ensuring their participation in this scheme.

The ABC Id can be created by students themselves using Digi-locker, UMANG application, ABC portal or Academic Institution Portal. The process for which is provided below.

Process	• Students can register by logging in at www.abc.digilocker.gov.in • Click on My Account → Login as Student • Click on "Sign up with DigiLocker" → Enter valid mobile number → An OTP is sent at the phone number via SMS → Enter the OTP and click on "Continue" button → Enter Security PIN set created during Sign Up and click "Submit" Button • You will be prompted with ABC student account creation window
Documents and proofs required	• Aadhaar Card is mandatory for ABC Id creation • Learners Name • Date of Birth • Gender • Enrolment Number • Requirements by Academic Institution: • Mobile Number

The University will extend support to the students to create ABC ID. The documents required will remain the same as stated above.

Annexure V– Guidelines and pre-requisites of Proctored Examination

the minimum hardware, software, and connectivity requirements for taking exams through the Online Proctored Examination Platform are mentioned below:

TYPE	MINIMUM	RECOMMENDED
Internet Connection	Wifi Connection	Wired Connection
PC Users	Windows 8 (Windows 10 S mode is not supported)	Windows 10 (10 S mode is not supported)
Mac Users	MacOS 10.13 (Oldest Still Maintained Version)	MacOS 10.15
CPU	more than 2 core CPU less than 85% CPU Usage	more than 4 core CPU less than 50% CPU Usage
Webcam	640x480 resolution	1280x720 resolution
Internet Download Speed	1 Mbps	12 Mbps
Internet Upload Speed	1 Mbps	3 Mbps
RAM	4 GB less than 90% Ram Usage	16 GB less than 70% Usage
Connectivity Ports	1935, 843, 80, 443, 61613, UDP/TCP	1935, 843, 80, 443, 61613, UDP/TCP
Screen Resolution	1366 x 768	1920 x 1080 and above
Chromebook Users (Only for Automated Proctoring. Is not Supported for Live Proctoring)	Chrome device is running the latest version of Chrome OS.	Chrome device is running the latest version of Chrome OS.

1) **Additional Requirements:**

- A functioning microphone (some web cameras have them built-in); the microphone should not be part of headphones.
- Headphones are generally not permitted; check with your testing organization to determine if headphones are allowed.
- A compatible browser: Google Chrome (preferred) or Mozilla Firefox.
- Webcam and microphone (built-in or external) – test your webcam at https://webcamtests.com/.
- Connection to a network with sufficient internet speed: at least 1 Mbps download speed and 1 Mbps upload – test internet speed at www.speedtest.net.

2) **Not Supported:**

- Microsoft Edge browser.
- Google Chromebooks (for Live Proctoring only).
- Tablets (Nexus, iPad, Tab, Note, etc.).
- Smartphones.
- Linux operating systems.
- Windows 10 in S mode or Surface RT.
- Connecting from within a virtual machine. You will be asked to reconnect using your host operating system to take your exam.
- Apple Boot Camp.
- Remote Access Software.
- Inactive Version of Windows and Test Builds/Test Mode.

3) **Pop-up Blocker:**
Pop-up blockers must be either off or disabled. Disable your pop-up blocker as follows:

    - Open Chrome on your computer.
    - Click on the icon with three vertical dots.
    - Click More, then Settings on the top right.
    - Go to Privacy and security and click Site settings.
    - Click Pop-ups and redirects.
    - Turn the setting to Allowed at the top.

Important: The Institute regularly takes actions to optimize its examination system, and hence please note that the above-mentioned hardware, software, equipment, and connectivity requirements might change at the Institute's discretion. All students will need to 100% comply with any such changed specifications announced by the Institute.

General Instructions

For Proctored Online Examinations, the timing will strictly adhere to the communicated timetable schedule in Indian Standard Time (IST), including for candidates taking the exam outside India.

Candidates can take exams on devices such as laptops or desktops. Ensure that the device is fully charged well in advance to last for at least 2 hours. It should also have continuous internet connectivity. Avoid sharing the phone's hotspot with any other device during the examination.

To ensure a smooth examination attempt, students are advised to:

a) Sit in a closed room with adequate lighting for the camera to detect them. Face the light during the examination and avoid sitting near or against a window.

b) Ensure a noise-free environment during the examination to avoid detection and capture as deviation.

c) Position the device so that the front camera captures the student's face properly, and they can sit comfortably for one hour without moving the device.

d) If using a Wi-Fi router, sit near the router/modem to prevent any signal-related issues.

Students must log in to the portal 30 minutes before the start of the examination compulsorily. This ensures sufficient time for any technical checks or troubleshooting before the exam begins.

- During the online examination, the following activities are strictly prohibited:
  a) Having any other person present in the room where the student is taking the examination.
  b) Moving from one place to another during the examination.
- You are not allowed to refer to any textbooks or any other material during the notified examination time.

- You are permitted to use rough paper and pen/pencil for solving analytical questions only and can use permitted scientific calculators. Before using rough papers and calculators, kindly show them in your PC/Mobile camera and then proceed.

- Once logged into the system with your Username and Password, please allow camera, location access, and audio device access when prompted. Failure to grant access to any of these may prevent you from appearing for the examination, or the remote proctor may disable your examination.

- In case of network disconnection or power failure during the examination, wait for internet connectivity to restore (do so as quickly as possible) and resume the test within 2 minutes by clicking on the "Resume" button. If unable to reconnect after 2 minutes, contact the administration for appropriate solutions to continue the test.

- It is advised to use the same laptop/desktop for both the mock examination and the final online examination.

- A helpdesk number will be provided to troubleshoot technical issues during the examination process. Students can contact this number for assistance in such cases.

2. Examination Rules

• Every student will need to log in through a secure ID and password on the online examination platform on the day of the examination. The time schedule, URL, User ID, and password will be provided in the LMS portal and will also be sent to the registered email ID or via SMS to the registered mobile phone.

- At the beginning of each session, the student undergoes identity verification at 2 levels:
    - Level 1: Capture of facial photo. During the examination, the student is required to click and upload their photograph in the system. The system constantly monitors the picture of the student taking the examination with the facial photo captured initially for any mismatch. In case of any mismatch, the system will capture the anomaly, and a notification to the student/live proctor will be instantly displayed.
    - Level 2: Student must display College ID/Government-authorized ID proof at the beginning of the examination.
- Only 2 attempts will be allowed for every student for every session of the day for a test. After two attempts, the student will not be able to take the test again for the respective session of the day.
- The student should ensure that they click on the "Submit" button available on the right top position of the screen before logging out of the exam.
- The Online Examination system will issue regular warnings for any deviations from the specified norms on the screen of your device. The maximum number of warnings will be 10, after which the test will be terminated.
- If a student violates any rules during the examination or tries to adopt any unfair means, the system will automatically collect data based on the following deviations and alert the student, immediately alerting the online live proctor:

    - Focus changed to a different window: student tabs out of the examination-taking window.

- Browser not supported: Student is using an older browser version or a non-compatible browser.
- Webcam is disabled: Student's webcam is disabled.
- Face is not visible in the camera: Student is not looking into the camera.
- Several faces in front of the camera: There are other people along with the examination taker.
- Face does not match the profile: Student taking the examination is not the same person whose photo was captured before starting the examination and the photo of the student as available in the University database.
- Microphone muted or its volume is low: Student has muted the microphone.
- Conversation or noise in the background: System has captured background noise.
- Screen activities are not shared: student has stopped screen share activity. Sharing of the screen is not necessary for the users of smartphones.
- Second display is used: Additional display like an extended monitor has been connected.
- Full-screen mode is disabled: student has disabled full-screen mode.

3. Examination code of conduct and Malpractices

• Students are not permitted to leave their seat during the examination.
• Consultation with others for information during the examination is strictly prohibited.
• The system utilizes Artificial Intelligence to monitor and record facial expressions, eye movements, and other activities.
• Engagement in suspicious or objectionable activities detected by the system will result in disciplinary action as per University regulations.
• Regular warnings will be issued on the device screen, recorded in the examination system, affecting the overall credibility score, potentially leading to examination cancellation.
• Taking photos, recording videos, or engaging in suspicious activities during the examination will be recorded and treated as malpractice.
• Use of headphones, noise cancellation devices, or Bluetooth devices during the examination is prohibited.
• Manual proctors (invigilators) will monitor students throughout the examination duration.
• Referring to textbooks or consulting others for information during the examination is not allowed.
• Taking photos, screenshots, audio recording, or video recording of the examination and sharing it with others is considered malpractice.
• Use of headphones, noise cancellation devices, or Bluetooth devices during the examination is prohibited.
• Attempting to navigate away from the main screen will automatically terminate the examination.

• While using a laptop or desktop, refrain from using the keyboard except for communicating with the proctor; only use the mouse to answer questions.
• Starting the examination from multiple devices simultaneously is not allowed; however, changing devices due to technical faults is permitted.
• Students must remain in their place for the duration of the examination.
• Ensure no light source is behind your face.
• Avoid covering your face with hair, clothing (mask), hands, or any other object.
• Do not use headphones, earbuds, or any listening equipment.
• Eliminate background noise, voices, music, or television.
• Do not wear sunglasses during the examination.
• Do not allow any other individuals into the room.
• Avoid communication with any person during the examination.
• Do not have any programs or applications running that utilize the webcam, microphone, or screen-share features.
• Refrain from taking photos, screenshots, audio recording, or video recording of the examination and sharing it with others, as it will be considered malpractice.

Annexure VI– Continuous Internal Assessment Pattern

Particular	A1 (Objective Type)	A2 (Objective Type)
Marks	15	15

Question Pattern for the CIA Components
A-1 1.There will be 15 Objective type Multiple Choice Questions (MCQs), each carrying mark1 mark 2. The time for the A-1 assignment will be 30 mins 3. All questions are compulsory 4. There will be NO NEGATIVE MARKING for the wrong answers. **A-2** 1. There will be 15 Objective type Multiple Choice Questions (MCQs), each carrying mark1 mark 2. The time for the A-1 assignment will be 30 mins 3. All questions are compulsory 4. There will be NO NEGATIVE MARKING for the wrong answers.

Annexure VII– End Term Examination Pattern

JNU

Centre for Distance and Online Education

End Term Examination

[PROGRAM NAME]

[COURSE NAME][COURSE CODE]

Time : 2 Hours	Max. Marks : 70
Note for students: The paper will comprises of 70 compulsory objective questions of 1 mark each.	
Answer all the questions. Each question carries one mark.	
Q. No. 1 to Q. No. 70 - Objective questions with four multiple choices.	