ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABI

FOR

M.C.A REGULAR THREE YEAR POST GRADUATE PROGRAM
(for the batches admitted from 2019-2020)

&

M.C.A LATERAL ENTRY PROGRAM
(for the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
(Affiliated to JNTUA Ananthapuramu, Approved by AICTE)
SREE SAINATH NAGAR, TIRUPATI – 517 102

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VISION

To be one of the Nation's premier Engineering Colleges by achieving the highest order of excellence in Teaching and Research.

MISSION

- To foster intellectual curiosity, pursuit and dissemination of knowledge.

- To explore students' potential through academic freedom and integrity.

- To promote technical mastery and nurture skilled professionals to face competition in ever increasing complex world.

QUALITY POLICY

Sree Vidyanikethan Engineering College strives to establish a system of Quality Assurance to continuously address, monitor and evaluate the quality of education offered to students, thus promoting effective teaching processes for the benefit of students and making the College a Centre of Excellence for Engineering and Technological studies.

The Challenge of Change

*"**M**astery of change is in fact the challenge of moving human attention from an old state to a new state. Leaders can shift attention at the right time and to the right place. The real crisis of our times is the crisis of attention. Those who lead are the ones who can hold your attention and move it in a purposeful way. Transformation is nothing but a shift in attention from one form to another. The form of a beautiful butterfly breaks free from a crawling caterpillar. If you pay enough attention, you would be able to see how the butterfly hides within the caterpillar. The leader points out a butterfly when the follower sees only a caterpillar".*

- Debashis Chatterjee

VISION AND MISSION OF THE DEPARTMENT

V I S I O N

To become a Nation's center of excellence in the field of computer science and applications through teaching, training, and research.

M I S S I O N

- The department of computer applications is established to provide solutions through computer applications.

- Through contemporary curriculum the knowledge of the diverse group of students in dissemination.

- Creating a talent pool of faculty in diverse domains of computer applications through continuous training.

- Domain and transferable skill development for holistic personality of students and employability.

- Inculcating values and Ethics for effective professional practice.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

After few years of completion of the Program, the graduates of MCA would be:

PEO1: Enrolled or completed higher education/research studies in the core and allied areas of computer science.

PEO2: Successful entrepreneurs and professionally excelled in diverse application skills in the core or allied area of computer science of societal importance.

PEO3: Professionals in industry, academia and organizations with ability to adapt to evolving technologies in the core and allied areas of computer science.

PROGRAM OUTCOMES (POs)

After completion of the program, a successful student will be able to:

P01. Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

P02. Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

P03. Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

P04. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

P05. Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

P06. Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

P07. Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

P08. Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

P09. Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

P010. Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.

P011. Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

P012. Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

<u>PROGRAM SPECIFIC OUTCOMES (PSOs)</u>

On successful completion of Program, MCA graduates will be able to:

PSO1: Design, implement and test applications for complex computing problems for desired specifications through modern tool usage, appropriate technologies and programming skills.

PSO2: Use managerial and domain Skills of Information Management to model an application's data requirements using domain specific modeling tools, Transaction & Query processing, Indexing & Searching techniques, and extract information for interpreting the datasets for Decision Making.

PSO3: Apply suitable techniques and algorithms to Integrate Operating System, Services, Network devices, Security mechanisms and Infrastructure to meet the requirements for the deployment of an application and to communicate on computer networks.

SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
(Affiliated to J.N.T. University Anantapur, Ananthapuramu)

ACADEMIC REGULATIONS
(SVEC-19)

CHOICE BASED CREDIT SYSTEM (CBCS)

**Master of Computer Applications (M.C.A) Regular Three Year
Post Graduate Degree Program
(For the batches admitted from the academic year 2019–20)
&
M.C.A (LATERAL ENTRY Scheme)
(For the batches admitted from the academic year 2020-2021)**

For pursuing three year Post Graduate Degree Program in Master of Computer Applications (M.C.A) offered by Sree Vidyanikethan Engineering College under Autonomous status and hereinafter referred to as SVEC:

1. Applicability: All the rules specified herein, approved by the Academic Council, shall be in force and applicable to the students admitted from the academic year 2019-2020 onwards. Any reference to "College" in these rules and regulations stands for SVEC.

2. Extent: All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation. As and when a doubt arises, the interpretation of the Chairman, Academic Council shall be final and ratified by the Academic Council in the forthcoming meeting. As per the requirements of statutory bodies, Principal, Sree Vidyanikethan Engineering College shall be the Chairman, Academic Council.

3. Admission:

3.1.   Admission into the Regular Three Year Post Graduate Degree Program MCA :

3.1.1. Eligibility:

Admission to the regular three year Post Graduate Degree Program MCA shall be made subject to the eligibility, qualifications prescribed by the competent authority from time to time. Admissions shall be made on the basis of rank obtained by the qualifying candidates at the Andhra Pradesh Integrated Common Entrance Test (AP ICET), subject to reservations or policies framed by the Government of Andhra Pradesh from time to time.

3.1.2. Admission Procedure:

Admissions are made into the three year Post Graduate Degree Program MCA as per the stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

(a) By the Convener, APICET, (for Category-A Seats).

(b) By the Management (for Category-B Seats).

3.2.   Admission into the second year of three year post graduate degree program MCA (Lateral Entry) applicable to students admitted from the academic year 2020-2021 onwards.

3.2.1. Eligibility:

A Candidate Seeking admission into the second year of three year post graduate degree program MCA (Lateral Entry) should:

(i) Hold a BCA degree; (or) B.Sc degree in Computer Science (or) B.Sc degree in Information Technology as one of the Subjects (or) as decided by the competent authority.

(ii) Be qualified in APICET and admitted by the Convener, APICET. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained.

3.2.2. Admission Procedure:

10% of the sanctioned strength as lateral entry students or as stipulated by APSCHE and shall be filled by the Convener, APICET.

4. Duration of the Program:

4.1.   Minimum Duration:

The program will extend over a period of three years leading to the Degree of Master of Computer Applications (M.C.A) of the J.N.T.University Anantapur, Ananthapuramu. The three academic years will be divided into six semesters with two semesters per year. Each semester shall normally consists of 21 weeks (minimum of 90 working days) having - **Continuous Internal Evaluation (CIE)** and **Semester End Examination (SEE)**. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as suggested by UGC and Curriculum as suggested by AICTE are followed. Provision is made for lateral entry admission of students into Second Year of Post Graduate Degree Program MCA and they will be required to satisfy the conditions of admissions thereto prescribed by the JNTUA, Ananthapuramu and Government of Andhra Pradesh.

4.2.   Maximum Duration:

The student shall complete all the passing requirements of the M.C.A Program within a maximum duration of SIX years for the **'regular'** admitted and FOUR years for **'lateral entry'** admitted; these durations are reckoned from the commencement of the semester to which the student is first admitted to the program.

5. Structure of the Program:

The Post Graduate Degree Program MCA shall consist of:

   a) Humanities, Mathematics and Management Courses
   b) Professional Core Courses
   c) Professional Electives Courses
   d) Open Elective Course (MOOC)
   e) Seminar
   f) Internship
   g) Project Work

Course Category	Course Description	Number of Credits
HS– Humanities and Management	Includes courses related to Humanities and Management.	11
BS – Mathematics	Includes courses related to Mathematics Management.	08
PC– Professional Core	Includes core courses related to the program of study.	86
PE– Professional Elective	Includes Elective courses related to the program. The electives can be chosen based on the interest of the student to broaden the skills and knowledge.	16
OE-Open Elective(MOOC)	Includes Open Elective courses aimed at unlimited participation and open access Via the web to diversify their spectrum of knowledge. The open elective can be chosen with the	03

	recommendations of chairman BOS.	
Seminar	A course of study with discussion and report.	02
Internship	A course of study to undertake Internship in an industry related to the program of study.	02
Project Work	A course of study planned to undertake Application / Research oriented project.	12

Contact Periods: Depending on the complexity and volume of the course, the numbers of contact periods per week are assigned.

6. **Credit Courses:** Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Course in an L: T: P: C (Lecture Hours: Tutorial Hours: Practical Hours: Credits) structure, based on the following pattern.

6.1. Theory Courses   : One hour Lecture (L) per Week in a Semester   = 01 Credit.

6.2. Practical Courses : One Practical hour (P) per Week in a Semester = 0.5 Credit.

6.3. Tutorial : One hour Tutorial (T) per Week in a Semester = 01 Credit.

6.4. Open Elective (MOOC): 03 Credits

6.5. Other student activities like NCC, NSS, Sports, Study Tour, Guest Lecture etc. will carry **'NO'** Credits.

6.6. For courses like Seminar/ Internship/ Project Work, where formal contact periods are not specified, credits are assigned based on the complexity of the work to be carried out.

6.7. The Three year curriculum of Post Graduate Degree Program MCA shall have total of **140** credits. However the curriculum for students admitted under lateral entry shall have a total of **91** credits.

7. Choice Based Credit System (CBCS):

7.1. Choice Based Credit System (CBCS) is introduced in line with UGC guidelines in order to promote:

- Student centered learning
- Students to learn courses of their choice
- Interdisciplinary learning

A Student has a choice of registering for courses comprising program core, professional electives, open elective through MOOC course.

8. Course Enrollment and Registration:

8.1. Each student, on admission shall be assigned to a Faculty Advisor (Mentor) who shall advice and counsel the student about the details of the academic Program and the choice of courses considering the student's academic background and career objectives.

8.2. A **regular** admitted student shall register for all the courses prescribed in the curriculum in the I Semester of MCA program. The student shall enroll for the courses with the help of the student's Faculty Advisor (Mentor). The enrollment for the courses of the succeeding semester will commence 10 days prior to the last instructional day of the preceding semester and complete the registration process duly authorized by the Chairman, Board of studies of the department.

8.3. For **Lateral Entry** admitted students into Second year of Three year Post Graduate Degree Program MCA, each student on admission shall register for the courses prescribed in the curriculum in the III Semester of MCA program. The student shall enroll for the courses with the help of the student's Faculty Advisor (Mentor).

For the enrollment of courses in succeeding semesters, a student shall follow the course registration process as applicable for the **regular** admitted student.

8.4. If any student fails to register the courses in a semester, he shall undergo the courses as per the program structure.

8.5. After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Continuous Assessment marks and appear for the Semester-End Examinations.

8.6. Elective courses shall be offered by the department only if a minimum of 20 students register for that course.

9. Open Elective(MOOC):

OPEN ELECTIVE (MOOC) is an online course aimed at unlimited participation and open access via the web.

9.1. A Student is offered an Open Elective (MOOC), in the VI-Semester of MCA, and pursued through Massive Open Online Course (MOOC) platforms. The duration of the MOOC course shell be for a minimum period of 08 weeks.

9.2. The student shall confirm registration by enrolling the course within 10 days prior to the last instructional day of the V-Semester along with other courses.

9.3. The list of courses along with MOOC service providers shall be identified by the Chairman, BOS, and Head of the Department. The identified Open Elective (MOOC) courses are to be approved by the Chairman, Academic Council.

9.4. The HOD shall appoint one faculty member as **mentor** (one mentor for each course with minimum of 20 students and maximum of 60 students) during the V-Semester for each Open Elective Course (MOOC) identified.

9.5. There shall be only semester-end examination for open elective (MOOC) course. It shall be evaluated by the department through ONLINE with 50 multiple choice questions for 100 marks. The department shall prepare the Question Bank for Conducting the ONLINE Open Elective (MOOC) Examination.

10. Break of Study from a Program (Gap Year)

10.1. A student is permitted to go on break of study for a maximum period of **two** years either as two breaks of one year each or a single break of **two** years.

10.2. In case, a student wishes to extend the gap year for one more consecutive year, he shall be permitted with the prior approval of the Principal on the recommendations of the Head of the Department prior to the beginning of the semester in which he has taken break of study.

10.3. The student shall apply for break of study in advance, in any case, not later than the last date of the first assessment period in a semester. The gap year concept is introduced for start-up (or) incubation of an idea, National/International Internships, and Professional Volunteering. The application downloaded from the website and duly filled in by the student shall be submitted to the Principal through the Head of the department. A Committee shall be appointed by the Principal in this regard. Based on recommendations of the committee, Principal shall decide whether to permit the student to avail Gap Year or not.

10.4. The students permitted to rejoin the program after break of study shall be governed by the Curriculum and Regulations in force at the time of rejoining.

The students rejoining in new regulations shall apply to the Principal in the prescribed format through Head of the Department at the beginning of the re-admitted semester for registering additional/equivalent courses to comply with curriculum in-force.

10.5. The two years period of break of study shall not be counted for the maximum time of graduation (i.e., The maximum period of graduation is 8 years for Regular admitted students and 6 years for Lateral Entry admitted students availing Gap Year).

10.6. If a student has not reported to the college after completion of approved period of break of study, he is deemed to be detained in that semester. Such students are eligible for readmission into the semester when offered next.

11. Examination System: All components in the MCA program shall be evaluated through internal evaluation and/or an external evaluation conducted as semester-end examination.

11.1. Distribution of Marks:

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
1.	Theory	60	Semester-end examination of 3 hours duration (External evaluation)		The examination question paper in theory courses shall be for a maximum of 60 marks. The question paper shall be of descriptive type with 10 questions each of 12 marks, taken two from each unit. Each unit will have internal choice and 5 questions shall be answered, one from each unit.
		40	Mid-term Examination of 2 hours duration (Internal evaluation)		Two mid-term examinations each for 40 marks are to be conducted. For a total of 40 marks, 80% of better one of the two and 20% of the other one are added and finalized. **Mid-I:** After first spell of instruction (I & II Units). **Mid-II:** After second spell of instruction (III, IV & V Units). The question paper shall be of descriptive type with 5 essay type questions each of 10 marks, out of which 3 are to be answered and evaluated for 30 marks. There will also be 5 short answer questions each of 2 marks, all are to be answered and evaluated for 10 marks.
2.	Laboratory	50	Semester-end Lab Examination for 3 hours duration (External evaluation)		The examination shall be conducted by the faculty member handling the laboratory (Examiner-2) and another faculty member (Examiner-1) appointed by the Chief Controller of examinations.
		50	30	Day-to-Day evaluation for Performance in laboratory experiments and Record. (Internal evaluation)	Two laboratory examinations, which include Day-to-Day evaluation and Practical test, each for 50 marks are to be evaluated by the faculty members handling the laboratory. For a total of 50 marks 80% of better one of the two and 20% of the other one are added and finalized. **Laboratory Examination-I:** Shall be conducted just before FIRST mid-term examinations. **Laboratory Examination-II:** Shall be conducted just before SECOND mid-term examinations.
			20	Practical test (Internal evaluation)	
3.	Seminar	100	Semester-end Examination		**Seminar** shall be evaluated at semester-end by the Seminar Evaluation Committee **(SEC)** as given in 11.2.1.
4.	Internship	100	Semester-end Examination		The semester-end evaluation shall be done by the Department Evaluation Committee **(DEC**) as given in 11.2.2.
5.	Open Elective (MOOC)	100	Semester-end Examination		The evaluation shall be done by the department through ONLINE with 50 multiple choice questions.
6.	Project Work	200	100	Internal Evaluation	Continuous evaluation shall be done by the Project Evaluation Committee **(PEC)** as given in 11.2.3.
			100	Semester-end Evaluation	**Project Work** Viva-Voce Examination shall be conducted by a Committee at the end of the semester as given in 11.2.3.

11.2. Seminar / Internship /Project Work Evaluation:

11.2.1. For the seminar, the student shall collect information through literature survey on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department just before presentation. The report and the presentation shall be evaluated at the end of the semester by the Seminar Evaluation Committee **(SEC),**

each consisting of concerned supervisor and two senior faculty members. The **SEC** will be constituted by the Principal on the recommendations of the Head of the Department.

11.2.2. Internship

A student shall undergo **Internship** in an Industry/ National Laboratories relevant to the program of study. This course is to be registered during IV semester, and taken up during the summer vacation for about FOUR weeks duration. The Internship shall be submitted in a Report form, and a presentation of the same shall be made before a Department Evaluation Committee **(DEC).** The **DEC** shall consist of Head of the Department, the concerned supervisor of Internship, and a Senior Faculty Member of the Department. The DEC is constituted by the Principal on the recommendations of the Head of the Department. There shall be no internal marks for Internship. The Internship report shall be evaluated at the end of the V Semester.

11.2.3. Project Work

The Project Work Viva-Voce examination shall be conducted by a Committee consisting of External examiner (nominated by the Chief Controller of Examinations), HOD and Concerned Supervisor. The evaluation of project work shall be conducted at the end of the VI Semester. The Internal Evaluation shall be conducted by the Project Evaluation Committee **(PEC),** consisting of concerned supervisor and two senior faculty members on the basis of TWO project reviews conducted on the topic of the Project Work. The **PEC** is constituted by the Principal on the recommendations of the Head of the Department.

11.2.3.1. A student shall be allowed to submit the report on the recommendations of the **PEC** and then attend viva-voce examination of the Project Work. The Project Work Viva-Voce examination may be conducted once in three months for all the eligible candidates.

11.2.3.2. Student can initiate the Project Work only after obtaining the approval of Title of Project Work from **PEC** within TWO weeks from the commencement of VI Semester. In Project Work Review-I, a student has to present the title, objective, Problem Definition, Scope of Work, Literature Survey, analysis of the problem, implementation tools / methodologies, plan of action (in consultation with his Project Supervisor) and design of the problem to the **PEC** for approval within NINE weeks from the commencement of VI Semester. The Project Work Review-I will be evaluated by **PEC** for 100 Marks.

11.2.3.3. In Project Work Review-II, student has to present the implementation, Verification and Validation of Project Work along with the report to the PEC for approval within NINE Weeks after Project Work Review-I. The Project Work Review-II will be evaluated by **PEC** for 100 Marks.

For a total of 100 marks, 80% of better one of the two and 20% of the other one are added and finalized.

11.2.3.4. If a student wishes to change his supervisor or topic of the project work, he can do so with the approval of the **PEC**. However, the **PEC** shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work is deemed to be started from the date of change of Supervisor or change of topic as the case may be.

11.2.3.5. Three copies of the dissertation certified in the prescribed form by the concerned supervisor and HOD shall be submitted to the Department. One copy is to be submitted to the Chief Controller of Examinations and one copy to be sent to the examiner. The examiner shall be nominated by the Chief Controller of the Examinations from the panel of three examiners submitted by the department for a maximum of 10 students for adjudication.

11.2.3.6. If the report of the examiner is favorable, Viva-Voce examination shall be conducted by a Committee consisting of the concerned Supervisor, Head of the Department and the examiner who adjudicated the dissertation. The Committee shall jointly evaluate the

student's project work. If the report of the examiner is not favorable, the student should revise and resubmit the project report followed by Viva-Voce examination.

11.2.3.7. The student who fails in Viva-Voce examination shall have to re-appear the Viva-Voce examination after three months. Extension of time within the total permissible limit for completing the project is to be obtained from the Chairman, Academic Council, SVEC.

11.3.   Eligibility to appear for the Semester-End Examination(SEE):

11.3.1. A student shall be eligible to appear for semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

11.3.2. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

11.3.3. Shortage of Attendance below 65% in aggregate shall **in no case be condoned**.

11.3.4. Student whose shortage of attendance is not condoned in any semester is not eligible to take their end examination of that class and their registration shall stand cancelled.

11.3.5. A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable. The student may seek readmission for the semester when offered next. He will not be allowed to register for the courses of the semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that semester when offered next.

11.3.6. A stipulated fee shall be payable to the College towards condonation of shortage of attendance.

11.3.7. The attendance in Student Development Activities shall be considered for finalization of aggregate attendance.

11.3.8. For the calculation of a student attendance in any semester, the total number of classes conducted shall be counted as scheduled in the class-work time table.

11.4.   Evaluation:

Following procedure governs the evaluation:

11.4.1. Marks for components evaluated internally by the faculty shall be submitted to the Controller of Examinations one week before the commencement of the End examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the Semester-end examinations, to arrive at the total marks for any course in that semester.

11.4.2. Performance in all the courses is tabulated course-wise and shall be scrutinized by the Results Committee and moderation is applied if needed and course-wise marks are finalized. Total marks obtained in each course are converted into letter grades.

11.4.3. Student-wise tabulation shall be done and individual grade sheet shall be generated and issued to the student.

11.5.   Personal verification / Revaluation / Recounting: Students shall be permitted for personal verification/request for recounting/ revaluation of the Semester-end examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

11.6.   Supplementary Examination: In addition to the regular semester-end examinations conducted, the College may also schedule and conduct supplementary examinations for all the courses of other semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

12.   Re-Registration of Theory Courses:

Following are the conditions for Re-Registration of Theory Courses:

12.1. The student should have completed all the course work and obtained examinations results for I to V semesters.

12.2. If the student has failed in the examination due to internal evaluation marks secured being less than 50%, he shall be given one chance for a maximum of 3 theory courses for improvement of internal evaluation marks.

12.3. The candidate has to register for the chosen courses and fulfill the academic requirements.

12.4. For each course, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D. / Challan in favour of the Principal, Sree Vidyanikethan Engineering College payable at Tirupati along with the requisition through the concerned Head of the Department.

12.5. A student availing the benefit for Improvement of Internal evaluation marks, the internal evaluation marks as well as the semester-end examinations marks secured in the previous attempt(s) for the re-registered courses stands cancelled.

13.   Academic Requirements for promotion/ completion of Regular Post Graduate Degree Program MCA:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of regular Post Graduate Degree Program MCA.

For students admitted into Regular Post Graduate Degree Program MCA for the academic year 2019-2020:

13.1. A student shall be deemed to have satisfied the minimum academic requirements for each theory, laboratory course, and project work, if he secures not less than 40% of marks in the semester-end examination and a minimum of 50% of marks in the sum total of the internal evaluation and Semester-end examination taken together. **For the Seminar and Internship, he should secure not less than 50% of marks in the semester-end examination.**

13.2. A student shall register for all the **140** credits and earn all the **140** credits. Marks obtained in all the **140** credits shall be considered for the calculation of the DIVISION based on CGPA.

13.3. A student who fails to earn **140** credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit his seat in M.C.A Program and his admission stands cancelled.

For Lateral Entry Students admitted into Post Graduate Degree Program MCA (Lateral Entry) from the academic year 2020-2021:

13.4. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical course and project, if he secures not less than 40% of marks in the semester-end examination and a minimum of 50% of marks in the sum total of the internal evaluation and semester-end examination taken together. For the Seminar and Internship, he should secure not less than 50% of marks in the Semester-End Examination.

13.5. A student shall register for all the **91** credits and earn all the **91** credits. Marks obtained in all the **91** credits shall be considered for the calculation of the DIVISION based on CGPA.

13.6. A student who fails to earn **91** credits as indicated in the course structure within **four** academic years from the year of their admission shall forfeit his seat in Post Graduate Degree Program MCA and his admission stands cancelled.

14. **Transitory Regulations:**

Students who got detained for want of attendance (**or**) who have not fulfilled academic requirements (**or**) who have failed after having undergone the Program in earlier regulations (**or**) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (**or**) equivalent courses as and when courses are offered and they will be in the academic regulations into which they are presently readmitted. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of **six years** for the award of M.C.A Degree and a lateral entry student within **four years** for the award of M.C.A Degree.

15. **Grades, Semester Grade Point Average and Cumulative Grade Point Average:**

15.1. **Grade System:** After all the components and sub-components of any course (including laboratory courses) are evaluated, the final total marks obtained shall be converted into letter grades on a "10 point scale" as described below.

Grades conversion and Grade points attached

% of Marks obtained	Grade	Description of Grade	Grade Points (GP)
≥ 95	O	Outstanding	10
≥ 85 to < 95	S	Superior	9
≥ 75 to < 85	A	Excellent	8
≥ 65 to < 75	B	Very Good	7
≥ 55 to < 65	C	Good	6
≥ 50 to <55	D	Pass	5
< 50	F	Fail	0
Not Appeared	N	Absent	0

Pass Marks: A student shall be declared to have passed theory course, laboratory course and project work if he secures minimum of 40% marks in external examination, and a minimum of 50% marks in the sum total of internal evaluation and external examination taken together. For the seminar and Internship, he shall be declared to have passed if he secures minimum of 50% of marks in the Semester-End Examination. Otherwise, he shall be awarded fail grade – **'F'** in such a course irrespective of internal marks. **'F'** is considered as a fail grade indicating that the student has to pass the semester-end examination in that course in future and obtain a grade other than **'F'** and **'N'** for passing the course.

15.2. **Semester Grade Point Average (SGPA):**
SGPA shall be calculated as given below on a "10 point scale" as an index of the student's performance at the end of each semester:

$$SGPA = \frac{\sum (C \, x \, GP)}{\sum C}$$

Where **C** denotes the "Credits" assigned to the courses undertaken in that semester and **GP** denotes the "Grade Points" earned by the student in the respective courses.

Note: SGPA is calculated only for the candidates who appeared in the semester-end regular examinations in a particular Semester.

15.3. Cumulative Grade Point Average (CGPA):

The CGPA shall be calculated for a candidate appeared in the semester-end examinations for all the courses (including regular and supplementary) till that semester. The CGPA will be displayed in the grade sheet of the regular semester-end examinations and also in the consolidated grade sheet issued at the end of the program. The CGPA is computed on a 10 point scale as given below:

$$CGPA = \frac{\sum (C \, x \, GP)}{\sum C}$$

Where **C** denotes the "Credits" assigned to courses undertaken up to the end of the Program and **GP** denotes the "Grade Points" earned by the student in the respective courses.

16. Grade Sheet: A grade sheet (Marks Memorandum) shall be issued to each student indicating his performance in all courses registered in that semester indicating the SGPA and CGPA.

17. Consolidated Grade Sheet: After successful completion of the entire Program of study, a Consolidated Grade Sheet indicating performance of all academic years shall be issued as a final record. Duplicate Consolidated Grade Sheet will also be issued, if required, after payment of requisite fee.

18. Award of Degree: The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Chairman, Academic Council, SVEC (Autonomous)

18.1. Eligibility: A student shall be eligible for the award of M.C.A Degree if he fulfills all the following conditions:

18.1.1. Registered and successfully completed all the components prescribed in the Program of study to which he is admitted.

18.1.2. Successfully acquired all the required credits as specified in the curriculum of post graduate degree program MCA within the stipulated time.

18.1.3. Obtained CGPA greater than or equal to 5.0 (Minimum requirement for declaring as passed).

18.1.4. Has NO DUES to the College, Hostel, and Library etc. and to any other amenities provided by the College.

18.1.5. No disciplinary action is pending against him.

18.2. Award of Division: Declaration of Division is based on CGPA.

Awarding of Division

CGPA	Division
> = 7.0	First Class with Distinction
> = 6.0 and < 7.0	First Class
> = 5.0 and < 6.0	Second Class

19. Additional Academic Regulations:

19.1 A student may appear for any number of supplementary examinations within the stipulated time to fulfill regulatory requirements for award of the degree.

19.2 In case of malpractice/improper conduct during the examinations, guidelines shall be followed as given in the **ANNEXURE-I**.

19.3 When a student is absent for any examination (Mid-term or Semester-end) he shall be awarded **zero** marks in that component (course) and grading will be done accordingly.

19.4 When a component is cancelled as a penalty, he shall be awarded zero marks in that
component.

20. **Withholding of Results:**

If the candidate has not paid dues to the College/University (or) if any case of indiscipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted to the next higher semester.

21. **Amendments to Regulations:**

The Academic Council of SVEC (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and/or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the Board of Studies.

22. Attendance for student development activity periods indicated in the class time tables shall be considered as in the case of a regular course for calculation of overall percentage of attendance in a semester.

23. **General:** The words such as "he", "him", "his" and "himself" shall be understood to include all students irrespective of gender connotation.

Note: *Failure to read and understand the regulations is not an excuse.*

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)
(Affiliated to JNTUA, Ananthapuramu; Approved by AICTE)
SREE SAINATH NAGAR, TIRUPATI – 517 102

Master of Computer Applications (MCA)

SVEC-19: REGULATIONS

COURSE STRUCTURE

| S. No | Course Code | Course Title | Contact hours per Week | | | | C | Scheme of Examination Max. Marks | | |
			L	T	P	Total		Int. Marks	Ext. Marks	Total
					MCA I- Semester					
1.	19MC1HS01	Financial and Management Accounting	4	-	-	4	4	40	60	100
2.	19MC10101	Computer Organization	4	-	-	4	4	40	60	100
3.	19MC10102	Mathematical Foundations of Computer Science	3	1	-	4	4	40	60	100
4.	19MC10103	Operating Systems	4	-	-	4	4	40	60	100
5.	19MC10104	Programming in C	4	-	-	4	4	40	60	100
6.	19MC1HS31	Communicative English Lab	-	-	3	3	1.5	50	50	100
7.	19MC10131	PC Software Lab	-	-	3	3	1.5	50	50	100
8.	19MC10132	Programming in C Lab	-	-	3	3	1.5	50	50	100
		TOTAL	**19**	**1**	**9**	**29**	**24.5**	**350**	**450**	**800**

S. No	Course Code	Course Title	Contact hours per Week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total
MCA II- Semester										
1.	19MC2BS01	Probability and Statistics	3	1	-	4	4	40	60	100
2.	19MC20101	Database Management Systems	4	-	-	4	4	40	60	100
3.	19MC20102	Data Structures	3	1	-	4	4	40	60	100
4.	19MC20103	Object Oriented Programming through JAVA	3	1	-	4	4	40	60	100
5.	19MC20104	Software Engineering	4	-	-	4	4	40	60	100
6.	19MC20131	Database Management Systems Lab	-	-	3	3	1.5	50	50	100
7.	19MC20132	Data Structures Lab	-	-	3	3	1.5	50	50	100
8.	19MC20133	Object Oriented Programming through JAVA Lab	-	-	3	3	1.5	50	50	100
		TOTAL	17	3	9	29	24.5	350	450	800

S. No	Course Code	Course Title	Contact hours per Week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total
MCA III- Semester										
1.	19MC3HS01	Organizational Behavior and Human Resource Management	4	-	-	4	4	40	60	100
2.	19MC3BS01	Operations Research	4	-	-	4	4	40	60	100
3.	19MC30101	Computer Networks	4	-	-	4	4	40	60	100
4.	19MC30102	Data Warehousing and Data Mining	4	-	-	4	4	40	60	100
5.	19MC30103	Python Programming	3	1	-	4	4	40	60	100
6.	19MC30131	Computer Networks Lab	-	-	3	3	1.5	50	50	100
7.	19MC30132	Data Warehousing and Data Mining Lab	-	-	3	3	1.5	50	50	100
8.	19MC30133	Python Programming Lab	-	-	3	3	1.5	50	50	100
	TOTAL		19	1	9	29	24.5	350	450	800

S. No	Course Code	Course Title		Contact hours per Week				C	Scheme of Examination Max. Marks		
				L	T	P	Total		Int. Marks	Ext. Marks	Total
MCA IV- Semester											
1.	19MC40101	Object Oriented Analysis and Design		3	1	-	4	4	40	60	100
2.	19MC40102	LINUX Programming		3	1	-	4	4	40	60	100
3.	19MC40103	Web Programming		3	1	-	4	4	40	60	100
4.	**Professional Elective – I**			4	-	-	4	4	40	60	100
	19MC40104	Block Chain Technologies									
	19MC40105	Multimedia Application Development									
	19MC40106	Information Security									
	19MC40107	Software Project Management									
5.	**Professional Elective – II**			4	-	-	4	4	40	60	100
	19MC40108	Information Retrieval Systems									
	19MC40109	Artificial Intelligence									
	19MC40110	Cyber Security									
	19MC40111	Software Oriented Architecture									
6.	19MC4HS31	Soft Skills Lab		-	-	3	3	1.5	50	50	100
7.	19MC40131	Object Oriented Analysis and Design Lab		-	-	3	3	1.5	50	50	100
8.	19MC40132	LINUX and Web Programming Lab		-	-	3	3	1.5	50	50	100
		TOTAL		**17**	**3**	**9**	**29**	**24.5**	**350**	**450**	**800**

S. No	Course Code	Course Title	L	T	P	Total	C	Int. Marks	Ext. Marks	Total
								Contact hours per Week	Scheme of Examinations Max. Marks	
MCA V- Semester										
1.	19MC50101	Cloud Computing	4	-	-	4	4	40	60	100
2.	19MC50102	Data Analytics	4	-	-	4	4	40	60	100
3.	19MC50103	Mobile Application Development	4	-	-	4	4	40	60	100
4.	**Professional Elective – III** 19MC50104 Data Visualization 19MC50105 .Net Technologies 19MC50106 Social Networks 19MC50107 Software Testing		4	-	-	4	4	40	60	100
5.	**Professional Elective – IV** 19MC50108 M-Commerce 19MC50109 Machine Learning 19MC50110 Internet of Things 19MC50111 Software Security		4	-	-	4	4	40	60	100
6.	19MC50131	Cloud Computing Lab	-	-	3	3	1.5	50	50	100
7.	19MC50132	Data Analytics Lab	-	-	3	3	1.5	50	50	100
8.	19MC50133	Internship	-	-	-	-	2	-	100	100
		TOTAL	**20**	**-**	**6**	**26**	**25**	**300**	**500**	**800**

S. No	Course Code	Course Title	L	T	P	Total	C	Int. Marks	Ext. Marks	Total
MCA VI- Semester										
1.	19MC6MOOC	Open Elective (MOOC)	-	-	-	-	3	-	100	100
2.	19MC60131	Seminar	-	-	-	-	2	-	100	100
3.	19MC60132	Project Work	-	-	-	-	12	100	100	200
		TOTAL	**-**	**-**	**-**	**-**	**17**	**100**	**300**	**400**

(19MC1HS01) **FINANCIAL AND MANAGEMENT ACCOUNTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE REQUISITE: --

COURSE DESCRIPTION:

Accounting concepts, Principles of accountancy, Types of accounts, Journal, Ledger and Trial Balance; Trading account, Profit and Loss account, Balance sheet; Ratio analysis of investments; Analysis and determination of Break-Even-Points; Methods of capital budgeting.

COURSE OUTCOMES:

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

CO1: Demonstrate the concepts of Financial Accounting in preparation of Financial Statements.

CO2: Analyze and interpret the financial data using Ratio Analysis, Break-Even Analysis and Capital Budgeting Techniques for the decision-making of an Organization.

DETAILED SYLLABUS:

UNIT I - ACCOUNTING **(11 periods)**

Meaning and Definition, Objectives, Functions; Principles of accountancy: Concepts and Conventions, Double entry system of accounting, Types of accounts, Journal, Ledger and Trial Balance.

UNIT II - PREPARATION OF FINANCIAL STATEMENTS **(11 periods)**

Trading account, Profit and Loss Account and Balance Sheet (with simple adjustments).

UNIT III - RATIO ANALYSIS **(11 periods)**

Capital Structure Ratios, Liquidity Ratios, Activity Ratios, Profitability Ratios (Simple Problems).

UNIT IV - BREAK-EVEN-ANALYSIS **(11periods)**

Concept of Break Even Point (BEP), Determination of BEP, Profit/Volume (P/V) ratio, Margin of safety (Simple Problems).

UNIT V - CAPITAL BUDGETING **(11periods)**

Features, Proposals, Methods of Capital Budgeting: Payback Period Method, Accounting Rate of Return (ARR), Time value of money, Net Present Value Method (NPV), Profitability Index (PI) and Internal Rate of Return (IRR) (Simple problems).

Total Periods: 55

TEXT BOOKS:

1. Tyagi, C.L. and Madhu Tyagi, "*Financial and Management Accounting,*" Atlantic Publishers and Distributors, New Delhi, 2016.

2. Madhu Vij, "*Financial and Management Accounting*," Anmol Publishers, New Delhi, 11th Edition, 2018.

REFERENCE BOOKS:

1. Pauline Weetman, "Finan*cial and Management Accounting – An Introduction*," Financial Times Prentice Hall, New Delhi, 4th Edition, 2014.

2. Jain, S.P. & Narang, K.L., "*Financial Accounting*," Kalyani Publishers, Ludhiana, 2nd Edition, 2016.

MCA I-SEMESTER

(19MC10101) COMPUTER ORGANIZATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: -

COURSE DESCRIPTION:

Digital logic circuits and its components; Types of data in circuits; Design of control unit; Organizations of Central Processing Unit(CPU), instruction formats, addressing modes, types of instructions; Design of basic computer; Types of peripheral devices, modes of transfers, interrupts, memory and mappings.

COURSE OUTCOMES:

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

CO1: Design control unit using logic circuits and analyze central processing unit, instruction formats, addressing modes, types of instructions, modes of transfer for effective utilization of a system.

CO2: Apply boolean algebra and map simplification techniques to design logic circuits and basic computer using memory mappings, techniques of I/O and instruction sets.

DETAILED SYLLABUS:

UNIT I - DIGITAL LOGIC CIRCUITS AND DIGITAL COMPONENTS   (11 Periods)

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map simplification, Combinational Circuits, Flip-Flops, Sequential Circuits.

Digital Components: Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters.

UNIT II - DATA REPRESENTATION   (10 Periods)

Data Representation: Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Binary Codes, Error Detection Codes.

UNIT III - MICRO PROGRAMMED CONTROL AND CENTRAL PROCESSING UNIT
**   (12 Periods)**

Micro programmed Control: Control Memory, Address Sequencing, Micro-program Example, Design of Control Unit.

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data transfer and manipulation, Program control, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC).

UNIT IV - BASIC COMPUTER ORGANIZATION AND DESIGN   **(11 Periods)**

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-output and interrupt, Complete computer description, Design of basic computer.

UNIT V - INPUT-OUTPUT ORGANIZATION AND MEMORY ORGANIZATION
                                                              (11 Periods)
Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory.

                                                        Total Periods: 55

TEXT BOOK:

1. M. Morris Mano, "*Computer System Architecture,*" Pearson Education, 3rd Edition, 2017.

REFERENCE BOOKS:

1. T. Rajaraman and V. Radhakrishnan, "*Computer Organization and Architecture,*" Prentice Hall India Learning Private Limited, 2007.
2. William Stallings, "*Computer Organization and Architecture,*" Pearson Education, 10th Edition, 2016.

ADDITIONAL LEARNING RESOURCES:

1. http://nptel.ac.in/courses/106106092
2. https://swayam.gov.in/course/3724-computer-architecture-and-organization.

MCA I- SEMESTER

(19MC10102) **MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	--	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Mathematical logic and predicates; Functions and Relations; Algebraic Structures; Mathematical Reasoning; Recurrence Relations; Graphs and Trees.

COURSE OUTCOMES:

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

CO1: Identify the types of functions, formulate truth tables and solve normal forms using the knowledge of mathematical logic.

CO2: Analyze computer algorithms using the knowledge of graph theory and solve recurrence relations using discrete mathematics.

DETAILED SYLLABUS:

UNIT I - MATHEMATICAL LOGIC AND PREDICATES   (10 Periods)

Mathematical Logic: Statements and Notations, Connectives, Well formed formulas, Truth Tables, Tautology, Normal forms.

Predicates: Predicate calculus, Rules of inference, Consistency, Proof of contradiction.

UNIT II - RELATIONS AND FUNCTIONS   (8 Periods)

Relations: Properties of Binary Relations, Equivalence Relations, Partial Ordering Relations, Hasse diagrams.

Functions: Inverse Functions, Composition of functions, Recursive functions, Lattice and its Properties.

UNIT III - ALGEBRAIC STRUCTURES AND MATHEMATICAL REASONING (9 Periods)

Algebraic structures: Algebraic system problems and general properties, Semi groups and monoids, Groups, Homomorphism, Isomorphism.

Mathematical Reasoning: Methods of Proof, Mathematical Induction, The Inclusion-Exclusion Principle, The Pigeonhole principle.

UNIT IV - RECURRENCE RELATIONS   (9 Periods)

Recurrence Relation: Generating functions of Sequences, Calculating co-efficient of Generating functions, Homogeneous Recurrence relation, Solving recurrence relations by substitution and generating functions, Methods of characteristic roots.

UNIT V - GRAPHS AND TREES **(9 Periods)**

Graphs: Introduction to Graphs, Types of Graphs, Graphical representations, Paths and Circuits, Euler and Hamiltonian Paths and Circuits, Graph Coloring.

Trees: Introduction to Trees, Binary Search Trees, Spanning Trees, Depth-First Search, Breadth-First Search, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm.

Total Periods: 45

TEXT BOOKS:

1. Trembly J.P. and Manohar.P, *"Discrete Mathematical Structures with applications to computer science,"* Tata McGraw Hill, New Delhi, 2017.

2. Kenneth H. Rosen, *"Discrete Mathematics and its Applications,"* Tata McGraw Hill, New Delhi, 7th edition, 2017.

REFERENCE BOOKS:

1. J.L. Mott, A. Kandel, T.P Baker, *"Discrete Mathematics for Computer Scientists and Mathematicians,"* Prentice Hall India, 2nd Edition 2015.

2. D. S. Chandrasekharaiah, *"Mathematical Foundations of computer science (Discrete Structures),"* Prism Books Pvt. Ltd, India, 2006.

(19MC10103) **OPERATING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	-	--	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Operating Systems; Design and Implementation of Operating System Structure; Evaluation of Multithreading and CPU Scheduling Algorithms; Deadlocks and Synchronization Methods; Memory Management Techniques; Protection & Security.

COURSE OUTCOMES:

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

CO1: Identify and analyze Inter Process Communication (IPC), Process Synchronization, Memory Management, Process Scheduling, System protection & Security mechanisms and algorithms to solve problems of resource utilization.

CO2: Select and apply Deadlock handling mechanisms, Synchronization tools, Process Scheduling and Page Replacement algorithms to interpret and resolve optimal resource allocation problems.

DETAILED SYLLABUS:

UNIT I – SYSTEM STRUCTURES AND PROCESSES   (10 periods)

System Structures: Operating System concepts, Role of Operating System, Operating System services, user operating system interface, Operating System Operations, Computing Environments, Operating system structure, System calls, types of system calls, System programs, Virtual machines.

Processes: Process concept, Process scheduling, Operations on processes, Inter process communication (IPC), Examples of IPC systems.

UNIT II- MULTITHREADED PROGRAMMING AND PROCESS SCHEDULING

(12 periods)

Multithreaded Programming: Multithreaded models, Thread libraries, Threading Issues, Operating System Examples.

Process Scheduling: Basic Concepts, Type of Scheduler, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling.

UNIT III - PROCESS SYNCHRONIZATION AND DEADLOCKS   (11 periods)

Process Synchronization: Concepts, Critical-Section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of Synchronization, Critical regions, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT IV - MEMORY MANAGEMENT **(11 periods)**

Memory Management strategies: Concepts, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation.

Virtual Memory Management: Concepts, Demand paging, Copy on write, Page replacement, Allocation of frames, Thrashing.

UNIT V - SYSTEM PROTECTION AND SECURITY **(11 periods)**

System Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights.

System Security: The Security problem, Program threats, System and Network threats.

Total Periods: 55

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *"Operating System Concepts,"* John Wiley & Sons. Inc, 8th Edition, 2009.

REFERENCE BOOKS:

1. Achyut S. Godbole, *"Operating Systems,"* Tata McGraw-Hill, 3rd Edition, 2017.
2. William Stallings, *"Operating Systems: Internals and Design Principles,"* Pearson Education, 9th Edition, 2018.

ADDITIONAL LEARNING RESOURCES:

1. https://www.javatpoint.com/os-tutorial
2. https://www.os-book.com/OS10/slide-dir/index.html

MCA I- SEMESTER
(19MC10104) **PROGRAMMING IN C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Problem Solving; Analysis and Efficiency of Algorithms; Problem solving approaches; Elements of C and Data types; Program design; Operators and Expressions; Data Input and Output ; Control Statements; Functions ; Arrays ; Strings ; Pointers; Structures & Unions and File handling Techniques; Preprocessor directives; Command line argument and its usage.

COURSE OUTCOMES:

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

CO1: Design algorithms using problem-solving approaches, C language Tokens, Input/output Formatting styles, Control statements, Dynamic memory allocation functions, parameter passing mechanism, command line arguments and functions to solve problems.

CO2: Select and apply control statements, 'C' language constructs, functions, pre-processor directives, sequential and random access of text/binary files for persistent data storage to solve computational problems.

DETAILED SYLLABUS:

UNIT I - PROBLEM SOLVING AND C LANGUAGE   (11 Periods)

Problem Solving: Problem solving, Top-Down Design, Implementation of Algorithms, Program Verification, Efficiency of Algorithms, Analysis of Algorithms.

C Language: Identifiers, Types, Variables, Constants, Keywords, Expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion, Structure of a C Program, Prepare and Run a C Program.

UNIT II -PROGRAM CONTROL STATEMENTS, ARRAYS AND STRINGS   (11 Periods)

Program Control Statements: Two way Selection: If, If-Else, Nested If-Else; Multi way selection: else if-ladder and switch statement; Repetition: Concept of Loop, For Loop, While Loop, Do-While Loop; Break, Continue and goto statement.

Arrays and Strings: Array concept, types of Arrays: One Dimensional, Two Dimensional and Multi-Dimensional Arrays; Strings, String Representation and initialization, Array Of Strings, String Manipulation Functions.

UNIT III -POINTERS AND FUNCTIONS   (11 Periods)

Pointers: Pointers declaration and initialization, Arithmetic operations on Pointers, Array of Pointers, Pointer to an Arrays, Dynamic Memory Management Functions: malloc, calloc and realloc and free.

Functions: Declaring Functions, System Defined and User Defined Function; Local and Global Variables, Parameter Passing Mechanism: Pass By Value and Pass By Reference; Scope, Storage Classes, Recursion: Recursive Function, Application of Recursion: Factorial Calculation and Fibonacci number generation.

UNIT IV -DERIVED DATA TYPES   (11 Periods)

Derived Data Types: Structures: Structure declaration and initialization, Anonymous structure, Accessing Operators, Nested Structure, Array of structure, Array within a structure, Pointer to Structure, Passing Structures through Functions; Union: Declaration, Initialization and its usage; Typedef, Enumerated types and Bit field, Application of structure with pointers: Static and Dynamic linked list representation.

UNIT V- FILES AND PREPROCESSOR DIRECTIVES   (11 Periods)

Files, types of files: Unformatted Data, Binary and Text file; Operations on File: open, close, read, write, seek, tell, read data from files, writing data to files; Program to implement Sequential access and Random access; Preprocessor directive statements and its usage; Command line argument and its usage.

Total Periods: 55

TEXT BOOKS:

1. B.A. Forouzan, "*A Structured programming approach using C,*" Cengage learning, 3rd Edition, 2007.
2. R.G. Dromey, "*How to Solve it by Computer*", Pearson Education, 2006.

REFERENCE BOOKS:

1. Ajay Mittal, "*Programming in C – A practical approach*," Pearson Education in south Asia, 2010.
2. Byron Gottfried, "*Programming in C*," Schaum Outline Series, Tata MC Grawhill, 3rd Edition, 2017.
3. M.T. Somashekara, "*Problem Solving with C,*" PHI Learning Private Limited, New Delhi, 2009.

ADDITIONAL LEARNING RESOURCES

1. https://nptel.ac.in/courses/106104074/

2. https://swayam.gov.in/course/1388-introduction-to-programming-in-c

MCA I- SEMESTER

(19MC1HS31) **COMMUNICATIVE ENGLISH LAB**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	3	1.5

PRE REQUISITE: --

COURSE DESCRIPTION:

Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing

COURSE OUTCOMES:

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

CO1: Analyze the limitations of language and apply appropriate modes and techniques of LSRW to communicate effectively with the engineering community and society and to function effectively as an individual and a member in a team.

*First ten exercises are mandatory among the following:

LIST OF EXERCISES:

1. Just a Minute, Elocution/Impromptu
   Steps to be followed, Useful tips, Do's & Don'ts, Preparation, Examples**.**
2. Phonetics
   Sounds of English, Consonants, Vowels, Speech Organs, Phonetic Transcription, Word Accent, Basics of Intonation.
3. Vocabulary Building
   Prefixes & Suffixes, Synonyms & Antonyms, Phrasal verbs, Idioms, One word substitutes, Words often confused.
4. Grammar
   Tenses, Nouns, Word order and error correction.
5. Giving Directions
   Useful phrases, Sample conversations, Exercises.
6. Role Plays
   Useful tips, Do's & Don'ts, Exercises, Role Plays for practice.
7. Public Speaking
   Stage presence, Voice control, Body Language, Rehearsals, Audience, Delivery, Do's & Don'ts, Project Submission.
8. Letter Writing
   Introduction, Objective, Formats, Types, Exercises.
9. Describing Objects
   Jargon, Useful Phrases,Do's & Don'ts, Exercises.
10. Listening Comprehension
   Introduction, Types of listening, Practice, Benefits of listening, Exercises.

11. Information Transfer

Tables, Pie-Charts, Venn Diagrams, Graphs, Flow Charts, Steps to be followed, Exercises.

12. Reading Comprehension

Introduction, Types of reading, Inferring, Critical analysis, Exercises.

TEXT BOOK:

1. Communicative English Lab Manual, SVEC, 2019.

REFERENCE BOOKS:

1. D. Sudha Rani, "*A Manual for English Language Laboratories*," Pearson, Noida, 2010.

2. Nira Kumar, "*English Language Laboratories*," PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARES:

1. SoftX
2. Speech Solutions
3. English Pronunciation Dictionary by Daniel Jones
4. Learning to Speak English 8.1, The Learning Company – 4 CDs.
5. Mastering English: Grammar, Punctuation and Composition.
6. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
7. Dorling Kindersley Series of Grammar.
8. Language in Use 1, 2 and 3
9. Cambridge Advanced Learner's Dictionary - 3rd Edition
10. Centronix – Phonetics
11. Let's Talk English, Regional Institute of English South India.

ADDITIONAL LEARNING RESOURCES:

1. https://goo.gl/IjE45p: Amazon India site – with thousands of different product descriptions.
2. https://goo.gl/3ozeO6: 15 ways to calm your nerves before giving a presentation.
3. https://goo.gl/p20ttk: useful site for more language about introducing yourself.
4. https://goo.glsvMHZ1: information and advice about describing line graphs
5. https://goo.gl/NqFJuc: an informative presentation about using line graphs

MCA I-SEMESTER
(19MC10131) PC SOFTWARE LAB

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	3	1.5

PREREQUISITES: --

COURSE DESCRIPTION:

Peripherals of a computer; Disassembling & Assembling the Personal Computer(PC); Linux file system, File handling utilities & Text processing utilities; Productivity tools including Word, Excel, Power Point, Access and publisher.

COURSE OUTCOMES:

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

CO1: Identify and analyze functional parts of PC, functionalities of Operating System and Information Management.

CO2: Apply Troubleshooting techniques for Assembling and Disassembling of PC and create professional word documents, Excel Spreadsheets and power point presentations for effective management of data.

CO3: Work independently and in a team to solve problems with effective communication.

LIST OF EXERCISES:
PC Hardware

1. a) Identification of peripherals of a computer, components in a CPU and its functions. Construct block diagram of CPU along with the configuration of each peripheral.

    b) Demonstration of disassembling and assembling the PC.

2. Demonstrate Operating System, Components of OS, Installation of Microsoft Windows XP Operating System.

3. Implement Basic MS-DOS Internal and External commands.

4. a) Introduction to Linux file system, perform File handling utilities and Text processing Utilities.

    b) Implement Shell Script to generate Fibonacci series.

MS Word and LaTeX

5. Implement Mail merge using MS-Word.

6. a) Design a visiting card using MS-Word.

    b) Create a project Certificate using LaTeX with the features like Formatting Fonts,

Text Effects, Borders and Colors.

MS Excel

7. The ABC Company shows the sales of different products for 5 years.

Create Column Chart, Pie Chart and Bar chart for the following data:

YEAR	PRODUCT-1	PRODUCT-2	PRODUCT-3	PRODUCT-4
2014	1000	800	900	1000
2015	800	80	500	900
2016	1200	190	800	400
2017	400	200	300	1000
2018	1800	400	400	1200

MS Power Point

8. Design a power point presentation on Department of MCA which includes Animations, Design, Sound effects and Images.

MS Access

9. Create Employee and Department tables with the following fields:

Employee table: enumber, ename, salary, deptno.

Department table: deptno, dname, location.

a) Create one-to-many relationship between above two tables.

b) Create a table, form and generate a report with the following fields:

Book_No, Book_Name, Author, Publisher and Price.

10. Design Form and generate Reports for the above employee table and implement the queries as per the given criteria:

a) Retrieve employee details whose salary is above 30,000.

b) Retrieve employee details whose deptno is 20.

11. Mini Project:

Create a Web page with the given features: Home page, About us, Department, Contact page using Microsoft Publisher.

REFERENCE BOOKS:

1. ITL Education Solutions Limited, "*Introduction to Information Technology,*" Pearson Education India, 2nd Edition, 2012.

2. John Walkenbach, Herb Tyson, Michael R. Groh, Faithe Wempen, Lisa A. Bucki, "*Microsoft Office 2010 Bible,*" John Wiley & Sons, 2010.

3. Peter Norton, "*Introduction to Computers*," Tata McGraw-Hill, New Delhi, 7th Edition, 2012.

4. Vikas Gupta, "*Comdex Information Technology Course Tool Kit,*" WILEY Dreamtech, New Delhi, 10th Edition, 2009.

5. Sumitabha Das, "*UNIX Concepts and Applications*," Tata McGraw Hill, 4th Edition, 2017.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106106144/2

2. https://support.office.com/

3. https://www.latex-project.org/

4. https://www.pcworld.com/

(19MC10132) **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	3	1.5

PRE-REQUISITES:--

COURSE DESCRIPTION:
Program Design and Problem Solving using the C Programming Language; Control Structures; Functions; Arrays; Strings; Pointers; File I/O and the usage of Preprocessor Directives.

COURSE OUTCOMES:

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

CO1: Analyze and implement algorithms using C language Tokens, Input/output formatting styles and Programming components to solve problems.

CO2: Design and develop programs using Control Structures, Loops, Functions, Parameter Passing Mechanism, Command Line Arguments, File Handling to solve complex problems.

CO3: Work independently and in a team to solve problems with effective Communication.

LIST OF EXERCISES:

1. a) Design a flow chart and algorithm to add two numbers and find the largest number among two numbers.
   b) Design a flow chart and algorithm for printing prime numbers for a given range of numbers.

2. a) Write a C Program to find the sum of individual digits of a positive integer.
   b) Write a C Program to find the roots of a quadratic equation.

3. Write a C language programs to implement non-recursive and recursive functions for the following task:
   a) Calculating Factorial of a given number
   b) GCD of a given numbers

4. a) Write a C Program to Add, Subtract and Multiply Two Matrices Using
            Functions (Passing arrays as arguments to the function)
   b) Write a C program to determine whether a given string is a palindrome or not.

5. a) Write a C program to Insert a Substring into a given main String at a given Position.
   b) Write a C program to delete 'n' characters from a given position in a given string.

6. a) Write a C program to generate Electricity Bill for different categories of users based on different slabs in each category. (Using Nested if else Statement).
   b) Write a c program to evaluate the following expression using loops:

$1+x2/2!+x4/4!+...$ upto 5 terms.

7. Write a menu driven program to read list of student names and perform the following operations using array of character pointers:
      a) To insert a student name
      b) To delete a student name

8. a) Write a program to read in an array of names and sort them.
Note: Use functions and pointers.

    b) Write a program to read and display values of an integer array.
Note: Allocate space dynamically for the array using the malloc ().

9. a) Write a C program to copy contents of one file to another file.
   b) Write a C program to reverse the first 'n' characters in a file.
Note: The file name and n are specified on the command line.

10. a) Write a C program to display the contents of a file.
    b) Write a C program to merge two files into a third file
 Note: The contents of the first file followed by those of the second are put in the third file).

Mini Project-1:
Create a list of Employees with the following fields and calculate minimum and maximum salaries of an employee: Emp_Id, Name: First name, Middle name, Last name, Address: Area, City, State, Age, Salary, Designation.

Mini Project-2: Estimation of Tax for an Employee, given the following conditions:
    If income is less than 1,50,000 then no tax.
    If taxable income is in the range 1,50,001 – 3,00,000 then charge 10% tax.
    If taxable income is in the range 3,00,001 – 5,00,000 then charge 20% tax.
    If taxable income is above 5,00,001 then charge 30% tax.

REFERENCE BOOKS:

1. Byron Gottfried, "*Programming in C*," SchaumOutline Series, Tata MC Grawhill, 3rd Edition, 2017.
2. M.T. Somashekara, "*Problem Solving with C,*" PHI Learning Private Limited, New Delhi, 2009.

MCA II – SEMESTER
(19MC2BS01) **PROBABILITY AND STATISTICS**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	1	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Concepts of Probability; Probability distributions; Random variables; Sampling, Correlation and regression analysis; Statistical quality control; Testing of hypothesis.

COURSE OUTCOMES:

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

CO1: Analyze the correlation and regression, estimation and sampling distributions to identify and solve the problems for testing of hypothesis.

CO2: Apply the methods of probability and its distributions to solve the problems on random variables and formulate statistical quality control charts.

DETAILED SYLLABUS:

UNIT I- PROBABILITY AND RANDOM VARIABLES   (9 Periods)

Probability: Random experiment, event, sample space, probability, Addition and Multiplication theorems of probability, conditional probability, Bayes' theorem.

Random Variables: Discrete and continuous random variables, probability mass function and probability density function of a random variable, Distribution function and its properties, problems on random variable and Mathematical expectation of a random variable.

UNIT II- PROBABILITY DISTRIBUTIONS AND STATISTICAL QUALITY CONTROL

(10 Periods)

Probability Distributions: Discrete Distributions: Binomial Distribution, Mean and variance of Binomial distribution, Poisson distribution, Mean and variance of Poisson distribution. **Continuous Distributions:** Normal Distribution- Mean, variance and area properties.

Statistical Quality Control: Construction of quality control charts $\overline{X}$, R, p, np and c-charts.

UNIT III - CORRELATION AND REGRESSION ANALYSIS   (8 Periods)

Correlation Analysis: Types of Correlation, Karl Pearson's coefficient of Correlation and Spearman's Rank correlation coefficient.

Regression Analysis: Fitting of two lines of Regression, Regression coefficients.

UNIT IV - SAMPLING DISTRIBUTIONS, ESTIMATION AND TEST OF SIGNIFICANCE FOR LARGE SAMPLES (10 Periods)

Sampling distributions and Estimation: Population, sample, parameter, statistic, sampling distribution of sample mean and sample standard deviation, standard error of a statistic; Point estimation and Interval estimation.

Test of Significance for large samples: Null hypothesis and Alternative hypothesis, Type-I and Type-II errors, Level of significance, Critical Region, one tailed and two tailed tests; Test of Significance of single proportion, Difference of two Proportions, Single mean, Difference of two Means.

UNIT V - TEST OF SIGNIFICANCE FOR SMALL SAMPLES (8 Periods)

Student's t-test: Single Mean, Difference of two sample means; Paired t-test, F-test for equality of two population variances; Chi-square test of goodness of fit and independence of attributes.

Total Periods: 45

TEXT BOOKS:
1. T. K. V. Iyengar, B. Krishna Gandhi etal., *"Probability and Statistics,"* S. Chand and Company ltd: New Delhi, 3rd Edition, 2011.
2. S.P. Gupta, *"Statistical Methods,"* Sultan and Chand, New Delhi, 34th Edition, 2005.

REFERENCE BOOKS:

1. Shanaz Bhatul, *"Probability and Statistics,"* RIDGE Publications, 2nd Edition, 2006.
2. S.C. Gupta and V.K. Kapoor, *"Fundamentals of Applied Statistics,"* S. Chand and Sons, New Delhi, 2010.

(19MC20101) **DATABASE MANAGEMENT SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Operating Systems.

COURSE DESCRIPTION:
Databases; Database Architecture and Database Design; Concepts of Relational Database and its Design; Representation of ER Diagram to Relational model; SQL queries; Normal forms; Recovery & Concurrency Control mechanism; Storage and Indexing mechanism.

COURSE OUTCOMES:

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

CO1: Identify and analyze the problems arise due to redundancy, Data normalization techniques, Transaction processing approaches, Concurrency control and Recovery mechanisms for an optimal database application system.

CO2: Select and apply integrity constraints over relations, relational models, storage and indexing, hashing techniques for the construction of relational database systems.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION TO DATABASES, DATABASE ARCHITECTURE AND DATABASE DESIGN (11 Periods)

Databases and Database Users: Concepts, Characteristics of the Database approach, Actors on the Scene, Workers behind the scene, Advantages of the using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas and Instances, Three Schema architecture and Data Independence, Database Languages and Interfaces, Database system environment, Centralized and Client/Server Architectures for DBMS, Classification of Database Management Systems.

Database Design: Database design and ER-diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER-model, Conceptual Design with the ER-Model.

UNIT II - RELATIONAL MODEL AND BASIC SQL (10 Periods)

Relational Model: Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational.

Case Study: ER-diagram for banking enterprise and university database.

Basic SQL: SQL data definition and data types, CREATE table command in SQL, attribute data types in SQL, Specifying constraints in SQL: specifying attribute constraints and attribute defaults, specifying key and Referential integrity constraints, specifying CHECK constraints on tuples.

UNIT III - SQL, SCHEMA REFINEMENT AND NORMAL FORMS   (12 Periods)

SQL: Form of Basic SQL Query, Examples of queries in SQL: Insert, Delete and Update statements; Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, NULL values, Comparison using Null values, Logical connectives: AND, OR , NOT; Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Views, Destroying /altering Tables and Views, Triggers and Active Databases.

Schema Refinement and Normal Forms: Schema Refinement: Problems Caused by redundancy, Decompositions; Problem related to decomposition, Functional Dependencies, Normal Forms: FIRST, SECOND, THIRD Normal forms, BCNF; Properties of Decompositions: Loss less, join Decomposition, Dependency preserving Decomposition.

UNIT IV - OVERVIEW OF TRANSACTION MANAGEMENT, CRASH RECOVERY AND CONCURRENCY CONTROL   (11 Periods)

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock Based Concurrency Control, Performance of Locking.

Concurrency Control: 2Phase Locking (2PL), Serializability and Recoverability, Lock Management, Lock Conversions.

Crash recovery: ARIES, the Log, Other Recovery related Structures, Write-Ahead Log Protocol, Check pointing, Recovering from a System Crash.

UNIT V - OVERVIEW OF STORAGE AND INDEXING   (11 Periods)

Overview of Storage & Indexing: Data on External Storage, File Organization & Indexing: Clustered Indexes, Primary and Secondary Indexes; Index Data Structures: Hash based Indexing, Tree based Indexing.

Storing Data: Memory Hierarchy: Magnetic disks, Performance implications of disk structure; Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Total Periods: 55

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, "*Data base Management Systems*," Tata McGraw-Hill, 3rd Edition, 2013.

2. Ramez Elmasri, Shamkant B.Navathe, *"Database Systems*," Pearson Education, 6th Edition, 2013.

REFERENCE BOOKS:

1. A.Silberschatz, H.F. Korth, S.Sudarshan, "*Data base System Concepts*," McGraw hill, 6th Edition, 2011.

2. C.J.Date, "*Introduction to Database Systems,*" Pearson Education, 8th Edition, 2006.

ADDITIONAL LEARNING RESOURCES:

1. http://www.nptelvideos.in/2012/11/database-management-system.html
2. http://www.oracle.com/technetwork/tutorials/index.html
3. https://www.tutorialcup.com/dbms
4. https://www.javatpoint.com/oracle-tutorial

MCA II-SEMESTER

(19MC20102) **DATA STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PREREQUISITES: A course on "Programming in C".

COURSE DESCRIPTION:

Pseudo code; Abstract Data Type (ADT); Implementation of Stack; Queues; Linked Lists; Graphs; Tree ADT's and its Application; Sorting and Searching techniques; Binary Search Tree ADT, AVL- Height balanced trees and its Applications; Graphs; Shortest Path algorithms.

COURSE OUTCOMES:

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

CO1: Analyze abstract data types to implement stacks, queues, linked lists, trees and graphs to solve computational problems.

CO2: Select and apply sorting, searching, tree and graph traversal techniques for designing algorithms.

DETAILED SYLLABUS:

UNIT I - BASIC CONCEPTS AND STACKS   (9 Periods)

Basic Concepts: Algorithm**,** Pseudo code, Abstract Data Type, Model for an Abstract Data Type, Abstract Data Type Implementations.

Stacks: Concepts of Stack**,** Stack Operations, Representation of Stack using arrays, Applications- Recursion, Infix to Postfix Transformation, Evaluating Postfix Expressions.

UNIT II - QUEUES AND GENERAL LINEAR LISTS   (10 Periods)

Queues: Concepts of Queue, Queue Operations, Representation of Queue using arrays, Various Queue Structures: Circular Queue, Double ended queue, Priority queue, Applications –Simulation.

General Linear Lists: Operations, Implementations- Single linked list, Double linked list, Circular Linked List, Applications- Stacks using Linked List, Queue using Linked List, Polynomial Addition, Sparse Matrix Implementation.

UNIT III - SORTING AND SEARCHING   (8 Periods)

Sorting: Sort Concepts, Sort Stability, Sort Efficiency, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge sort, Heap Sort.

Searching: Sequential Search, Binary Search, Analyzing Search Algorithms.

UNIT IV -TREES   (10 Periods)

Trees: Tree Concepts, Binary Trees, General Trees, Binary Tree Traversals.

Binary Search Trees: Concepts, BST Operations, Binary Search Tree Abstract Data Type, Binary Search Tree Applications, Threaded Trees.

AVL Search Trees: AVL Tree Concepts, AVL Tree Implementations, AVL Tree Abstract Data Type, AVL Tree Algorithms.

UNIT V - GRAPHS   (8 Periods)

Graphs: Concepts of graph, Operations, Graph Storage Structures, Graph Algorithms, Graph Abstract Data Type.

Application of Graph Structures: Dijkstra's Algorithm, Topological Sorting,

Minimum Spanning Tree: Kruskal's, Prim's Algorithm, Euler's and Hamiltonian Circuits.

Total Periods: 45

TEXT BOOKS:

1. Richard F.Gilberg & Behrouz A. Forouzan, "*Data Structure: A Pseudo code Approach with C,*" Thomson India Edition, 2nd Edition, 2007.

2. D Samanta, "*Classic Data Structures,*" PHI Publications, New Delhi, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Mark Allen Weiss, "*Data Structures and Algorithm Analysis in C*", Pearson Education, 2nd Edition, 2002.

2. Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran "*Fundamentals of Computer Algorithms*", Galgotia publications Pvt. ltd., New Delhi, 2010.

3. Jean-Paul Tremblay and Paul G. Sorenson, "*An Introduction to Data Structures with Applications*", McGraw-Hill education, 2nd Edition, 2017.

ADDITIONAL LEARNING RESOURCES:

https://www.coursera.org › Browse › Computer Science › Algorithms
https://nptel.ac.in/courses/106102064
https://nptel.ac.in/courses/106103069
https://nptel.ac.in/courses/106102064/24
https://swayam.gov.in/course/235-data-structure

(19MC20103) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PREREQUISITES: A course on "Programming in C".

COURSE DESCRIPTION:

Principles of Object Oriented Programming; Representation of Java Classes and methods; Inheritance and Polymorphism using Java, Creation of Packages and Interfaces; Implementation of Utility Classes and Input/output; Exception handling mechanism and multithreading; Event handling techniques; GUI applications by using AWT and Swings.

COURSE OUTCOMES:

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

CO1: Analyze Object Oriented Programming Principles and apply Exception Handling mechanisms and Multithreading for application development**.**

CO2: Design and develop complex user interface applications using AWT, Applets, Swings, Java Collection API and Java standard class libraries to solve complex problems.

DETAILED SYLLABUS:

UNIT I - JAVA PROGRAMMING   **(9 Periods)**

Java Programming: Java Buzzwords, Object-Oriented Programming, Beginner Program, Data Type, Variables, Operators, Control Statements, Arrays; Classes: Class and Objects, Methods, Constructors, this Keyword, Garbage Collection, finalize Method; Overloading Methods, Access Control, static Keyword, final Keyword, Nested and Inner Classes, String Class.

UNIT II - INHERITANCE AND POLYMORPHISM   **(9 Periods)**

Inheritance and Polymorphism: Inheritance, super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Final with Inheritance, Object Class.

Packages and Interfaces: Packages, Access Protection, Importing Packages; Interfaces: Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

UNIT III - UTILITY CLASSES AND INPUT/OUTPUT   **(9 Periods)**

Utility Classes: Java Collections, Java Collection Frame Work, Collection Interfaces: Set, List, Queue, Map; Collection Classes: Hash Set, LinkedHashSet, SortedSet, Linked List, Stack, Array List, Vector, Hash table; Iteration over Collections: Iterator Interface, Comparator Interface, ListIterator Interface and Enumeration Interface; StringTokenizer, Date, Calendar.

Input/output: Stream Classes: Byte Streams, Character Streams, Console Class, Stream I/O, Serialization.

UNIT IV - EXCEPTION HANDLING AND MULTITHREADING   (9 Periods)

Exception Handling: Exception Handling, Exception Types, Uncaught Exceptions, try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, User defined Exceptions, Exception Subclasses, Chained Exceptions.

Multithreading: Java Thread Model, Thread life Cycle, Main Thread, Threads, Multiple Threads, Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming and Stopping Threads.

UNIT V - EVENT HANDLING AND GUI PROGRAMMING WITH JAVA   (9 Periods)

Event Handling: Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces.**GUI Programming with Java:** Abstract Window Toolkit (AWT): AWT Classes, Windows, Working with Frame Windows, Graphics and Color, AWT Controls: Labels, Buttons, Check Boxes, Lists, Scroll Bars, Text Field, Text Area, Layout Managers; Applets: Applet, Applet Architecture, Applet Skeleton, Applet Display Methods, Passing Parameters to Applets.

Swings: Swings, Hierarchy of Swing Components, JFrame, JWindow, JDialog, JPanel ; Swing Components: JLabel, JTextField, JButton, JToggleButton, Check Boxes, Radio Buttons, JTabbedPane, JScrollPane, JList, JComboBox, Trees, JTable.

Total Periods: 45

TEXT BOOK:

1. Herbert Schildt, "*The Complete Reference Java*", Tata McGraw-Hill, 10th Edition, 2017.

REFERENCE BOOKS:

1. B. Eswar Reddy, T. V. Suresh Kumar and P. Ragavan, *"Object Oriented Programming with Java,"* Pearson Sanguine Publications, 2nd Edition, 2011.

2. H. M. Dietel and P. J. Dietel, *"Java How to Program,"* Pearson Education India, 10th Edition, 2016.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106105191

2. https://javabeginnerstutorial.com/core-java-tutorial

3. https://www.javatpoint.com/java-tutorial

(19MC20104) **SOFTWARE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		4	-	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Nature of Software, Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice; Process Models, Agile Development, Understanding Requirements, Requirements Modeling; Design Concepts, Architectural And Component-Level Design; User Interface Design and Testing Strategies; Product Metrics, Risk Management And Quality Management.

COURSE OUTCOMES:

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

CO1: Identify and analyze software requirements, cost estimations, risk and quality management using the principles of software engineering, process models, design models, testing strategies, risk and management strategies to develop an application software.

CO2: Design software applications by applying design principles, user interface design rules, architectural design process, component-level design, agile development and metrics to develop a quality software product.

DETAILED SYLLABUS:

UNIT I - SOFTWARE AND SOFTWARE ENGINEERING, PROCESS MODELS AND AGILE DEVELOPMENT   (11 Periods)

Software and Software Engineering: Nature of Software, Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: Agility, Agility and Cost of Change, Agile Process, Extreme Programming, Other Agile Process Models.

UNIT II - UNDERSTANDING REQUIREMENTS AND REQUIREMENTS MODELING

(11 Periods)

Understanding Requirements: Requirements Engineering, Establishing the groundwork, Eliciting Requirements, Developing Use Cases, Building the requirements model, Negotiating Requirements, Validating Requirements.

Requirements Modeling (Scenarios, Information and Analysis Classes): Requirements Analysis, Scenario-Based Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

Requirements Modeling (Flow, Behavior, Patterns and WEBAPPS): Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirements Modeling for WebApps.

UNIT III- DESIGN CONCEPTS, ARCHITECTURAL AND COMPONENT-LEVEL DESIGN
(11 Periods)

Design Concepts: Design with Context of Software Engineering, Design Process, Design Concepts, Design Model.

Architectural Design: Software Architecture, Architecture Genres, Architecture Styles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow.

Component-Level Design: Component, Designing Class-Based Components, Conducting Component-level Design, Component Level Design for WebApps, Designing Traditional Components, Component-Based Development.

UNIT IV- USER INTERFACE DESIGN AND TESTING STRATEGIES (11 Periods)
User Interface Design: Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

Testing Strategies: Strategic approach to software testing, test strategies for conventional software, Black-box and White-box testing, Validation testing, System testing, the art of debugging.

UNIT V - PRODUCT METRICS, RISK MANAGEMENT AND QUALITY MANAGEMENT
(11 Periods)

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Total Periods: 55

TEXT BOOKS:

1. Roger S. Pressman, "*Software engineering A practitioner's Approach*", Tata Mc-Graw Hill International Education, 7th Edition, 2016.
2. Ian Sommerville, "*Software Engineering,*" Pearson, 9th Edition, 2011.

REFERENCE BOOKS:

1. Rajib Mall, "*Fundamentals of Software Engineering*", PHI, 5th Edition, 2018.
2. Hans Van Vliet, "*Software Engineering: Principles and Practices",* Willey Publications, 3rd Edition,2010.

ADDITIONAL LEARNING RESOURCES:

https://nptel.ac.in/courses/106101061

(19MC20131) **DATABASE MANAGEMENT SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	3	1.5

PRE-REQUISITES:

COURSE DESCRIPTION:

Creation of Data Definition commands; Implementation of Data Manipulation Commands; Table level and Column level Constraints; Construction of ER diagrams; Implementation of GROUP BY, HAVING, ORDER By clause; Creation and dropping of Views; Implementation of Nested Queries, Joins, Cursors, Functions, Procedures and Triggers.

COURSE OUTCOMES:

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

CO1: Design and implement ER-diagrams, Relational schemas, table and column level constraints, Cursors, Triggers, Functions and procedures to develop Relational Database applications.

CO2: Select and apply Nested Queries, Joins, Views, Group functions in updating and managing the databases to solve relational database problems using SQL and PL/SQL languages.

CO3: Work independently and in team to solve problems with effective Communication.

LIST OF EXERCISES:

1. Creation of DDL Commands

> Consider the following relation schemas:
> Client_master(Client_no, Name, Address1, Address2, City, State, Pincode, Bal_due)
> Product_master(Product_no, Description, Unit_measure, Qty_on_hand, Record_lvl, Sell_price, Cost_price)
> Salesman_master(Salesman_id, Name, Address1, Address2, City, State, Pincode, Sal_amt, Target_amt, Remarks)
> Create the above tables, insert suitable tuples and perform the following DDL operations (CREATE, ALTER, DROP, RENAME, TRUNCATE) in Oracle SQL.

2. Creation of DML Commands

> Using the table client master and product master answer the following Questionnaires.

i. Change the selling price of '1.44 floppy drive to Rs.1150.00

ii. Delete the record with client 0001 from the client master table.

iii. Change the city of client_no'0005' to Bombay.

iv. Change the bal_due of client_no '0001, to 1000.

v. Find the products whose selling price is more than 1500 and also find the new selling price as original selling price *15.

vi. Find out the clients who stay in a city whose second letter is a.

vii. Find out the name of all clients having 'a' as the second letter in their names.

viii. List the products in sorted order of their description.

ix. Count the total number of orders

x. Calculate the average price of all the products.

xi. Calculate the minimum price of products.

xii. Determine the maximum and minimum prices . Rename the tittle as 'max_price' and min_price respectively.

xiii. Count the number of products having price greater than or equal to 1500.

3. Creation of Table level and Column level Constraints

Implement table level and column level constraints like Domain Integrity constraints (NOT NULL, CHECK), Entity integrity constraints (UNIQUE, PRIMARRY KEY) and Referential integrity constraints (FOREIGN KEY) for the below tables.

Create table Salesman_master with the following columns and constraints-

Column Name	Data Type	Size	Attributes
Salesman_no	Varchar	6	Primary Key / First letter must start with 'S'
Salesman_name	Varchar	20	Not Null
Address1	Varchar	30	Not Null
Address2	Varchar	30	
City	Varchar	20	
Pincode	Varchar	6	
State	Varchar	20	
Sal_amt	Numeric	8,2	Not Null, cannot be 0
Tgt_to_get	Numeric	6,2	Not Null, cannot be 0
Ytd_sales	Numeric	6,2	Not Null
Remarks	Varchar	60	

Create table sales_order with following columns and constraints

Column Name	Data Type	Size	Attributes
S_order_no	Varchar	6	Primary Key / First letter must start with 'O'
S_order_date	Date		
Client_no	Varchar	6	Foreign Key references client_no of client_master table
Dely_addr	Varchar	25	
Salesman_no	Varchar	6	Foreign Key references salesman_no of salesman_master table.
Dely_type	Char	1	Delivery : part (P) / full (F), Default 'F'
Billed_yn	Char	1	
Dely_date	Date		Cannot be less than s_order_date
Order_status	Varchar	10	Values('In Process', 'Fulfilled', 'BackOrder','Canceled')

Create table sales_order_details with following columns and constraints

Column Name	Data Type	Size	Attributes
S_order_no	Varchar	6	Primary Key / Foreign Key references s_order_no of sales_order table.
Product_no	Varchar	6	Primary Key / Foreign Key references product_no of product_master table.
Qty_ordered	Numeric	8	
Qty_disp	Numeric	8	
Product_rate	Numeric	10,2	

4. Construction of ER diagram

a) Construct an ER diagram for a **University** database application. Identify the Relations and include necessary integrity constraints.

An University has many departments, where each department has multiple Instructors. An Instructor belongs to only one department. Each department offers multiple Courses, each of which is taught by a single Instructor. A student may enroll for many courses offered by the department.

For the above problem create the following:

     i. Analyze the date required

     ii. Normalize the attributes

     iii. Create the logical data model (ER diagram)

b) Construct an ER diagram for a **Bank Database** by considering the following set of requirements that is used to keep track of Customer.

    i.   Each bank has a unique name.

    ii.   Each branch has a number, name, address (number, street, city), and set of phones.

    iii.   Customer includes their name, set of address (P.O. Box, city, zip code, country), set of phones, and social security number.

    iv.   Accounts have numbers, types (e.g. saving, checking) and balance. Other branches might use the same designation for accounts. So to name an account uniquely, we need to give both the branch number to which this account belongs to and the account number.

    v.   Not all bank customers must own accounts and a customer may have at most 5 accounts in the bank.

    vi.   An account must have only one customer.

    vii.   A customer may have many accounts in different branches.

5. Group functions: Implement queries using Aggregate functions, GROUP BY, HAVING, ORDER By clause and Creation, dropping of Views for the above tables using SQL.

6.Subqueries: Implement queries using SUBQUERIES for the above tables using SQL.

7.Joins: Implement queries using JOINS and OUTER JOINS for the above tables using SQL.

PL/SQL PROGRAMS:

8. PL/SQL **CURSOR** program

Write a PL/SQL program for generation of Electricity Bill using CURSORS.

> **Note:** Create a table for Electricity bill consists of Customer_no, Customer_name, Customer_type, Prev_met_read, Curr_met_read, Month_name. Assume there are three Customer types namely Industrial, Agriculture and Domestic. Calculate the total charges based on the type of customer.

9. Triggers

Generate a database trigger to update the salary of an employee before/after performing any DML operations.

10. Procedures & Functions

> a) Write a procedure which takes the department_id as an input parameter and lists the names of all employees belonging to that department.

> b) Write a PL/SQL block of code that lists the highest salary drawn by an employee in each of the departments. It should make use of a function dept_highest which return the highest salary drawn by an employee for the given department.

Mini Project 1: Consider the following schema for a Library Database: BOOK(Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS(Book_id, Author_Name) PUBLISHER(Name, Address, Phone) BOOK_COPIES(Book_id, Branch_id, No-of_Copies) BOOK_LENDING(Book_id, Branch_id, Card_No, Date_Out, Due_Date) LIBRARY_BRANCH(Branch_id, Branch_Name, Address)

Write SQL queries to

a. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.
b. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
c. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
d. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
e. Create a view of all books and its number of copies that are currently available in the Library.

Mini Project 2: Consider the schema for College Database: STUDENT(USN, SName, Address, Phone, Gender) SEMSEC(SSID, Sem, Sec) CLASS(USN, SSID) SUBJECT(Subcode, Title, Sem, Credits) IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)]

Write SQL queries to

a. List all the student details studying in fourth semester 'C' section.

b. Compute the total number of male and female students in each semester and in each section.

c. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.

d. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.

e. Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT = 'Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA< 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.

REFERENCE BOOKS:

1. Ivan Bayross, "SQL, PL/SQL The Programming Language of ORACLE," BPB Publications, 2010.

2. Dr. P. S. Deshpande, "SQL & PL/SQL for Oracle 10g Black Book," Dreamtech Press, 2011.

3. J. J. Patrick, "SQL Fundamentals," Pearson Education, 3rd Edition, 2008.

4. Rick F. Vander Lans,"Introduction to SQL," Addison-Wesley Professional, 4th Edition, 2006.

MCA II-SEMESTER
(19MC20132) DATA STRUCTURES LAB

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	3	1.5

PREREQUISITES: Courses on "Programming in C Lab" and "Data Structures".

COURSE DESCRIPTION:

Logical and physical representation of data, Abstract data types of Linear and Non-linear Data structures; Singly and Doubly Linked lists; Queues, Stacks and their applications; Binary tree, Binary Search Tree and AVL trees; Usage of graphs, Sorting and Searching techniques.

COURSE OUTCOMES:

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

CO1: Analyze and implement algorithms to perform the operations of stacks, queues, linked lists, trees and graphs using problem solving approaches to solve computational problems.

CO2: Develop programs using sorting and searching techniques, trees and graph traversal techniques to solve memory utilization problems.

CO3: Work independently and in a team to solve problems with effective Communication.

LIST OF EXERCISES:

1. Write a C program to implement Stack and Queues using pointers.

2. Write a C program to perform the following expression using Stack operations

a) Convert infix expression into postfix expression

b) Evaluate postfix expression

3. Write a C program to implement the following:

a) Singly linked list

b) Doubly Linked List

4. Write a C program to implement Towers of Hanoi using Stack.

5. Write a C program to implement the following sorting algorithms:

i) Bubble sort   ii) Selection sort   iii) Quick sort   iv) Merge sort

6. Write a C program that use both Recursive and non-recursive functions to perform the following searching operations:

i) Linear search   ii) Binary search

7. Write a C program to create Binary Search Tree and perform operations on it.

8. a) Write a C program to implement Recursive Tree traversal techniques.

b) Write a C program to implement non-recursive Tree traversal techniques.

9. Write a C program to create AVL-tree and perform operations on it.

10. Write a C Program to implement Prim's Algorithm.

Mini Project-1:

Design, Develop and Implement a Program in C for the following operations on Graph of Cities

a. Create a Graph of N cities using Adjacency Matrix.

b. Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method.

Mini Project-2:

Design, Develop and Implement a menu driven Program in C for the following operations

on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept,

Designation, Sal, PhNo.

Perform the following operations on Employee data:
          a. Create a DLL of N Employees Data by using end insertion.
          b. Display the status of DLL and count the number of nodes in it
          c. Perform Insertion and Deletion at End of DLL
          d. Perform Insertion and Deletion at Front of DLL
          e. Demonstrate how this DLL can be used as Double Ended Queue
          f. Exit

REFERENCE BOOKS:

1. P. Padmanabham, "*C programming and Data Structures,*" B.S. Publications, 3rd Edition, 2008.

2. M.T. Somashekara, D. S. Guru, K. S. Manjunatha, "*Problem Solving with C,*" PHI Learning, 2nd Edition, 2018.

3. E. Karthikeyan, "*A Textbook on C: Fundamentals, Data Structures and Problem Solving,*" Prentice Hall of India Private Limited, 2008.

ADDITIONAL LEARNING RESOURCES:

https://nptel.ac.in/courses/106102064

https://nptel.ac.in/courses/106103069

https://nptel.ac.in/courses/106102064/24

https://swayam.gov.in/course/235-data-structure

(19MC20133) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES: Courses on "Programming in C" and "Object oriented Programming. through JAVA".

COURSE DESCRIPTION:

Object oriented concepts, recursive and non recursive function; StringTokenizer class; Method Overloading; String Operations; Creation of package and Interfaces; Handling predefined and User Defined Exceptions; Creation of Files and its Operations; Implementation of Multithreading; Creating and testing Applets; Event handling techniques**,** GUI applications using AWT and Swings.

COURSE OUTCOMES:

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

CO1: Apply object oriented Programming Principles to solve problems using control Structures, strings, functions, packages, interfaces, types of file streams and I/O operations on files.

CO2: Design and develop applications and graphical user interface components using Applet, AWT, Swings components, multithreading techniques, Inter threaded communication and Process synchronization to solve problems.

CO3: Work independently and in team to solve problems with effective communication.

LIST OF EXERCISES:

1. a)Write a Java program that prints all real solutions to the quadratic equation
$$ax^2 + bx + c = 0.$$
   b) Write a Java program to implement nth value of Fibonacci sequence using recursive and non recursive functions.

2. a) Write a Java program that prompts the user for an integer and print out all
   prime numbers up to the given integer.
   b) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use StringTokenizer class of java.util)

 3. Write a Java program to illustrate method overloading.

 4. Write a Java program to implement the matrix ADT using a class:
   a) Addition and Subtraction of matrices.   b) Multiplication of matrices.

5. Write a Java program to implement the following:

a) Create and Access a package b) Interfaces.

6. Write a Java program to implement the following:

a) Predefined exceptions   b) User defined exceptions

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

b) Write a Java program to display the number of characters, lines and words in

a text file.

8. a) Write a Java program to implement multithreading techniques.

b) Write a Java program to implement producer consumer problem using the concept of inter thread communication.

9. a)Write a java program to develop GUI components in java (AWT) with appropriate Event Handling techniques   .

b)Write a Java program to create user interface to perform integer divisions using Swings.

10. a) Develop an applet in Java to display a message.

b) Develop an applet to perform factorial of a given value.

 Mini Project

 1. Use Eclipse IDE to implement calculator using AWT and SWINGS.

 2. Application for Temperature Conversion

a).Write a temperature conversion applet that converts from Fahrenheit to Celsius.

Use the following formula for the conversion:

 Celsius = ((5/9)*(Ferenheit-32)).

 b).Enhance the temperature conversion applet by adding the Kelvin temperature scale.

Use the following formula for the conversion between Kelvin and Celsius
 Kelvin = Celsius + 273.15

REFERENCE BOOKS:

1. B. Eswar Reddy, T. V. Suresh Kumar and P. Ragavan, *"Object Oriented Programming with Java,"* Pearson Sanguine Publications, 2nd Edition, 2011.

2. Harvey Dietel and Paul Dietel, *"Java How to Program,"* Pearson Education, 11th Edition, 2018.

ADDITIONAL LEARNING RESOURCES:

1. https://javabeginnerstutorial.com/core-java-tutorial/

2. https://www.javatpoint.com/java-tutorial

3. URL: http://docs.oracle.com/javase/

4. URL: http://www.ibm.com/developerworks/java/

ANNEXURE-I
GUIDELINES FOR DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

Rule No.	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including labs and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations, if his involvement is established. Otherwise, The candidate is debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also

		debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course only.
6.	Refuses to obey the orders of the Chief Controller of Examinations/Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the Controller of Examinations or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the Controller of Examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. If the candidate physically assaults the invigilator/Controller of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.

Note: Whenever the performance of a student is cancelled in any course(s) due to Malpractice, he has to register for Semester-end Examinations in that course(s) consequently and has to fulfill all the norms required for the award of Degree.