KIT- KALAIGNARKARUNANIDHI INSTITUTE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

Coimbatore – 641 402

REGULATIONS 2020

CHOICE BASED CREDIT SYSTEM

DEGREE OF
MASTER OF COMPUTER APPLICATIONS (M.C.A.)

(Applicable for students admitted from the Academic Year 2020-21 onwards)

1. SHORT TITLE AND COMMENCEMENT

> These Regulations shall be called the "KIT-Kalaignarkaraunanidhi Institute of Technology, Coimbatore, Regulations for the Award of M.C.A., Degree".

> They have been evolved, drafted and implemented after deliberations in and approvals from UGC, Anna University and Academic Council of the Institute, and are subject to change/modifications from time to time; (major modifications at a frequency of FOUR years in synchronization with the curriculum structure revision and minor changes as and when applicable).

> The latest/first version shall be applicable for the students enrolling for M.C.A., degree programs at this Institute from Academic year 2020-2021 onwards.

2. PREAMBLE

The regulations prescribed herein have been made by KIT, an autonomous institution, approved by AICTE,New Delhi and affiliated to the Anna University, Chennai, to facilitate the smooth and orderly conduct of its academic programmes and activities at the M.C.A.,. level. It is expected that the regulations will enable the students to take advantage of the various academic opportunities at the Institute and prepare themselves to face the challenges in their professional careers ahead. It may be noted that:

a) The provision made herein shall be applicable to the M.C.A.,. programmes offered at the institute, at present;

b) Academic and non-academic requirements prescribed by the Academic Council have to be fulfilled by a student for eligibility towards award of M.C.A., Degree.

3. PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

Sl. No.	Name	Definition
1	**Programme**	Refers to Degree Programme that is M.C.A. Degree Programme.
2	**Discipline**	Refers to branch or specialization of M.C.A. Degree Programme, like Computer Science and Engineering, Mechanical Engineering etc.,
3	**Course**	Refers to a theory or practical subject that is normally studied in a semester, like Mathematics, Physics, etc.,
4	**Head of the Institution**	Refers to the Principal of the College.
5	**Controller of Examinations (CoE)**	Refers to the authority of the college who is responsible for all activities of the Examinations.
6	**Head of the Department (HoD)**	Refers to the Head of the Department concerned.
7	**University**	Refers to Anna University, Chennai.
8	**College(KIT)**	Refers to KIT-Kalaignarkarunanidhi Institute of Technology, Coimbatore.
9	**Curriculum**	Refers to the various components/courses studied in each programme that provide appropriate outcomes (knowledge, skill and behavior/attitude) in the chosen branch of study.
10	**T-P-TU- C**	Refers to **T**heory, **P**ractical, **TU**torial, and **C**redits respectively.
11	**Foundation Courses (FC)**	May include Mathematics or other basic courses
12	**Professional Core (PC)**	Courses include the core courses relevant to the chosen specialization/branch.
13	**Professional Elective (PE)**	Courses include the elective courses relevant to the chosen specialization/ branch.
14	**Project Work(PW)**	Refers to the project done by a student or a group of students during final year.
15	**Career Enhancement Courses(CEC)**	Includes Mini Project Work and/or Internship, Seminar, Professional Practices, Case Study, soft skills and Industrial/Practical Trainings etc.,
16	**Academic Evaluation Committee (AEC)**	The committee includes Principal, CoE, HoD concerned(For details refer **Appendix V**)
17	**Department Evaluation Committee (DEC)**	The committee included HoD (need basis), senior faculty member(s) of department from various levels, class advisor, Mentor of the students. (For details refer **Appendix V**)

4. ADMISSION

4.1 Candidates seeking admission to M.C.A.,Degree Programme:

Candidates for admission to the first semester of the Post-Graduate Degree Programme shall be required to have passed an appropriate Under-Graduate Degree Examination of Anna University or equivalent as specified under qualification for admission as per the Tamil Nadu Common Admission (TANCA) criteria.

Note: TANCA releases the updated criteria during the admissions every academic year.

Admission shall be offered only to the candidates who possess the qualification prescribed against each programme.

Any other relevant qualification which is not prescribed against each programme shall be considered for equivalence by the committee constituted for the purpose. Admission to such degrees shall be offered only after obtaining equivalence to such degrees.

4.2 Re - admission

Students, who have discontinued for reasons other than disciplinary action, may be readmitted as per guidelines given by DoTE, Government of Tamilnadu and Anna University. Department Evaluation Committee (DEC) shall study and recommend on the exception and addition of courses to be registered for, by the student concerned during re-admission. The details shall be forward to Academic Evaluation Committee (AEC) for approval and the committee's decision shall be final.

5. **PROGRAMMES OFFERED**

KIT offers 2 year (4 Semesters) M.C.A., Degree programme affiliated to Anna University, under Choice Based Credit System (CBCS) for students admitted from 2020 onwards.

6. **ACADEMIC STRUCTURE OF PROGRAMMES**

6.1 Medium of Instruction

The medium of instruction is English for all courses, examinations, seminar presentations and project / thesis / dissertation.

6.2 Categorization of Courses

Every Post Graduate Degree Programme will have a curriculum with syllabi consisting of theory and practical courses that shall be categorized as follows:

i. **Foundation Courses (FC)** may include Mathematics or other basic courses

ii. **Professional Core (PC)** courses include the core courses relevant to the chosen specialization/branch.

iii. **Professional Elective (PE)** courses include the elective courses relevant to the chosen specialization/ branch.

iv. **Project Work (PW)** includes Project Work to be done in final semester

v. **Carrear Enhancement Courses (CEC)** includes Mini Project Work and/or Internship, Seminar, Professional Practices, Summer Project, Case Study and Industrial / Practical Training.

Instead of two electives in the curriculum, the student may be permitted to choose a maximum of 2 courses from other PG programmes with the approval of the Head of the Department offering such courses.

6.3   Number of courses per semester

Curriculum of a semester shall normally have a blend of lecture courses and practical courses including Career Enhancement Courses. Each course may have credits assigned as per clause 6.4.

6.4   Credit Assigned

Each course offered is given a T-P-TU-C structure, depending on the number of lecture periods (T), number of periods for practical (P) and number of tutorial periods (T) required per week for an efficient teaching – learning process. A student is expected to put-in his/her own efforts in proportion with periods spent in classroom, as defined in T-P-TU-C structure. On successful completion of the course a student is said to have earned a specified number of credits defined for each course. Each course is assigned certain number of credits based on the following table:

Table 4: Credit Assigned

Contact period per week	Credits
1 Lecture Period (**T** = Lectures given during class by the faculty)	1
1 Tutorial Periods (**TU**= Tutorial, also class based with more emphasis on problem solving)	1
2 Practical Period (**P**) (Laboratory Periods/CEC/Project Work)	1

6.5 Career Enhancement Courses

6.5.1 Industrial Training / Internship

Students shall undergo industrial training/Internship if mandated in the curriculum for periods as specified in the curriculum during the summer/winter vacation, the training being taken on a continuous basis for the periods mentioned. The industry/organization is to be selected with the approval of the Department Evaluation Committee (DEC). Industrial training may also be referred to as "In-plant training".

The Industrial Training / Internship shall carry 100 marks and shall be evaluated through CIA only. The credit will be awarded to the student after the submission of Internship/Training report to the HoD. The report will be evaluated by a team of (DEC) faculty members nominated by the HoD for awarding the Credit. Based on the recommendation by the team, the student will be awarded credits and the results will be sent to the Controller of Examinations. The awarded credit will taken for CGPA calculation. The final year project period at industry/research organization will not be considered as industrial Training/internship.

6.5.2   Industrial Visit

Every student is required to go for at least one Industrial Visit every year starting from the second year of the Programme subject to the approval of the Head of the Department and Principal. The Heads of Departments shall ensure that necessary arrangements are made in this regard.

6.5.3   Professional Certificate Courses

Students have to undergo one credit courses offered by experts from industry / research organizations and approved by academic council. Students can register such courses from his/her second year of study as and when these courses are conducted by the departments. A student is also permitted to register for these courses of other departments.

If a student does not successfully complete the registered industry supported one credit courses in a semester, the registration of that course will be considered as cancelled. Further, it will not be treated as arrear and if he/she wishes, he/she can re-register for the same course in the ensuing semesters and successfully complete it as and when it is offered subsequently.

6.5.4   Online Courses

Students may be permitted to register for online courses (which are provided with certificate after evaluation of the performance, SWAYAM/NPTEL), during third to sixth semester of his/her study. On successful completion of the course, he/she has to submit the

copy of the certificates to the Head of the Department. The assessment will not be calculated for CGPA.

6.5.5 Soft Skills

Every Student is required to go for two soft skill courses during first year of study. The soft skill course includes the communication skill, interpersonal skill and career development courses. One credit will be awarded for each soft skills courses and it will be included for SGPA/CGPA calculations.

6.5.6 Career Ability Course

The career Ability courses will be designed by the respective department with approval from DEC/AEC based on the industry requirements. One credit will be awarded for each soft skills courses and it will be included for SGPA/CGPA calculations.

6.5.7 Evaluation of One Credit Courses

Students can register for one credit courses in any semester when it is offered. Experts from the industry/Institution (KIT) may design such specialized one-credit courses based on the current technical skill requirements. The Department Evaluation Committee (DEC) shall review and approve the syllabus, course plan, and pedagogy and assessment pattern for the course. One credit courses can also be offered by internal experts i.e faculty members from other departments (not belonging to the specific discipline of the programme) also can offer such courses to the students with the approval of DEC.

A one - credit course shall carry 100 marks and shall be evaluated through Continuous Internal Assessment (CIA) only. The QP pattern and scheme will be decided by the course faculty and will be approved by the DEC/AEC.

The Head of the Department may identify a faculty member as the coordinator for the course. A committee consisting of the Head of the Department, faculty handling the course (if available), coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process.

The grades shall be assigned to the students by the above committee based on their performance and included in the calculation of CGPA.

6.5.8   Industry Supported Project Work

The students satisfying the following conditions shall be permitted to carry out their final semester Project work for six months in industry/research organization.

The student should not have current arrears and shall have CGPA of 8.0 and above until 2nd semester. The student shall undergo the final semester courses in the Pre semester. The Head of Department, in consultation with the faculty handling the said courses shall forward the proposal recommended by the Principal to CoE after approval from AEC at least four weeks before the commencement of the pre - semester of the programme.

6.6   Course Numbering Scheme

Each course is denoted by a unique code consisting of 9 alphanumeric characters. The details of the numbering scheme are in Annexure A

6.7 Credit Requirement for Programmes

The total number of credits that a student earns during the period of study is called the Total credits. The minimum prescribed credits required for the award of the degree shall be within the limits specified below:

Programme	KIT Credit Range
M.C.A.	80-85

7. DURATION OF THE PROGRAMMES

7.1   The minimum and maximum period for completion of the M.C.A.   Programmes are   given below:

Programme	Min. No. of Semesters	Max. No. of Semesters
M.C.A. (Full Time)	4	8

7.2   The Curriculum and Syllabi of all the M.V.A. Programmes shall be approved by the Academic Council of KIT. The number of Credits to be earned for the successful completion of the programme shall be as specified in the Curriculum of the respective specialization of the M.C.A. Programme

7.3   Each semester normally consists of 90 working days, including test and examination days. In any contingent situation, the number of working days per semester shall not be less than 65 days. The Principal is given the discretionary powers to decide the number of working days. In such contingencies, the Principal shall ensure that every faculty member teaches the full content of the specified syllabus for the course being taught.

Due to Pandemic / Abnormal situations the Scheme of Examinations and Evaluation will be followed as per the guidelines issued by the Government of Tamil Nadu and Anna University, Chennai.

7.4   The total period for completion of the programme reckoned from the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 7.1 irrespective of the period of break of study in order that he/she may be eligible for the award of the degree .7.5

For the purpose of regulations, the academic year will be divided into two semesters, the odd semester normally spanning from June to November and the even semester from December to May.

8. COURSE REGISTRATION

Each student, on admission shall be assigned to a mentor who shall advice and counsel the student about the details of the academic programme and choice of courses, considering the student's academic background and career objectives. Some courses require students to register through a course registration process via online.

8.1. Course Registration

Each student on admission shall register for all the courses prescribed in the curriculum in the students first semester of the study.

The registration process for the courses offered in the online registration mode in the forthcoming semester, will commence preferably 10 working days prior to the last working day of the current semester.

A department shall offer a course only if a minimum number of students register for that course. This minimum number may vary from course to course and shall be specified by the department from time to time.

After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Continuous Assessment Marks and appear for the End Semester Examination (ESE).

8.2 Credits details for Course Registration

Each student has to register for all courses to be undergone in the curriculum of a particular semester (with the facility to drop courses to a maximum of 6 credits). The student can also register for courses for which the student has failed in the earlier semesters.

The registration details of the candidates may be approved by the Head of the Institution and forwarded to the Controller of Examinations. This registration is for undergoing the course as well as for writing the End Semester Examinations.

The courses that a student registers in a particular semester may include
➢ Courses of the current semester.
➢ The core (Theory/Lab /CEC) courses that the student has not cleared in the previous semesters.
➢ Elective courses which the student failed (either the same elective or a different elective instead)

8.3 Flexibility to Drop courses

A student has to earn the total number of credits specified in the curriculum of the respective programme of the study in order to be eligible to obtain the degree. From II semester to Final semesters, the student has the options for dropping an existing course. The total number of credits that a student can drop is limited to 6. Practical courses cannot be dropped.

8.4 Reappearance Registration

8.4.1   If a student fails in a theory or practical course, the student shall do reappearance registration for that course in the subsequent semester by retaining the Continuous Assessment Marks already earned.

8.4.2   If the theory course, in which the student has failed, is a Professional Elective or an Open Elective, the student may register for the same or any other Professional Elective or Open Elective course respectively in the subsequent semesters. Such changes can be done only with due approval by DEC.

8.43   The student who fails in Project work/ Seminar other than Practical courses shall register for the same in the subsequent semester and reappear for the End Semester Examination.

8.4.4   If a student is not eligible to appear for end semester examination of a course due to lack of attendance, the student has to register for that course again, when offered next, attend the classes and fulfill the attendance requirements. If the course, in which the student has lack of attendance, is an elective, the student may register for the same or any other elective in the subsequent semesters.

8.4.5 If a student has completed the 8 semesters and has obtained RA grade in one or more courses, he can register and appear for arrear examination directly whenever conducted next.

8.4.6 A student who has already appeared for a course in a semester and passed the examination is not entitled to reappear the same course for improvement of Grade/Marks.

9. REQUIREMENTS FOR APPEARING FOR CIA, ESE

9.1 A student who has fulfilled the following conditions shall be deemed to be eligible to appear for the CIA-I, CIA-II, CIA-III and ESE. Ideally, every student is expected to attend all the classes and earn 100% attendance. Students who have earned not less than 75% attendance course wise taking into account the number of periods required for that course as specified in the curriculum. Table 5 illustrates the mandatory attendance requirement for CIA-I, CIA-II, CIA-III and ESE.

Table 5: Mandatory Attendance Requirement for CIA-I, CIA-II, CIA-III and ESE.

Test/Examination Type	Period of Calculation	Minimum % of attendance required
Continuous Internal Assessment Test I (CIA -I)	**First Semester** From the date of joining of course to three working days before the start of CIA -I	60%
	Second to Eighth semester From the date of commencement of the class to one week before the start of CIA-I	75%
Continuous Internal Assessment Test II (CIA-II)	From the date of joining (1stsemester) / date of commencement of class (2nd to 8th Semester) to one week before the start of CIA-II	75% (for students maintaining 80% or more attendance between CIA-I and CIA-II, but falls short of the 75% cumulative requirement, the requirement may be relaxed if recommended by the AEC)
Continuous Internal Assessment Test III (CIA-III)	From the date of joining (1st semester)/date of commencement of class	75% (for students maintaining 80% or more attendance between

	(2nd to 8th Semester) to one week before the start of CIA -III	CIA-II and CIA - III but falls short of the 75% cumulative requirement, the requirement may be relaxed if recommended by the AEC)
End Semester Examination (ESE)	From the date of joining (1st semester)/ date of commencement of class (2nd to 8th Semester) to the last day of instruction.	75%

9.1.1   Students having a CGPA of 8.50 and above and with no standing arrears will be exempted from the minimum attendance requirements (from 7th Sem. onwards).

9.1.2   A student shall normally be permitted to appear for End Semester Examination of the course if he / she has satisfied the attendance requirements (vide Clause -9.1). He /she is eligible to register for ESE in that semester by paying the prescribed fee.

9.1.3   A Candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester. Ideally every student is expected to attend all classes of all the courses and secure 100% attendance. However, in order to give provision for certain unavoidable reasons such as Medical / participation in sports, the student is expected to attend atleast 75% of the classes. Therefore, he/she shall secure not less than 75%.

9.1.4   However, a candidate who secures overall attendance between 65% and 74% in the current semester due to medical reasons (prolonged hospitalization / accident / specific illness) / Participation in Sports events may be permitted to appear for the current semester examinations subject to the condition that the candidate shall submit the medical certificate / sports participation certificate attested by the Head of the Institution. The same shall be forwarded to the Controller of Examinations for record purposes.

9.1.5   Candidates who secure less than 65% overall attendance and candidates who do not satisfy the clause 9.1.3 and 9.1.4 shall not be permitted to write the semester examination at the end of the semester and not permitted to move to the next semester. They are required to repeat the incomplete semester in the next academic year, as per the norms prescribed.

9.1.6   The students who are consistently good in academics ONLY be considered for the grant of ODL under Co-curricular activities by the competent authorities. The following activities shall be considered for the sanction of ODL;

> Sports and Games: TIES, Inter Collegiate, Inter Zonal, Inter University, State Level, National Level and Open Tournaments.
> NCC: Camps and expeditions, NSS camps
> Cultural Programme at State, National and International Level
> Seminar/Symposia: Paper presentation/Quiz
> Leadership courses organized by other organizations & Alumni Association activities, Association activities, Placement activities.
> Training programs/Internship at industries and Higher learning Institutions
> Personal damage incurred during the extracurricular activities
> The ODL requisition letter shall be forwarded to the Principal through the HoD of the student by the staff-in-charge of the respective activities before completion of every activity.
> The ODL sanctioned letters shall be submitted to the Department Office. The faculty-in-charge of the department office will check the eligibility for the award of attendance at the end of semester and the same may be submitted to DEC for approval.

9.1.7   The student should register all the courses of current semester and all the arrear courses in the previous semesters. If any student fails to register and pay the examination fees within the due date, he/she shall not be permitted to attend the End Semester Examinations. However, he/she will be permitted to continue their studies in the next higher semester, provided that the student satisfies the requirements as stipulated in this clause of this regulation.

9.1.8   Those students who are not deemed to have completed the semester with references to the conditions specified above shall undergo the semester again in all the courses in the respective semester during next academic year. He/she shall seek re-admission as per the norms of the affiliating University/DOTE (Directorate of Technical Education).

The days of suspension for a student on disciplinary grounds will be considered as days of absence for calculating the percentage of attendance for each individual course.

10. PROVISION FOR WITHDRAWAL FROM EXAMINATION

A student may, for valid reasons (medically unfit / unexpected family situations/Sports person representing Tamilnadu / India with prior permission for participation from Principal / CoE / DEC), be granted permission to withdraw (after registering for the examinations) from appearing for any course or courses in the End Semester Examination of a particular semester. The student may withdraw by following the due process of the CoE's office before the commencement of examination. This facility can be availed **only once** during the entire duration of the degree programme.

Withdrawal from ESE will be valid only if the student is, otherwise, eligible to write the examination and the application for withdrawal is made to the CoE, prior to the examination in the course or courses concerned. The application for withdrawal should be recommended by the Head of the Department concerned and approved by the Head of the Institution.

11. TEMPORARY BREAK OF STUDY FROM A PROGRAMME

11.1 Break of study is normally not permitted. However, if a student intends to temporarily discontinue the programme in the middle of a semester / year for valid reasons (such as Internships, accident or hospitalization due to prolonged ill health) and wishes to re-join the programme in the next academic year, he / she shall apply in advance to the Principal through the Head of the Department, stating the reasons. The application shall be submitted not later than the last date for registering for the semester examinations. Break of study is permitted only once during the entire period of the degree programme.

11.2 The student permitted to re-join the programme after the break shall be governed by the rules and regulations in force, at the time of re-joining.

11.3 The duration specified for passing all the courses for the purpose of classification of degree(vide clause 19) shall be increased by the period of such break of study permitted(vide clause 11)

11.4 If a student is detained for want of requisite attendance, academic progress and good conduct, the period spent in that semester shall not be considered as permitted Break of Study and Clause 11.3 is not applicable for such cases.

12. ASSESSMENT PROCEDURES FOR AWARDING MARKS

The total marks for each course generally (Theory, Practical, Project Work) will be 100, comprising of two components namely Continuous Internal Assessment (CIA) and End Semester Examination (ESE). However, there could be some open elective courses, human excellence courses, one credit industry courses, add-on courses and Mandatory courses that have only continuous assessment for 100 marks without an End Semester Examination. The Department Consultative Committee (DCC) has to approve such courses every semester. The scheme of assessment may also be decided by the faculty handling the course concerned with the approval from DCC and shall be made available to the students during the online course registration. Each course shall be evaluated for a maximum of 100 marks as illustrated in **Table 6**

Table 6: Course Evaluation

S. No.	Category of course	Continuous Internal Assessment	Semester End Examinations
1	Theory Courses	40 Marks	60 Marks
2	Laboratory Courses	60 Marks	40 Marks
3	Project Work	40 Marks	60 Marks
4	Career Enhancement Course (CEC) and Mandatory Course (MC)	100 Marks	-

The End Semester Examination (theory and practical) of 3 hours duration shall ordinarily be conducted between October and December during the odd semesters and between April and June during the even semesters.

The End Semester Examination for project work shall consist of evaluation of the final report submitted by the student or students of the project group (of not exceeding 4 students) by an external examiner and an internal examiner, followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner, the supervisor of the project group and an internal examiner.

For the End Semester Examination in both theory and practical courses including project work the internal and external examiners shall be appointed by the Controller of Examinations.

13. MARKS DISTRIBUTION

13.1 Question paper pattern

a) **Table 7.1 Continuous Internal Assessment**

(CIA - I, CIA - II and CIA - III)

2 Marks	12 Marks	Total marks
7	3(Either or Type)	50

b) **Table 7.2 Midsem and End Semester Examinations**

2 Marks	13 Marks	15 marks	Total Marks
10	5(Either or Type)	1(Either or Type)	100
For Mathematics paper only			
2 Marks	**16 Marks**		**Total Marks**
10	5 (Either or Type)		100

13.2   Theory Courses

Theory Courses including mandatory courses are to be assessed out of 100 marks, the maximum marks for CIA is fixed as 40 and the ESE carries 60 marks.

The ESE for theory courses including mandatory courses will be of 3 hours duration and shall normally be conducted for a maximum of 100 marks during the Odd and Even Semesters. Every student should appear for the ESE for all the courses excluding the courses for which only continuous assessment is recommended.

A minimum of two tests would be conducted in a day (in the case of tests and they would be of two hours duration each) students will have two hours of coaching session followed by the CIA. In case a student misses the assessment due to medical reasons (hospitalization / accident / specific illness) or due to participation in the College / University / State / National / International level academic and sports events with prior permission from the HOD, a Reassessment may be given at the end of the semester after getting approval from the HOD through the Course Coordinator concerned.

To arrive the Continuous Assessment Marks, the following guidelines should be   followed

Table 8: Theory Courses: Continuous Assessment Marks

CIA I (100 Marks)		CIA II (100 Marks)		CIA III (100 Marks)		Total Continuous Assessment Marks
Individual Assignment/ Case Study/ Seminar/ Mini project	Written Test	Individual Assignment/ Case Study/ Seminar/ Mini project	Written Test	Individual Assignment/ Case Study/ Seminar/ Mini project	Written Test	
40	60	40	60	40	60	300*

*The weighted average shall be converted into 40 marks for Internals

A minimum of three CIA will be conducted as a part of continuous assessment during the semester by the respective department. Each Continuous assessment is to be conducted for 100 marks and will have to be distributed in two parts viz., Individual Assignment/Case study/Seminar/Mini project and Test with each having a weightage of 40% and 60% respectively. The tests shall be in written mode. The total Continuous assessment marks of 300 shall be converted into a maximum of 40 marks and rounded to the next integer.

13.3 Criteria for Assessment for Lab Courses

For practical including virtual practical Courses, out of 100 marks, the maximum marks for CIA is fixed as 60 and the ESE carries 40 marks.

Every practical exercise / experiment shall be evaluated (as per the rubrics approved by the class committee) based on conduct of experiment / exercise and records. There shall be at least one model test. The criteria for arriving at the CIA marks of 60 is as follows:

Table 9: Practical Courses: Continuous Internal Assessment Marks

Continuous Assessment (100 Marks)*	
Evaluation of Laboratory experiment, results & Record	Test
75	25

Continuous Assessment marks shall be converted into 60 marks

The ESE for practical courses shall be of 3 hours duration and normally be conducted for a maximum of 100 marks during the odd and Even Semesters.

13.4 PROJECT WORK

For Project Work (Phase I & II) out of 100 marks, the maximum marks for Continuous Assessment is 40 marks and that for the End Semester Examination (project report evaluation and viva-voce examination) is 60 marks. Project work may be assigned to a single student, under the supervision of faculty guide(s).

The Head of the Department shall constitute a review committee for each programme. There shall be a minimum of three faculty members in the review committee. There shall be three reviews (as per **Table 10**) in total, during the semester by a review committee. The student shall make presentation on the progress made before the committee.

Interim project report shall be submitted before the project reviews with the approval of the guide. The Project Report, prepared according to the approved guidelines and duly signed by the guide and the Head of the Department, shall be submitted to the department as per the timeline announced by the department. The End Semester Examination for project work shall consist of evaluation of the final project report by an external examiner, followed by a viva-voce examination conducted separately for each student, by a committee consisting of the external examiner, and an internal examiner. The Controller of Examinations (CoE) shall appoint Internal and External Examiners for the End Semester Examination of the Project Work.

A candidate may, however, in certain cases, be permitted to work on projects in an Industrial/Research Organization, on the recommendations of the Head of the Department Concerned. In such cases, the Project work shall be jointly supervised by a supervisor of the department and an expert, as a joint supervisor from the organization and the student shall be instructed to meet the supervisor periodically and to attend the review committee meetings for evaluating the progress.

The Project work shall be pursued for a minimum of 16 weeks during the final semester.

The deadline for submission of final Project Report is 60 calendar days from the last working day of the semester in which project / thesis / dissertation is done. However, the Phase-I of the Project work shall be submitted within a maximum period of 30 calendar days from the last working day of the semester as per the academic calendar published by the University.

The Continuous Internal Assessment Marks (CIAM) and End Semester marks (ESEM) for Project Work and the Viva-Voce Examination will be distributed as indicated in **Table 10**

Table 10: CIAM and SEM break-up for project work

Sl.No	Review No	Description	Marks	Total Marks
1	**Continuous Internal Assessment Marks**			
a.	Review 1	Review Committee#	5	10
		Guide	5	
b.	Review 2	Review Committee	7	15
		Guide	8	
c.	Review 3	Review Committee	7	15
		Guide	8	
		Total CIAM		**40**
2	**End Semester Examinations Marks**			
a.	Evaluation of final report and viva-voce	Internal Examiner	10	50
		External Examiner	40	
b.	Outcome*	Publication of papers/prototype/ patents etc.,	10	10
	Total ESEM			**60**
	Total Marks			100

Review committee consists of internal faculty members nominated by the Head of the Department. The guide of student being examined shall not be part of the committee.

* Outcome – in terms of paper publication, patents, product development and industry projects shall be awarded by both internal and external examiners, based on the document proofs submitted by the student concerned.

If a student fails to submit project report / does not appear for the ESE /fails in the End Semester Examination (ESE)/ fails in Continuous Internal assessment (CIA) he/she is deemed to have failed in the project work and shall have to re-register for the same when offered next.

14. PASSING REQUIREMENTS

14.1 A student is declared to have successfully passed a theory based course if he/she has secured:

➢ A minimum of 50% marks in the End Semester Examinations.
➢ A minimum of 50% marks on combining both Continuous Internal Assessment Marks (CIAM) and End Semester Examination Marks (ESEM).

14.2. A student is declared to have successfully passed a practical / project based course if he/she has secured:

➢ A minimum of 50% marks in the End Semester Examinations.
➢ A minimum of 50% marks on combining both Continuous Internal Assessment Marks (CIAM) and End Semester Examination Marks (ESEM).

14.3. For a student who does not meet the minimum passing requirements, the term "RA" against the course will be indicated in his/her grade sheet. He/she shall reappear in the subsequent examinations for the course as arrear or re-register for the course when offered.

14.4. For a student who is absent for end-semester theory / practical / project viva-voce, the term "RA" will be indicated against the corresponding course. He/she shall reappear for the End Semester Examination of that course as arrear in the subsequent semester or when offered next. .

14.5. The letter grade "W" will be indicated for the courses for which the student has been granted authorized withdrawal (refer Clause 10).

14.6. For mandatory courses (non-credit), the student must satisfy the minimum attendance requirement & passing criteria as specified for the course as detailed in Section 16.2

15. METHODS FOR REDRESSAL OF GRIEVANCES IN EVALUATION

Students who are not satisfied with the grades awarded in the End Semester Examination of Theory for regular and arrear exams can seek redressal as illustrated in **Table 11.**

Table 11: Grievance Redressal Mechanism

Sl. No	Redressal Sought	Methodology	
		Regular Exam	**Arrear Exam**
1	Revaluation	• Apply for photo copy of answer book • Then apply for revaluation after course expert recommendation	
2	Challenge of Evaluation	• Apply for photo copy of answer book • Then apply for revaluation after course expert recommendation • Next apply for challenge of evaluation	
Note: All applications to be made to COE along with the payment of the prescribed fee.			

Challenge of Evaluation – Flow Process

Table 12: Evaluation – Flow Process

Step 1	A student can make an appeal to the CoE for the review of answer scripts after paying the prescribed fee
Step 2	CoE will issue the photocopy of answer scripts to the student
Step 3	The faculty who had handled the subject will evaluate the script and HoD will recommend
Step 4	A committee consisting of 2 evaluators appointed by CoE will review and declare the result
Step 5	If the result is in favour of the student, the fee collected will be refunded to the student
Step 6	The final mark will be announced by CoE.

16. LETTER GRADE

16.1 Grading System:

The award of letter grades will be decided based on relative grading principle. The relative grading is applicable to ONLY those students who have passed the examination as per the passing requirements enumerated above. For those students who have not passed

the examination, Reappearance (U) shall be awarded as shown in the below Table. 13.a and 13.b.

For those students who have passed the course, the relative grading shall be done. The marks of those students who have passed only shall be considered for relative grading. The evolved relative grading method normalizes the results data using the BOX-COX transformation method and computes the grade range for each course separately and awards the grade to each student. For a given course, if the students' strength is greater than 30, the relative grading method shall be adopted. However, if the students' strength is less than 30 then the absolute grading shall be followed with the grade range as specified below.

Table 13.a: Grades and Range of Marks

O	A+	A	B+	B	C	U
91-100	81-90	71-80	61-70	56-60	50-55	<50

The performance of a student shall be reported using letter grades, each carrying certain points as detailed below

Table 13.b: Grades and Grade Points

LETTER GRADE	GRADE POINTS	RESULT
O (Outstanding)	10	
A+ (Excellent)	9	
A (Very Good)	8	PASS
B+ (Good)	7	
B (Average)	6	
C (Satisfactory)	5	
U (Re-appearance)	0	RA (Re- appearance)
SA (Shortage of Attendance)	0	RC (Repeat Course)
WD (Withdrawal)	0	EA (Extended Appearance)
AB (Absent)	0	RA (Re- appearance)
WH(Withheld)	0	RA(Re-appearance)
Pass in Mandatory non-credit courses	P	0
Fail in Mandatory non-credit courses	F	0

A student is deemed to have passed and acquired the corresponding credits in a particular course if he/she obtains any one of the following grades: "O", "A+", "A", "B+", "B", "C". 'SA' denotes shortage of attendance and hence prevented from writing the ESE. 'SA' will figure both in the Grade Sheet as well as in the Result Sheet.

"U" denotes that the student has failed to pass in that course. "WD" denotes withdrawal from the exam for the particular course. WH denotes the result withheld for the particular course. The grades U,WD and WH will figure both in the Grade Sheet as well as in the Result Sheet. In both cases, the student has to appear for the ESE.

If the grade U/AB is given to the courses which are evaluated through CIA and ESE, is not required to satisfy the attendance requirements, but has to appear for the end semester examination and fulfill the passing requirements to earn a pass in the respective courses.

If the grade U/AB is given to the courses which are evaluated only through Continuous assessment, the student shall register for the course again in the subsequent semester, fulfill the passing requirements to earn pass in the course. However, attendance requirement need not be satisfied

16.2 Grading for Mandatory Courses

Mandatory Courses are courses that are required to be completed to fulfill the degree requirements (e.g. Human excellence, Environmental science, etc.). They are normally non – credit based. These courses will not be taken in to consideration for the SGPA / CGPA calculations. Each of these courses is assessed continuously and internally for a total mark of 100. The pass mark is 50%. Students, who fail to pass this course, are required to repeat the course, when offered next.

16.2.1. For Mandatory non-credit courses the student must satisfy the minimum attendance requirement & passing criteria as specified for the course. These courses do not carry credits but needs to be completed to fulfill the degree requirements.

16.2.2. For the Mandatory non-credit courses student completing the course will be awarded Pass grade (P) and those who fail to satisfy the attendance requirement or fail to satisfy the minimum passing requirement of 50% marks, will be awarded Fail (F) grade and the student must re-register for the course when it is offered next.

16.3 Formula for SGPA & CGPA Calculation

After the results are declared, grade sheets will be issued to each   student, which will contain the following details:

- ➢ The College Name and Affiliating University.

- ➢ The list of courses registered during the semester and the grades scored.

- ➢ The Semester Grade Point Average (SGPA) for the semester.

- ➢ The Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards.

On completion of a semester, each student is assigned a Semester Grade Point Average which is computed as below for all courses registered for, by the student during that semester.

Semester **G**rade **P**oint **A**verage = $\dfrac{\sum (C_i \times GP_i)}{\sum C_i}$

where **C$_i$** is the credit for a course in that semester and **GP$_i$** is the Grade Point earned by the student for that course. The **SGPA** is rounded off to two decimals.

The overall performance of a student at any stage of the Degree programme is evaluated by the   **C**umulative **G**rade **P**oint **A**verage (**CGPA**) up to that point of time.

Cumulative **G**rade **P**oint **A**verage = $\dfrac{\sum (C_i \times GP_i)}{\sum C_i}$

where **C$_i$** is the credit for each course in each of the completed semesters at that stage and **GP$_i$** is the grade point earned by the student for that course. The **CGPA** is rounded off to two decimals.

16.4 FORMULA FOR CALCULATING PERCENTAGE

CGPA X 10 = % of Marks

17. ELIGIBILITY FOR THE AWARD OF DEGREE

A student shall be declared to be eligible for the award of the M.C.A. Degree provided the student has

i.   Successfully gained the required number of total credits as specified in the curriculum corresponding to the student's programme within the stipulated time.

ii.   Successfully completed the course requirements, appeared for the End-Semester examinations and passed all the subjects prescribed in clause no.7.

iii.   Successfully passed any additional courses prescribed by the Academic council Successfully passed any additional courses prescribed by the Department & concerned whenever readmitted under regulations 2019 (R19) (vide Clause 4.2)

iv.   No disciplinary action pending against the student.

v.   The award of Degree must have been approved by the Academic Council of KIT.

18. CLASSIFICATION OF M.C.A. DEGREE

The degree awarded to eligible students will be classified as given in **Table 14**

Table 14: Classification of the M.C.A. Degree

Sl. No.	Class Awarded	Criteria
1	First class with distinction	A student who satisfies the following conditions shall be declared to have passed the examination in First class with Distinction: ➢ Should have passed the examination in all the courses of all the **four semesters** in the student's First Appearance within **Three years,** which includes authorized break of study of one year (if availed). Withdrawal from examination will not be considered as an appearance. ➢ Should have secured a CGPA of not less than **8.50.** ➢ Should NOT have been prevented from writing end Semester examination due to lack of attendance in any of the courses.

2	First Class	A student who satisfies the following conditions shall be declared to have passed the examination in **First class**: ➢ Should have passed the examination in all the courses of all six semesters **within three years** , which includes one year of authorized break of study (if availed) or prevention from writing the End Semester Examination due to lack of attendance (if applicable). ➢ Should have secured a CGPA of not less than **6.50.**
3	Second Class	All other students (not covered in clauses Sl.No.1 and 2 under clause 18) who qualify for the award of the degree (vide Clause 19) shall be declared to have passed the examination in Second Class.

Note: *A student who is absent for the End Semester Examination in a course / project work Viva Voce after having registered for the same will be considered to have appeared for that examination (except approved withdrawal from End Semester Examinations as per Clause 9) for the purpose of classification.*

19. AWARD OF DEGREE

The Academic Council of the institution will approve the award of Degree to all eligible students. The degree will be issued by Anna University, Chennai and the consolidated Grade Sheet will be issued by the institution. The consolidated grade sheet will specify any specializations and distinctions that the student has earned during the course of the study.

20. FACULTY MENTOR

To help the students in palnning their courses of study and for general advice on the academic progarmme, the Head of the Department will attach a certain number of students (maximum 20) to a faculty member of the department. He/She shall function as Faculty Mentor for these students throughout their period of study. The faculty mentor shall,

- Advice the students in registering and reappearance registering of courses
- Monitor their attendance, academic progress and discipline of the students
- Counsel periodically or during the faculty mentor meeting scheduled in the class time table.
- Inform the students about the various facilities and activities available to enhance the student's curricular and co-curricular activities.
- If necessary, the faculty mentor may also discuss with or inform the parents about the progress of the students through Head of the Department or in Parent-Teacher meeting.

21. CLASS COMMITTEE

The objective of the Class Committee is to improve the teaching-learning process. The functions of the class committee include:

➢ Resolving difficulties experienced by students in the classroom and in the laboratories.

➢ Clarifying the regulations of the degree programme and the details of rules therein.

➢ Discussing the progress of academic schedule and deviations if any.

➢ Evaluating the performance of the students of the class after each test and finding the ways and means of improvement.

➢ Every class in first year of study shall have a class committee consisting of faculty members who are teaching in that class, student representatives (cross section of students from boys and girls) and a chairperson who is a faculty not handling the course for the class.

➢ From III semester onwards, Class committee comprises of all the faculty members who are handling courses in that particular semester and two student representatives from each course. A chairperson who is a faculty not handling course for that particular semester, nominated by the Head of the Department shall coordinate the activities of this committee.

➢ The class committee shall be constituted by the Head of the Department/Chief Tutor on the first week of commencement of the semester.

➢ The class committee shall meet three times in a semester as specified in the academic calendar.

➢ The Principal may participate in any class committee of the institution.

➢ During these meetings, the representative of the class shall meaningfully interact and express the opinions and suggestions of the other students of the class to improve the effectiveness of the teaching-learning process.

➢ The Chairperson is required to prepare the minutes of the meeting, signed by the members and submit the same to Head of the Department within five working days of the meeting. Head of the Department will in turn consolidate and forward the same to the Principal, within 10 working days of the meeting.

➢ In each meeting, the action taken report of the previous meeting is to be presented by the Chairperson of the class committee.

22. COMMON COURSE COMMITTEE

➢   A theory course handled by more than one teacher shall have a "Common Course Committee" comprising of all teachers teaching that course and few students who have registered for that course. There shall be two student representatives from each batch of that course. One of the teachers shall be nominated as Course Coordinator by the HoD concerned and duly approved by the Principal

➢ The first meeting of the Common Course Committee shall be held within fifteen days from the date of commencement of the semester. The nature and weightage of the continuous assessments shall be decided in the first meeting, within the framework of the Regulations. Two or three subsequent meetings in a semester may be held at suitable intervals. During these meetings, the student members shall meaningfully interact and express their opinions and suggestions of all the students to improve the effectiveness of the teaching-learning process. It is the responsibility of the student representatives to convey the proceedings of these meetings to the whole batch.

➢ In addition, the "Common Course Committee" (without the student representatives) shall meet to ensure uniform evaluation of continuous assessments after arriving at a common scheme of evaluation for the assessments.

➢ Wherever feasible, the common course committee (without the student representatives) shall also prepare a common question paper for the continuous assessment tests. The question paper for the end semester examination is common

and shall be set by the Course Coordinator in consultation with all the teachers or the external member as appointed by the Controller of Examinations.

23. DETAILS OF FACULTY PEDAGOGICAL AND STUDENT ASSESSMENT RECORD

Every teacher is required to maintain a Faculty Record Book/ course file consisting of the following details as shown below;

➢ Time-table, course syllabus, program outcomes, course outcomes.

➢ Details of attendance of each student marked in each theory/practical/project work class.

➢ CIA marks, Midsem marks, Details of Assignment/ seminar given, course delivery details, corrective and preventive actions on test performance of students and any other additional details.

➢ The record book should be submitted to the HOD periodically (at least three times in a semester) for checking the syllabus covered, the test marks and attendance. The HOD shall put his/her signature and date in the record book after due verification. At the end of the semester, the record book shall be verified by the Principal who will also ensure safe custody of the document for at least four years.

➢ The university or any inspection team appointed by the University/UGC/AICTE may verify the records of attendance and assessment of both current and previous semesters.

24. DISCIPLINE

Every student is required to maintain discipline and decorum both inside and outside the institution campus. They shall follow all the rules and regulations and should not indulge in any activity which can tarnish the reputation of the University or Institution. The Principal shall refer any act of indiscipline by students to the Discipline and Welfare Committee and other appropriate committees for action.

25. REVISION OF REGULATIONS AND CURRICULUM

The institution may from time to time revise, amend or change the Regulations, scheme of Examinations and syllabi, if found necessary. Academic Council assisted by Board of Studies and Standing Committee will make such revisions / changes.

Note: *Any ambiguity in interpretation of this regulation is to be put up to the Standing Committee, whose decision will be final.*

26. SPECIAL CASES

In the event of any clarification in the interpretation of the above rules and relations, they shall be referred to the Standing Committee. The standing committee will offer suitable interpretations/clarifications/amendments required for special case on such references and get them ratified in the next meeting of the Academic Council. The decision of the Academic Council is final.

ANNEXURE I
COURSE NUMBERING SCHEME

M	2	0	M	C	T	1	0	5
Programme	Regulation		Department Code		Course Type	Semester	Sequence Number	

Programme :

Masters Degree (M.C.A.) - M

Regulation:

R – 20

Department Code

AE - Applied Electronics

CS - Computer Science and Engineering

ED - Engineering Design

PS - Power System Engineering

VD - VLSI Design

CA - Computer Application

MB - Management Studies

EN - English

MA - Mathematics

CE - Career Enhancement

MC - Mandatory Course

Course Type

T - Theory

P - Practical / Project/ Internship

E - Elective

O - Open Elective

C - One Credit Courses

N - Online courses

S - Special Electives

Semester

1 - First Semester

2 - Second Semester

3 - Third Semester

4 - Fourth Semester

5 - Fifth Semester

6 - Sixth Semester

Sequence Number

00-99

ANNEXURE II
POLICY ON MALPRACTICES
GENERAL

➢ It shall be the endeavour of all concerned to prevent, control and take remedial action to bring about the occurrences of malpractices to "Zero" in Examinations (both Internal and External), Assignments and in all Academic class works.

➢ Therefore, a comprehensive approach to the malady of malpractices has to be adopted to create a mindset of integrity and honesty, and at the same time take sufficiently stern action to make it clear that such attempts are fraught with comparably very high risk.

➢ In keeping with this stance, the following measures are to be taken by all concerned from class room level to the Examination Halls:

A. PREVENTION (This is the best method of tackling this malady)

a)   Class room level:

All faculty members are to involve themselves in a psychological growth of students by personal example and self-respect and strive towards

➢ Developing a sense of honour in the minds of students so that they look down upon earning undeserved marks.

➢ Imbibing a sense of self-respect and internal dignity that prevents him/her from succumbing to the temptation of easy marks by cheating.

➢ Generating an awareness of the risks to their character and career if convicted, while also explaining the process and strict rules and regulations adopted by the educational system to prevent malpractices.

➢ Taking stern view of copied assignments and attempts at malpractices in internal examinations also merits equal seriousness as external examinations.

➢ Setting sufficiently strong deterrent rules in place and regulations like intimation to parents and warning to students in the presence of parents etc. even in case of efforts at malpractices in internal tests and/or repeated acts despite warnings in case of assignments also.

Examination Halls:

Detailed instructions on Invigilation, question paper setting and evaluation and such other instructions will be issued for Invigilation, vigilance, which are to be brought to the notice of all students prior to the examinations.

B.   PENAL ACTION FOR MALPRACTICES

All instances of malpractices will be forwarded to the Principal/ Chief Superintendents. The offences will be investigated by a Standing Enquiry Committee constituted by Principal, The committee is to summon and give the student an opportunity to present / plead his/her case. The Committee may also summon anybody else, if it so deems necessary for the conduct of enquiry, in the interest of proper investigation and dispensation of the case. The tenure of the committee would be a complete Academic year.

The Committee is to be guided by the following:

➢ The seriousness of the malpractice, in terms of deviousness, and culpability/ criminality of motive

➢ The seriousness in terms of effort and degree of deviousness and culpability / criminality of effort

➢ Any FIR/ Police case that has been registered in the first instance by the Principal/ Chief Superintendent

➢ Any other special consideration either mitigating or to the contrary.

C. PENALTY FOR OFFENSES

The penalties awarded will depend on the seriousness of the Offence. A list of Offences and penalties are placed at **Annexure III.**

The Enquiry Report with findings and recommendations of the Committee are to be forwarded to the Controller who will undertake necessary follow up action. Based on the recommendations of the Controller of Examinations, the Principal is empowered to award penalties for offences classified as belonging to categories 1 to 7 of the offence table.

The cases falling in categories from S.No. 8 onwards are to be put up to the Principal for consideration and award of suitable penalty.

Annexure III

Sl.No.	Nature of Malpractice	Maximum Punishment
1	Appeal by the candidate in the answer script to show mercy by way of awarding more than deserving marks.	Fine of Rs. 1000/- per subject.
2	The candidate writing his/her name in the answer script.	
3	The candidate writing his/her registration number/college name in places other than specified in the answer script	
4	Any special marking in the answer script by the candidate.	
5	The candidate communicating with neighbouring candidate orally or non- verbally; the candidate causing suspicious movement of his/her body.	
6	Irrelevant writing by the candidate in the answer script.	
7	The candidate writing answer on his/her question paper or making use of his/her question paper for rough work	
8	The candidate possessing cell phones / programmable calculator(s)/any other electronic storage device(s) **gadgets**	Invalidating the examination of the particular subject written by the candidate
9	The candidate possessing cell phones/ programmable calculator(s)/any other electronic storage device(s) **gadgets**	Invalidating the examination of the particular subject written by the candidate
10	The candidate possessing any incriminating material(s) (whether used or not). For example:-Written or printed materials, bits of papers	Invalidating the examination of the subject concerned and all the theory and

	containing written information, writings on scale, calculator, handkerchief, dress, part of the body, Hall Ticket, etc.	the practical subjects of the current semester registered by the candidate. Further the candidate is not considered for revaluation of answer scripts of the arrears-subjects. If the candidate has registered for arrears – subjects only, invalidating the examinations of all the arrears – subjects registered by the candidate.
11	The candidate possessing cell phone(s)/programmable calculator(s)/any other electronic storage device(s) **gadgets** and containing incriminating materials (whether used or not).	
12	The Candidate possessing the question paper of another candidate with additional writing on it.	
13	The candidate passing his/her question paper to another candidate with additional writing on it	
14	The candidate passing incriminating materials brought into the examination hall in any medium (hard/soft) to other candidate(s).	
15	The candidate copying from neighbouring candidate.	
16	The candidate taking out of the examination hall answer booklet(s), used or unused	
17	Appeal by the candidate in the answer script coupled with a promise of any form of consideration.	
18	Candidate destroying evidence relating to an alleged irregularity.	Invalidating the examinations of the subject concerned and all the theory and the practical subjects of the current semester registered by the candidate. Further the candidate is not considered for revaluation of answer scripts of the arrears-subjects.

		If the candidate has registered for arrears – subjects only, invalidating the examinations of all the arrears – subjects registered by the candidate. Additional Punishment: i. If the candidate has not completed the programme, he/she is debarred from continuing his/her studies for one year i.e., for two subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects during the debarred period. ii. If the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for two subsequent semesters.
19	Vulgar/offensive writings by the candidate in the answer script.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears – subjects registered by the candidate.
20	The candidate possessing the answer script of another candidate	
21	The candidate passing his /her answer script to another candidate	

22	Involved in any one or more of the malpractices of serial no. 8 to 21 for the second or subsequent times.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears – subjects registered by the candidate. **Additional Punishment:** i. If the candidate has not completed the programme, he/she is debarred from continuing his/her studies for one year i.e., for two subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects during the debarred period. ii. If the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for two subsequent semesters.
23	The candidate substituting an answer book let prepared outside the examination hall for the one already distributed to the candidate	
24	The candidate indulge in any disruptive conduct including, but not limited to, shouting, assault of invigilator, officials or students using abusive and /or threatening language, destruction of property.	Invalidating the examinations of all the theory and practical subjects of the current semester and all the arrears – subjects registered by the candidate. **Additional Punishment:** i. If the candidate has not completed the programme, he/she is debarred from continuing his/her studies for two years i.e., for four
25	The candidate harass or engage others to harass on his/her behalf an invigilator, official, witnesses or any other person in relation to an irregularity by making telephone	

	calls, visits, mails or by any other means.	subsequent semesters. However the student is permitted to appear for the examination in all the arrears-subjects during the debarred period.
26	Candidate possessing any firearm/weapon inside the examination hall.	ii. If the candidate has completed the programme, he/she is prevented from writing the examinations of the arrears-subjects for four subsequent semesters.
27	Cases of Impersonation	(i) Handing over the impersonator to the police with a complaint to take appropriate action against the person involved in the impersonation by the Chief Supt. (ii) If a student of this University is found to impersonate a 'bonafide student', the impersonating student is debarred from continuing his/her studies and writing the examinations **permanently.** He/she is not eligible for any further admission to any programme of the University. **(iii)** Debarring the 'bonafide student' for whom the impersonation was done from continuing his/her studies and writing the examinations **permanently.** He/she is not eligible for any further admission to any programme of the University.

Annexure IV

Process to Consider the Application for Revocation of Detainment

The process to consider the application for revocation of detainment on account of lack of attendance in 3 or more courses, due to genuine reasons (viz. sports participation, NCC, Medical Grounds etc.) is as follows:

The student submits an application for consideration via a request letter to the CoE,not later than 3 days from the last working day, along with the HoD's recommendation, Class Advisor's report and Mentor's recommendation. A committee consisting of the Principal, CoE, HoD (Respective Department) and HoD's-2 from departments other than the student's own. The committee shall meet within 4 working days,to consider the case. Stakeholders may be called to be present in the meeting as may be required, and Decision arrived at. The decision approved by Principal shall be final.

Annexure V

Academic Evaluation Committee (AEC)

The committee includes the Principal, CoE, HoD concerned. The committee meets to carry out business related to academic matters which require central decision making and approval viz. retest approval of missed CIA, addressing the feedback collected from the various departments' class committee meetings

Department Evaluation Committee(DEC)

The committee includes HoD (need basis), and a few faculty members of the department from various levels. The committee meets to carry out business related to academic matters that can be addressed within the department viz. course equivalence of common courses for readmitted students; approval of new courses to be offered by the department; consider and approve the credit equivalence of courses offered by industry, review the course offerings; consider the merit of applications involving lack of attendance in PE/OE courses to take up another PE or OE; approve CIAM only courses every semester; approve scheme of assessment for each course; Approval for and Mapping credits of certification courses; approval of list of nationally or internationally recognized professional certification courses with prometric testing.

Scheme of Instructions and Examinations

(For Students admitted from the Academic Year 2020-21 and onwards)

Semester I

Course Code	Course Name	Category	Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	Credit
			Instructional Hours				Assessment				
M20MAT101	Mathematical Foundations for Computer Applications	BS	4	3	0	1	3	40	60	100	4
M20CAT101	Problem Solving and PythonProgramming	PC	3	3	0	0	3	40	60	100	3
M20CAT102	Web Programming Essentials	PC	3	3	0	0	3	40	60	100	3
M20CAT103	Data Structures	PC	3	3	0	0	3	40	60	100	3
M20CAT104	Software Engineering	PC	3	3	0	0	3	40	60	100	3
M20CAP101	Python Programming Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP102	Web Programming Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP103	Data Structures Laboratory	PC	4	0	4	0	3	40	60	100	2
M20ENP101	Communication Skills Laboratory	CEC	3	1	2	0	3	40	60	100	2
Total Contact Hours/Week			**31**	**16**	**14**	**1**	**Total Credits**				**24**

Semester II

Course Code	Course Name	Category	Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	Credit
			Instructional Hours				Assessment				
M20CAT201	Analysis of Algorithms	PC	3	3	0	0	3	40	60	100	3
M20CAT202	Database Management Systems	PC	3	3	0	0	3	40	60	100	3
M20CAT203	Programming with Java	PC	3	3	0	0	3	40	60	100	3
M20CAT204	Computer Networks	PC	3	3	0	0	3	40	60	100	3
	Professional Elective- I	PE	3	3	0	0	3	40	60	100	3
M20CAP201	Algorithms Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP202	Database Management Systems Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP203	Programming With Java Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP204	Technical Seminar and Report Writing	CEC	2	0	2	0	3	40	60	100	1
Total Contact Hours/Week			**29**	**15**	**14**	**0**	**Total Credits**				**22**

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

Semester III

Course Code	Course Name	Category	Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	Credit
			Instructional Hours				**Assessment**				
M20MAT301	Resource Management Techniques	PC	4	3	0	1	3	40	60	100	4
M20CAT301	Internet of Things	PC	3	3	0	0	3	40	60	100	3
M20CAT302	Cyber Security	PC	3	3	0	0	3	40	60	100	3
M20CAT303	Machine Learning	PC	3	3	0	0	3	40	60	100	3
	Professional Elective II	PE	3	3	0	0	3	40	60	100	3
M20CAP301	Mobile Application Development Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP302	Open Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP303	Mini Project	PW	4	0	4	0	3	40	60	100	2
M20CAP304	Research Methodology	CEC	2	0	2	0	3	40	60	100	1
Total Contact Hours/Week			**29**	**15**	**14**	**1**	**Total Credits**				**22**

Semester IV

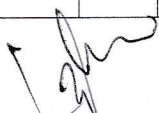| Course Code	Course Name	Category	Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	Credit
			Instructional Hours				**Assessment**				
M20CAP401	Project Work	PW	24	0	24	0	3	40	60	100	12
M20CAP402	MOOC Course	CEC	2	0	2	0	3	0	0	0	1
Total Contact Hours/Week			**26**	**0**	**26**	**0**	**Total Credits**				**13**

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402

BASIC SCIENCES (BS)

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	
M20MAT101	Mathematical Foundations for Computer Applications	BS	4	3	0	1	3	40	60	100	4

PROFESSIONAL CORE (PC)

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	
M20CAT101	Problem Solving and PythonProgramming	PC	3	3	0	0	3	40	60	100	3
M20CAT102	Web Programming Essentials	PC	3	3	0	0	3	40	60	100	3
M20CAT103	Data Structures	PC	3	3	0	0	3	40	60	100	3
M20CAT104	Software Engineering	PC	3	3	0	0	3	40	60	100	3
M20CAP101	Python Programming Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP102	Web Programming Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP103	Data Structures Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAT201	Analysis of Algorithms	PC	3	3	0	0	3	40	60	100	3
M20CAT202	Database Management Systems	PC	3	3	0	0	3	40	60	100	3
M20CAT203	Programming with Java	PC	3	3	0	0	3	40	60	100	3
M20CAT204	Computer Networks	PC	3	3	0	0	3	40	60	100	3
M20CAP201	Algorithms Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP202	Database Management Systems Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP203	Programming with Java Laboratory	PC	4	0	4	0	3	40	60	100	2

BoS Chairman
Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M20MAT301	Resource Management Techniques	PC	3	3	0	0	3	40	60	100	3
M20CAT301	Internet of Things	PC	3	3	0	0	3	40	60	100	3
M20CAT302	Cyber Security	PC	3	3	0	0	3	40	60	100	3
M20CAT303	Machine Learning	PC	3	3	0	0	3	40	60	100	3
M20CAP301	Mobile Application Development Laboratory	PC	4	0	4	0	3	40	60	100	2
M20CAP302	Open Laboratory	PC	4	0	4	0	3	40	60	100	2

PROFESSIONAL ELECTIVES (PE)

Semester – II

Elective –I

| Course Code | Course Name | Category | Instructional Hours | | | | Assessment | | | | Credit |
			Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	
M20CAE201	Soft Computing	PE	3	3	0	0	3	40	60	100	3
M20CAE202	Software Project Management	PE	3	3	0	0	3	40	60	100	3
M20CAE203	Security in Computing	PE	3	3	0	0	3	40	60	100	3
M20CAE204	Game Programming	PE	3	3	0	0	3	40	60	100	3

Semester – III

Elective –II

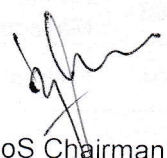| Course Code | Course Name | Category | Instructional Hours | | | | Assessment | | | | Credit |
			Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	
M20CAE301	Mobile Computing	PE	3	3	0	0	3	40	60	100	3
M20CAE302	Cloud Computing	PE	3	3	0	0	3	40	60	100	3
M20CAE303	Human Resource Management	PE	3	3	0	0	3	40	60	100	3
M20CAE304	Artificial Intelligence	PE	3	3	0	0	3	40	60	100	3

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

PROJECT WORK (PW)

Course Code	Course Name	Category	Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	Credit
			Instructional Hours				Assessment				
M20CAP303	Mini Project	PW	4	0	4	0	3	40	60	100	2
M20CAP401	Project Work	PW	24	0	24	0	3	40	60	100	12

CAREER ENHANCEMENT COURSE (CEC)

Course Code	Course Name	Category	Contact Periods	T	P	TU	Hours of Exam. (SEE)	CIA	SEE	Total	Credit
			Instructional Hours				Assessment				
M20ENP101	Communication Skills Laboratory	CEC	3	1	2	0	3	40	60	100	2
M20CAP204	Technical Seminar and Report Writing	CEC	2	0	2	0	3	40	60	100	1.
M20CAP304	Research Methodology	CEC	2	0	2	0	3	40	60	100	1
M20CAP402	MOOC Course	CEC	2	0	2	0	3	0	0	0	1

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20MAT101- MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS	T	P	TU	C
		3	0	1	4

Course Objectives:

1. The primary objective of this course is to provide mathematical background and sufficient experience on various topics of discrete mathematics like matrix algebra, logic and proofs, combinatory, graphs, algebraic structures, formal languages and finite state automata.
2. This course will extend student's Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

UNIT I   MATRIX ALGEBRA   12

Matrices - Rank of a matrix - Solving system of equations - Eigenvalues and Eigenvectors - Cayley - Hamilton theorem - Inverse of a matrix.

UNIT II   BASIC SET THEORY   12

Basic definitions - Venn diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion – Partitions - Permutation and combination – Relations - Properties of relations - Matrices of relations - Closure operations on relations - Functions - Injective, subjective and objective functions.

UNIT III   MATHEMATICAL LOGIC   12

Propositions and logical operators - Truth table - Propositions generated by a set - Equivalence and implication - Basic laws - Some more connectives - Functionally complete set of connectives - Normal forms - Proofs in propositional calculus - Predicate calculus.

UNIT IV   FORMAL LANGUAGES   12

Languages and grammars - Phrase structure grammar - Classification of grammars - Pumping lemma for regular languages - Context free languages.

UNIT V   FINITESTATEAUTOMATA   12

Finite state automata - Deterministic finite state automata (DFA) - Non deterministic finite state automata (NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages.
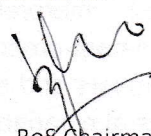
Total Instructional hours: 60

Course Outcomes:

After completing this course, students should demonstrate competency in the following skills:

CO1: Basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems.
CO2: Logical operations and predicate calculus needed for computing skill
CO3: Design and solve Boolean functions for defined problems.

BoS Chairman
Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology.
Coimbatore - 641 402.

CO4: Apply the acquired knowledge of formal languages to the engineering areas like Compiler Design.

CO5: Apply the acquired knowledge of finite automata theory and to design discrete problems to solve by computers.

Reference Books:

1. David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.
2. Grimaldi, R.P and Ramana, B.V. "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2006.
3. Hopcroft J . E and Ullman,J.D, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002.
4. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, 4 th Edition, 2002.
5. Sengadir, T. "Discrete Mathematics and Combinatorics" Pearson Education, New Delhi, 2009.
6. Trembley, J.P. and Manohar, R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, New Delhi, 2007.
7. Venkataraman, M.K., "Engineering Mathematics ", 2 nd Edition, Volume-I I , National Publishing Company, 1989.

M.C.A	M20CAT101- PROBLEM SOLVING AND PYTHON PROGRAMMING	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To know the basics of algorithmic problem solving
2. To read and write simple Python programs.
3. To develop Python programs with conditionals and loops.
4. To define Python functions and call them.
5. To use Python data structures -- lists, tuples, dictionaries.
6. To do input/output with files in Python.

UNIT I   ALGORITHMIC PROBLEM SOLVING   9

Algorithms, building blocks of algorithms - algorithmic problem solving-simple strategies for developing algorithms-Illustrative problems: find minimum in a list-insert a card in a list of sorted cards-guess an integer number in a range-Towers of Hanoi using MIT scratch.

UNIT II   DATA, EXPRESSIONS, STATEMENTS   9

Python interpreter and interactive mode-values and types-expressions-statements, tuple assignment-precedence of operators-comments- modules and functions- flow of execution, parameters and arguments-Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

BoS Chairman
Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

UNIT III   CONTROL FLOW, FUNCTIONS   9

Boolean values and operators-conditional (if),-alternative (if-else),-chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV   LISTS, TUPLES, DICTIONARIES   9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V   FILE HANDLING, MODULES, PACKAGES   9

File Handling: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

Total Instructional hours: 45

Course Outcomes:

CO1: Develop algorithmic solutions to simple computational problems
CO2: Read, write, execute by hand simple Python programs.
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries.
CO6: Read and write data from/to files in Python Programs.

Reference Books:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013
3. Kenneth A. Lambert,   "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

M.C.A	M20CAT102- WEB PROGRAMMING ESSENTIALS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the concepts and architecture of the World Wide Web.

BoS Chairman

2. To understand and practice markup languages
3. To understand and practice embedded dynamic scripting on client side Internet Programming
4. To understand and practice web development techniques on client-side.

UNIT I   INTRODUCTION TO WWW   9
Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages.

UNIT II   UI DESIGN   9
Markup Language (HTML5): Basics of Html -Syntax and tags of Html- Introduction to HTML5 - Semantic/Structural Elements -HTML5 style Guide and Coding Convention– Html Svg and Canvas – Html API"s - Audio & Video - Drag/Drop - Local Storage - Web socket API– Debugging and validating Html.

Cascading Style Sheet (CSS3): The need for CSS – Basic syntax and structure Inline Styles – Embedding Style Sheets - Linking External Style Sheets - Introduction to CSS3 – Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS - Responsive Web Design - Introduction to LESS/SASS

UNIT III OVERVIEW OF JAVASCRIPT   9
Introduction - Core features - Data types and Variables - Operators, Expressions, and Statements Functions - Objects - Array, Date and Math Related Objects - Document Object Model - Event Handling - Controlling Windows & Frames and Documents - Form validations.

UNIT IV ADVANCED FEATURES OF JAVASCRIPT   9
Browser Management and Media Management – Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub classes and Super classes – Introduction to JSON – JSON Structure –Introduction to jQuery –Introduction to AJAX-Bootstrap - Bootstrap components.

UNIT V PHP   9
Introduction - How web works - Setting up the environment (LAMP server) - Programming basics Print/echo - Variables and constants – Strings and Arrays – Operators, Control structures and looping structures – Functions – Reading Data in Web Pages - Embedding PHP within HTML - Establishing connectivity with MySQL database.

Total Instructional hours: 45

Course Outcomes:

CO1: Create a basic website using HTML and Cascading Style Sheets.
CO2: Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
CO3: Design rich client presentation using AJAX.
CO4: Design and implement simple web page in PHP, and to present data in XML format.
CO5: Design front end web page and connect to the back end databases

Reference Books:

BoS Chairman
Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

1. David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011
2. Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education, 2011
3. James Lee, BrentWare , "Open Source Development with LAMP: Using Linux, Apache, MySQL, Perl, and PHP" AddisonWesley, Pearson 2009
4. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, 2010
5. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013
6. Thomas A Powell, "Ajax: The Complete Reference", McGraw Hill, 2008.

M.C.A	M20CAT103- DATA STRUCTURES	T	P	TU	C
		3	0	0	3

Course Objectives:

1. Be familiar with basic techniques Data Structures.
2. Be exposed to the concept of ADTs.
3. Learn linear data structures-List, Stack and Queue.
4. Learn nonlinear data structures-Tree and Graphs.
5. Be exposed to sorting, searching and hashing Techniques.

UNIT I   LINEAR DATA STRUCTURES -ARRAY, LIST   9

Introduction - Abstract Data Types (ADT) – Arrays and its representation –Structures - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.

UNIT II   LINEAR DATA STRUCTURES - STACK, QUEUE   9

Stack – Operations on Stack – Applications of stack – Infix to postfix conversion – evaluation of expression – Queue – Circular Queue - Double Ended Queue - Evaluating Arithmetic Expressions - Applications of Queue.

UNIT III   NON-LINEAR TREE STRUCTURES   9

Trees and its representation -Binary Tree – Expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees.

Unit IV   NON-LINEAR GRAPH STRUCTURES   9

Graph -Types of Graph-Representation of Graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs.

UNIT V   SORTING, SEARCHING AND HASH TECHNIQUES   9

Sorting algorithms: Insertion sort - Bubble sort - Quick sort - Merge sort - Searching: Linear search – Binary Search - Hashing: Hash Functions – Separate Chaining – Open Addressing- Rehashing.

                                                    Total Instructional hours: 45

Course Outcomes:

BoS Chairman

Head of the Department
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

CO1: Able to analyse algorithms and determines their time complexity.
CO2: Able to understand the concepts of data types, data structures and linear structures.
CO3: Able to apply data structures to solve various problems
CO4: Able to understand non-linear data structures.
CO5: Able to apply different Sorting, Searching and Hashing algorithms.

Reference Books:

1. A.K. Sharma, "Data Structures using C", Pearson Education Asia, 2013.
2. E. Horowitz, Anderson-Freed and S.Sahni, "Fundamentals of Data structures in C", University Press, 2007
3. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education 2012
4. E.Balagursamy," Data Structures using C", Tata McGraw Hill 2015 Reprint.
5. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Asia, 2013.
6. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011.
7. Robert.L..Kruce "Data Structures and Program Design in C", Pearson Education 2007.
8. Tanaenbaum A.S, Langram Y. Augestein M.J, " Data Structures using C", Pearson Education, 2004.

M.C.A	M20CAT104-SOFTWARE ENGINEERING	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To provide an insight into software life cycle and various software process models.
2. To estimate the resources for developing the application and to prepare the schedule.
3. To know the various designing concepts and Agile.
4. To prepare the test cases for the project, apply various testing techniques, strategies and metrics to evaluate the software.
5. To understand the models and metrics of software quality and reliability.

UNIT I   INTRODUCTION   9
Software Engineering Concepts -A Generic view of Process - Categories of Software - Requirements Engineering: Tasks Initiation-Elicitation-Developing Use Cases-Building the analysis model-Negotiation-Validation - Building the Analysis Model. Requirement Analysis
- Approaches-Data modelling concepts- Flow Oriented modelling- Behavioral Modelling.

UNIT II   DESIGN ENGINEERING   9
Design Process and Quality-Design Concept-Model- Creating an Architectural Design- Software Architecture-Data Design-Architectural Styles and Patterns-Architectural Design- Mapping Data Flow into Software Architecture- Agile definition and roles in agile, agile manifesto, 12 principles of agile manifesto, agile characteristics, daily stand-up, agile iteration planning. Definition of Done in agile, Release planning in agile

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

UNIT III   MODELLING   9

Component level design-Component-Class based Components-Conducting component level design-Designing conventional components - Web Engineering-Attributes, Layers, Processes and best Practices - Product Metrics- Process Models-Perspective models-Waterfall model-Incremental models- Evolutionary models-Specialized models-Unified Process Models.

UNIT IV   TESTING TECHNIQUES & TEST CASE DESIG   9

Using White Box Approach to Test design - Test Adequacy Criteria – Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths –Test Case Design Strategies –Using Black Box Approach to Test Case Design – Random Testing – Requirements based testing – Web Application Testing using Selenium Tool– State based testing – Error guessing – Compatibility testing – User documentation testing – Domain testing

UNIT V   SOFTWARE TESTING AND QUALITY METRICS   9

Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics -Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment –

Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics.

Total Instructional hours: 45

Course Outcomes:

CO1: Able to understand the problem domain to choose process models and to develop SRS
CO2: Able to model software projects using appropriate design notations and agile **CO3:**
Able to measure the product and process performance using various metrics **CO4:** Able to
evaluate the system with various testing techniques and strategies **CO5:** Able to
understand the concepts of metrics and software models.

Reference Books:

1. Roger S. Pressman, David Lowe, "Web Engineering: A Practitioner"s Approach", Special Indian edition, McGrawHill, 2008.
2. Sommerville I, "Software Engineering", Sixth Edition, Addison Wesley, 2003.
3. G J Myers, Corey S, Tom B and Todd M T, " The Art of Software Testing", Second Edition, Wiley, 2004.
4. Pankaj J, "An Integrated Approach to Software Engineering", Third Edition, Narosa Publishing House, 2005.
5. Ali Behforroz, Frederick J.Hudson, "Software Engineering Fundamentals", Oxford Indian Reprint,2012.
6. Jibitesh Mishra, Ashok Mohanty, "Software Engineering", Pearson Education, First Edition, 2011.
7. Kassem A. Saleh, "Software Engineering", First Edition, J.Ross Publishing, 2009.
8. Pankaj Jalote, "An Integrated approach to Software Engineering", Third Edition, Narosa Publications, 2011.
9. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill Edition, 2008

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAP101- PYTHON PROGRAMMING LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:
• To understand the problem solving approaches.
• To learn the basic programming constructs in Python.
• To articulate where computing strategies support in providing Python-based solutions to real world problems.
• To use Python data structures - lists, tuples, dictionaries.
• To do input/output with files in Python.

LIST OF EXPERIMENTS
1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same.
2. Python programming using simple statements and expressions.
3. Scientific problems using Conditionals and Iterative loops.
4. Practical - Implementing real-time/technical applications using Lists, Tuples.
5. Practical - Implementing real-time/technical applications using Sets, Dictionaries.
6. Practical - Implementing programs using Functions.
7. Practical - Implementing programs using Strings.
8. Practical - Implementing programs using written modules and Python Standard Libraries.
9. Practical - Implementing real-time/technical applications using File handling.
10. Practical - Implementing real-time/technical applications using Exception handling.
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

Total Instructional hours: 60

Course Outcomes:

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

CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python data structures.
CO6: Apply Python features in developing software applications.

M.C.A	M20CAP102-WEB PROGRAMMING LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:
1. Try and develop the most important technologies that are being used today by web developers to build a wide variety of web applications.
2. To build web applications using proven developer tools and message formats.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

3. To understand and practice web development techniques on client-side Web applications using technologies such as HTML, CSS, Javascript, AJAX, JQuery and JSON.

LIST OF EXPERIMENTS:

1. Create your own Resume using HTML 5 Tags
2. Debug and validate your HTML document (Resume) using W3C validator and fix the issues. (https://validator.w3.org/#validate_by_upload).
3. Add Styles to your Resume using CSS 3 Properties.
   - Add External, Internal and Inline CSS styles to know the priority.
   - Add CSS3 Animation to your profile.
4. (a) Add functionalities that use any 2 of HTML 5 API"s.
   (b). Create a student Registration form for Job Application and validate the form fields using
     . . JavaScript.
5. (a) Create a CGPA Calculator in Web Brower using HTML, CSS and JavaScript. Use functions in . JavaScript.
   (b) Create a Quiz Program with adaptive questions using JavaScript.
6. Create a Pan Card Validation form using Object Oriented JavaScript, consider the 10th Character to be an alphabet.
   - Get the user's First Name, Last Name and other required fields as input
   - Assume the last digit of the Pan Number to be an alphabet
   - Validate the PAN Number.
7. (a) Create an online Event Registration form and validate using JQuery
   (b) Create an online video Player which will allow you to play videos from the system and also
     . create custom playlist using JQuery.
8. Construct a JSON Structure for a bookstore and validate it using JSON Validator such as http://jsonlint.com/ and parse the Json file to list the books under the category "Fiction". Use Javascript or JQuery for parsing.
9. Create a Single Page application allowing to search for a movie and displaying the trailer, poster for various movies.
   a) Create an admin login to upload the trailer, poster, keyword and details of the movie.
   b) Use Bootstrap and JQuery for designing the User Interface.
   c) Form Submission should be handled through Ajax.
10. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
11. Develop a Social Media Web Application using HTML5, CSS3, JQuery, AJAX & PHP.

Total Instructional hours: 60

Course Outcomes:

Upon Completion of the course, the students will be able to: CO1:
Develop simple web applications using scripting languages.
CO2: Implement server side and client side programming develop web applications with various

BoS Chairman

web technology concepts.
CO3: Design a Web application using various technologies such as AJAX, JQuery and JSON.
CO4: Develop an application for social media using HTML5, CSS3, JQuery, AJAX & PHP

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAP103- DATA STRUCTURES LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To develop skills in design and implementation of data structures and their applications
2. To learn and implement linear, nonlinear and tree data structures
3. To study, implement and analyze the sorting technique.

LIST OF EXPERIMENTS

1. Array- Insertion and Deletion
2. Application using array of structures
3. Array Implementation of Stack
4. Array Implementation of Queue
5. Infix to postfix conversion
6. Singly Linked List operations
7. Polynomial manipulation- addition, subtraction
8. Binary Tree Traversal
9. Quick Sort and Merge Sort
10. Binary Search
11. Sequential Search

Total Instructional hours: 60

Course Outcomes:

Upon Completion of the course, the students will be able to:

CO1: Work with basic data structures that are suitable for the problems to be solved efficiently.

CO2: Design and implement linear, and tree and its applications.

CO3: Design sorting technique, its algorithm design and analysis.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20ENP101-COMMUNICATION SKILLS LABORATORY	T	P	TU	C
		1	2	0	2

Course Objectives:

1. To provide opportunities to learners to practice their communicative skills to make them become proficient users of English.
2. To enable learners to fine-tune their linguistic skills (LSRW) with the help of technology to communicate globally.
3. To enhance the performance of learners at placement interviews and group discussions and other recruitment procedures.

UNIT I   LISTENING COMPREHENSION   12

Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions.

UNIT II   READING COMPREHENSION   12

Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

UNIT III   SPEAKING   12

Conversations: Face to Face Conversation – Telephone conversation– Role play activities =Elements of effective presentation - Body language – GDs Strategies in GD

UNIT IV   WRITING   12

Resume / Report Preparation / Letter Writing- Structuring the resume / report - Letter writing / Email Communication - Samples.

UNIT V   SOFT SKILLS & INTERVIEW SKILLS   12

Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management - Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews.

Total Instructional hours: 60

Course Outcomes:

CO1: Take part in Presentations and Group Discussions **CO2:**
Analyze information by relating different genres of texts **CO3:**
Develop the employability skills.
CO4: Builds critical thinking and self-awareness for life planning
CO5: Develop reading and writing skills needed for workplace situations
CO6: Take part in the interviews

Reference Books:

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

1. English and Communication skills- S.P. Dhanavel
2. Communication skills for Engineers-Sangeeta Sharma & Binod Mishra

M.C.A	M20CAT201- ANALYSIS OFALGORITHMS	T	P	TU	C
		3	0	0	3

Course Objectives:
1. Understand and apply linear data structures-List, Stack andQueue.
2. Understand the graphalgorithms.
3. Learn different algorithms analysistechniques.
4. Apply data structures and algorithms in real timeapplications
5. Able to analyse the efficiency ofalgorithm

UNITI   LINEAR DATASTRUCTURES   9
Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.

UNITII   NON-LINEAR TREE STRUCTURES   9
 Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – HeapHeap operations- - Binomial Heaps - Fibonacci Heaps- Hash set.

UNITIII   GRAPHS   9
Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra"s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms.

UNIT IV ALGORITHM DESIGN ANDANALYSIS   9
Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall"s Algorithm for Finding Transitive Closure.

UNIT V ADVANCED ALGORITHM DESIGNANDANALYSIS   9
Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem-Amortized Analysis.

Total Instructional hours: 45

Course Outcomes:

CO1: Describe, explain and use abstract data types including stacks, queues and lists
CO2: Design and Implement Tree data structures and Sets
CO3: Able to understand and implement non linear data structures - graphs.
CO4: Able to understand various algorithm design and implementation.

BoS Chairman

Reference Books:

1. Tanaenbaum A.S.,Langram Y. Augestein M.J, "Data Structures using C" Pearson Education, 2004.
2. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms" Pearson Education, 2015
3. Harsh Bhasin, "Algorithms Design and Analysis", Oxford University Press2015
4. Gilles Brassard, "Fundamentals of Algorithms", Pearson Education2015
5. Peter Drake, "Data Structures and Algorithms in Java", Pearson Education2014

M.C.A	M20CAT202- DATABASE MANAGEMENT SYSTEMS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the fundamentals of data models and conceptualize and depict a database system using ERdiagram.
2. To make a study of SQL and relational databasedesign.
3. To know about data storage techniques a queryprocessing.
4. To impart knowledge in transaction processing, concurrency control techniques and recoveryprocedures.

UNITI   INTRODUCTION   9

File systems versus Database systems – Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model – Enhanced E-R Modeling.

UNITII   RELATIONAL MODEL ANDQUERY EVALUATION   9

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Views – Constraints – Relational Calculus – Tuple Relational Calculus – Domain Relational Calculus – Functional Dependencies – Normal Forms – 1NF – 2NF-3NF-BCNF – 4NF-5NF.

UNITIII   TRANSACTION PROCESSING   9

Transaction Processing – Properties of Transactions - Serializability – Transaction support in SQL - Locking Techniques – Time Stamp ordering – Validation Techniques – Granularity of Data Items – Recovery concepts – Shadow paging – Log BasedRecovery.

UNITIV   FILESAND INDEXING   9

File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+ tree – Static Hashing - Indexes on MultipleKeys.

UNITV   SPECIAL PURPOSE DATABASES   9

OODBMS- - Object-Based Databases - OO Data Model - OO Languages – Persistence – Object Relational Databases - XML – Structure of XML — Cloud based systems – NOSQL introduction - NOSQL key features – Hbase data model – Hbase data operations - Database Tuning -Case Study for Design and Manage the Database for any Project.

Total Instructional hours: 45

BoS Chairman

Course Outcomes:

CO1: Understand the basic concepts of the database and data models
CO2: Design a database using ER diagrams and map ER into Relations and normalize the relations
CO3: Acquire the knowledge of query evaluation to monitor the performance of the DBMS
CO4: Develop a simple database applications using normalization.
CO5: Acquire the knowledge about different special purpose databases and to critique how
CO6: They differ from traditional database systems.

Reference Books:

1.Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database SystemConcepts", Seventh Edition, McGraw Hill, 2017.
2. RamezElamassri and ShankantBNavathe, "Fundamentals of Database Systems",Seventh Edition, Pearson Education Delhi, 2017.
3.RaghuRamakrishnan, —Database Management Systemsll, Fourth Edition,McGrawHill College Publications, 2015.
4. Carlos Coronel, Peter Rob, and Stephen Morris, "Database Principles Fundamentalsof Design, Implementation, and Management –10th Edition", Course Technology,Cengage Learning, 2013.
5.Frank. P. Coyle, "XML, Web Services And The Data Revolution", Pearson Education, 2012.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAT203- PROGRAMMING WITH JAVA	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To provide an overview of working principles of internet, web relatedfunctionalities
2. To understand and apply the fundamentals core java, packages, database connectivity for computing
3. To enhance the knowledge to server sideprogramming.
4. To Understand the OOPS concept & how to apply inprogramming.

UNITI   JAVAFUNDAMENTALS   9

Java features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Methods – Inheritance - Packages and Interfaces – Boxing,Unboxing – Variable-Length Arguments (Varargs), ExceptionHandling.

UNITII   COLLECTIONS AND ADVANCEFEATURES   9

Utility Packages- Introduction to collection –Hierarchy of Collection framework – Generics, Array list, LL, HashSet, Treeset, HashMap – Comparators – Java annotations – Premain method.

UNITIII   ADVANCEDJAVAPROGRAMMING   9

Input Output Packages – Inner Classes – Java Database Connectivity - Introduction JDBC Drivers - JDBC connectivity with MySQL/Oracle -Prepared Statement & Result Set – JDBC Stored procedures invocation - Servlets - RMI – Swing Fundamentals - Swing Classes.

**UNITIV   OVERVIEW OF DATA RETRIEVAL & ENTERPRISE APPLICATION DEVELOPMENT
                                                       9**

Tiered Application development - Java Servers, containers –Web Container – Creating Web Application using JSP/Servlets – Web Frameworks Introduction to Spring/ Play Framework – ORM Layer – Introduction to Hibernate.

UNITV   JAVA INTERNALSANDNETWORKING   9

Java jar Files-Introspection – Garbage collection – Architecture and design – GC Cleanup process, Invoking GC, Generation in GC - Networking Basics Java and the Net – InetAddress – TCP/IP Client Sockets – URL –URL Connection – TCP/IP Server Sockets – A Caching Proxy HTTP Server – Datagrams.

                                            Total Instructional hours:45

Course Outcomes:

CO1: Implement Java programs.
CO2: Make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API
CO3: Use the frameworks JSP, Hibernate, spring
CO4: Design and implement server side programs using Servlets and JSP.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

Reference Books:

1.R. NageswaraRao, "Core Java: An Integrated Approach", DreamTech Press,Edition 2016

2. Amritendu De, "Spring 4 and Hibernate 4: Agile Java Design and Development",McGraw-Hill Education, Illustrated Edition,2015

3. Herbert Schildt, The Complete Reference – Java 2, Ninth Edition, Tata McGrawHill,2014

4. Joyce Farrell, "Java Programming", Cengage Learning, Seventh Edition, 2014

5. John Dean, Raymond Dean, "Introduction to Programming with JAVA – A ProblemSolving Approach", Tata McGraw Hill, Second Edition, 2014.

BoS Chairman

M.C.A	M20CAT204- COMPUTER NETWORKS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand networking concepts and basic communicationmodel
2. To understand network architectures and components required for data communication.
3. To analyze the function and design strategy of physical, data link, network layer and transportlayer
4. To acquire basic knowledge of various application protocol for internet security issues and services.

UNITI   NETWORK FUNDAMENTALS   9

Uses of Networks – Categories of Networks -Communication model –Data transmission concepts and terminology – Protocol architecture – Protocols – OSI – TCP/IP – LAN Topology - Transmission media.

UNITII   DATALINKLAYER   9

Data link control - Flow Control – Error Detection and Error Correction - MAC – Ethernet, Token ring, Wireless LAN MAC – Blue Tooth – Bridges.

UNITIII   NETWORK LAYER   9

Network layer – Switching concepts – Circuit switching – Packet switching –IP – Datagrams –IP addresses- IPV6– ICMP – Routing Protocols – Distance Vector – Link State- BGP.

UNIT IVTRANSPORT LAYER   9

Transport layer –service –Connection establishment – Flow control – Transmission control protocol – Congestion control and avoidance – User datagram protocol. -Transport for Real Time Applications (RTP).

UNIT V APPLICATIONSAND SECURITY   9

Applications - DNS- SMTP – WWW –SNMP- Security –threats and services - DES- RSA.

Total Instructional hours: 45

Course Outcomes:

CO1: Able to trace the flow of information from one node to another node in the network
CO2: Able to Identify the components required to build different types of networks **CO3:** Able to understand the functionalities needed for data communication into layers **CO4:** Able to choose the required functionality at each layer for given application
CO5: Able to understand the working principles of various application protocols andfundamentals of security issues and services available.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

Reference Books:

1. Larry L. Peterson & Bruce S. Davie, "Computer Networks – A systems Approach", FifthEdition, Morgan Kaufmann, 2012.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach,Pearson Education, Limited, sixth edition, 2012.
3. AndrewS.Tannenbaum, David J. Wetherall, "Computer Networks" Fifth Edition, PearsonEducation 2011.
4. Forouzan, "Data Communication and Networking", Fifth Edition , TMH 2012.
5. William Stallings, —Data and Computer Communicationsll, Tenth Edition, PearsonEducation, 2013.

M.C.A	M20CAP201- ALGORITHMS LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To develop skills in design and implementation of datastructures.
2. To learn and implement linear, non-linear and tree datastructures.
3. To learn Set ADT and Graph data structures and itsapplications.
4. To study, implement and analysis the different sortingtechniques.

LIST OF EXPERIMENTS

2. Array implementation ofstack
3. Linked list implementation of Queue
4. Polynomial Addition using LinkedList
5. Binary Search treeoperations
6. AVL Treeoperations
7. GraphTraversals
8. Shortest Path using Dijkstra"sAlgorithm
9. Minimum Spanning Tree using Prim'sAlgorithm
10. Dictionary application using any of the datastructure
11. Divide and Conquer Method - MergeSort
12. Back Tracking - 8-Queen'sProblem.

Total Instructional hours: 60

Course Outcomes:

Upon Completion of the course, the students will be able to:
CO1: Work with basic data structures that are suitable for the problems to be solved efficiently.
CO2: Design and implement linear, tree, and graph structures and its applications
CO3: Design various sorting techniques, its algorithm design and analysis

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAP202- DATABASE MANAGEMENT SYSTEMS LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To understand the concepts ofDBMS.
2. To familiarize with SQLqueries.
3. To write stored procedures inDBMS.
4. To learn front end tools to integrate withdatabases.

LIST OF EXPERIMENTS:

1. Creation of base tables andviews
2. Data Manipulation INSERT, DELETE and UPDATE in Tables. SELECT, Sub Queries
3. Data ControlCommands
4. High level language extensions – PL/SQL or Transact SQL –Packages
5. Use of Cursors, Procedures andFunctions
6. Embedded SQL or DatabaseConnectivity
7. Oracle or SQL Server Triggers – Block Level – Form LevelTriggers
8. Working with Forms, Menus and ReportWriters for an application project in any domain
9. Front-end tools – Visual Basic/Developer2000
10. Write SQL queries to retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.
11. Write SQL queries to Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun2017
12. Write SQL queries to create a view of all books and its number of copies that are currently available in the Library.
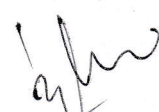
Total Instructional hours: 60

Course Outcomes:

Upon Completion of the course, the students will be able to:
CO1: Design and Implement databases
CO2: Formulate complex queries using SQL
CO3: Design and Implement applications that have GUI and access databases for backend Connectivity.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAP203- PROGRAMMING WITH JAVA LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. Try and develop the most important technologies that are being used today by web developers to build a wide variety of web applications.
2. To develop Java based web programming.
3. To understand and apply the fundamentals core java, packages, database connectivity for
4. computing
5. To enhance the knowledge to server-side programming
6. To provide knowledge on advanced features like Swing, JavaBeans, Sockets.

LIST OF EXPERIMENTS

1. Java programs by making use of class, interface, package, etc. for the following # Different types of inheritance study
   # Uses of „this" keyword
   #Polymorphism
   # Creation of user specific packages
   # User specific exception handling
2. Window based GUI applications using frames and applets such as Calculator application, Fahrenheit to Centigrade conversion, etc.
3. Application of threads examples
4. Personal Information System using Swing
5. Event Handling in Swing
6. Reading and writing text files
7. RMI application to access a remote method
8. Servlet program with database connectivity for a web-based application such as Students result status checking, PNR number enquiry etc.
9. Creation and usage of Java bean
10. Application to search Phone Number using contact Name Using HashMap.
11. Application which finds the Duplicates in E-mail using Set Interface.
12. FTP Using Sockets.

Total Instructional hours: 60

Course Outcomes:

Upon Completion of the course, the students will be able to:

CO1: Apply the Object Oriented features of Java for programming on the internet

CO2: Implement, compile, test and run Java program,

CO3: Make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API

CO4: Understand the components and patterns that constitute a suitable architecture for a web application using java servlets

CO5: Demonstrate systematic knowledge of backend and front end by developing an appropriate application.

CO6: Implement socket programming and Client side scripting in Java

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

PROFESSIONAL ELECTIVES (PE)

Semester – II
Elective – I

M.C.A	M20CAE201- SOFT COMPUTING	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To learn the key aspects of Soft computing
2. To know about the components and building block hypothesis of Genetic algorithm.
3. To understand the features of neural network and its applications
4. To study the fuzzy logic components
5. To gain insight onto Neuro Fuzzy modeling and control.
6. To gain knowledge in machine learning through Support vector machines

UNIT I   INTRODUCTION TO SOFT COMPUTING   9
Evolution of Computing – Introduction to Artificial Intelligence – Example problems – tic – tactoe – question answering – Turing test - Prepositional and Predicate Calculus Rule Based knowledge Representation - Knowledge acquisition – Expert system – Introduction – Example – MYCIN - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics – Case study : Simple artificial intelligence programs in PROLOG for diagnosis of a disease.

UNIT II   GENETIC ALGORITHMS   9
Introduction, Building block hypothesis, working principle, Basic operators and terminologies such as individual, gene, encoding, fitness function and reproduction, Genetic modelling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem), Differences & similarities between GA & other traditional methods, Applications of GA.

UNIT III   NEURAL NETWORKS   9
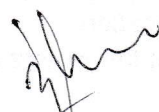Machine learning using Neural Network, Adaptive Networks – Feed Forward Networks Defuzzification – Supervised Learning Neural Networks – Radial Basis Function Networks -Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks – Case study: Identification and control of linear and nonlinear dynamic systems using MATLAB.

UNIT IV   FUZZY LOGIC   9
Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Defuzzification - Fuzzy Inference Systems – Mamdani Fuzzy Model – Takagi – Sugeno- Kang Fuzzy Model - Fuzzy Expert Systems – Fuzzy Decision Making - Case Study: implementation of fuzzy logic controller using MATLAB fuzzy logic toolbox.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

UNIT V   APPLICATIONS OF SOFT COMPUTING   9

Case study: Handwritten Script Recognition-Image Processing and Data Compression-Automotive Systems and Manufacturing-Soft computing-based Architecture-Decision Support System-Power System Analysis-Bioinformatics-Investment and Trading.

Total Instructional hours: 45

Course Outcomes:

CO1: Implement machine learning through neural networks.

CO2: Gain Knowledge to develop Genetic Algorithm and Support vector machine based machine learning system.

CO3: Write Genetic Algorithm to solve the optimization problem.

CO4: Understand fuzzy concepts and develop a Fuzzy expert system to derive decisions.

CO5: Able to Model Neuro Fuzzy system for data clustering and classification.

Reference Books:

1. Timothy Ross, "Fuzzy Logic with Engineering Applications", WileyPublications,4thEdition 2016.
2. Ross Timothy J, Fuzzy Logic with Engineering Applications, Wiley India Pvt Ltd, New Delhi, 2010
3. David E. Goldberg, "Genetic Algorithms in Search, Optimization and MachineLearning", Pearson Education, First Edition,2008.
4. S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic Algorithms", Springer, 2007
5. KwangH.Lee, "First course on Fuzzy Theory and Applications", Springer–Verlag Berlin Heidelberg, 2005

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAE202- SOFTWARE PROJECT MANAGEMENT	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To know of how to do project planning for the software process.
2. To learn the cost estimation techniques during the analysis of the project.
3. To understand the quality concepts for ensuring the functionality of the software

UNIT I   SOFTWARE PROJECT MANAGEMENT CONCEPTS   9

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and allocate resources- TQM, Six Sigma, Software Quality: defining software quality, ISO9126, External Standards.

UNIT II   SOFTWARE EVALUATION AND COSTING   9

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing technologies, choice of process models, structured methods.

UNIT III   SOFTWARE ESTIMATION TECHNIQUES   9

Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model.

UNIT IV   RISK MANAGEMENT   9
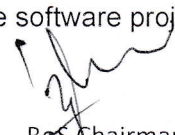
Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.

UNIT V   GLOBALIZATION ISSUES IN PROJECT MANAGEMENT   9

Globalization issues in project management: Evolution of globalization- challenges in building global teams-models for the execution of some effective management techniques for managing global teams. Impact of the internet on project management: Introduction – the effect of internet on project management – managing projects for the internet – effect on project management activities. Comparison of project management software"s: dot Project, Launch pad, openProj. Case study: PRINCE2.

Total Instructional hours: 45

Course Outcomes:

CO1:Understand the activities during the project scheduling of any software application.

CO2:Learn the risk management activities and the resource allocation for the projects.

CO3:Can apply the software estimation and recent quality standards for evaluation of the Softwareproject

CO4:Acquire knowledge and skills needed for the construction of highly reliable software project

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

CO5: Able to create reliable, replicable cost estimation that links to the requirements of project planning and managing.

Reference Books:
1. Bob Hughes & Mike Cotterell, "Software Project Management", Tata McGraw- Hill Publications, Fifth Edition 2012
2. Shriram K. Vasudevan, R. M. D. Sundaram & Prashant R. Nair, "Software Project Management", Alpha Science International Ltd, 2017
3. Futrell , "Quality Software Project Management", Pearson Education India, 2008
4. Richard H.Thayer "Software Engineering Project Management", IEEE Computer Society
5. S. A. Kelkar," Software Project Management" PHI, New Delhi, Third Edition ,2013
6. http://en.wikipedia.org/wiki/Comparison_of_project_management_software

M.C.A	M20CAE203- SECURITY IN COMPUTING	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To understand the basics of cryptography
2. learn to find the vulnerabilities in programs and to overcome them,
3. know the different kinds of security threats in networks and its solution
4. know the different kinds of security threats in databases and solutions available
5. learn about the models and standards for security.

UNIT I   ELEMENTARY CRYPTOGRAPHY   9
Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures.

UNIT II   PROGRAM SECURITY   9
Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code –Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Flaws

UNIT III   SECURITY IN NETWORKS   9
Threats in networks – Virtual Private Networks – PKI – SSL – IPSec – Content Integrity –Access Controls – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure   e-mail.

UNIT IV SECURITY IN DATABASES   9
Security requirements of database systems – Reliability and Integrity in databases – Redundancy – Recovery – Concurrency/ Consistency – Monitors – Sensitive Data – Types of disclosures –Inference- finding and confirming sql injection.

UNIT V   SECURITY MODELS AND STANDARDS   9

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

Secure SDLC – Security architecture models – Bell-La Padula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison- Ruzzo- Ulman Model – Secure Frameworks – COSO – CobiT – Security Standards - ISO 27000 family of standards – NIST.

Total Instructional hours: 45

Course Outcomes:

CO1: Apply cryptographic algorithms for encrypting and decryption for secure data transmission

CO2: Understand the importance of Digital signature for secure e-documents exchange

CO3: Understand the program threats and apply good programming practice

CO4: Get the knowledge about the security services available for internet and web applications

CO5: Understand data vulnerability and sql injection

CO6: Gain the knowledge of security models and published standards

Reference Books:

1. William Stallings, "Cryptography and Network Security : Principles and Practices", Fifth Edition, Prentice Hall, 2010

2. Michael Whitman, Herbert J. Mattord, "Management of Information Security",Third Edition, Course Technology, 2010.

3. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, McGrawHill Osborne Media, 2009.

4. Education Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson, 2007

5. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison- Wesley, 2002.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAE204- GAME PROGRAMMING	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To get subsequent understanding of game design and development, which includes the processes, mechanics, issues in game design, game engine development, modelling, techniques, handling situations, and logic.
2. To create interactive games

UNIT I   GRAPHICS FOR GAME PROGRAMMING   9

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping,Advanced Texturing, Character Animation, Physics-based Simulation.

UNIT II   GAME DESIGN PRINCIPLES   9

Game Logic, Game AI, Path Finding, Game Theory, Character development, Story Telling,Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games,Collision Detection

UNIT III   GAMING ENGINE DESIGN   9

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics.

UNIT IV   GAMING PLATFORMS AND FRAMEWORKS   9

Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DX Studio, Unity.

UNIT V   GAME DEVELOPMENT   9

Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

Total Instructional hours: 45

Course Outcomes:
CO1:Illustrate an understanding of the concepts behind game programming techniques.
CO2:Implement game programming techniques to solve game development tasks.
CO3:Construct a basic game engine using open-source programming libraries.

Reference Books:

1. Chetna S. Suthar, Rafat Khan Bagawan, "Game Programming",ech-Neo Publications LLP, 1st Edition, 2019
2. Nystrom, Robert, "Game Programming Patterns", GeneverBenning, 1st Edition, 2014
3. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" Morgan Kaufmann, 2nd Edition, 2006
4. Dino Dini, "Essential 3D Game Programming", Morgan Kaufmann, 1st Edition, 2012
5. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall,1st Edition,2006

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20MAT301–RESOURCE MANAGEMENT TECHNIQUES	T	P	TU	C
		3	0	1	4

The aim of this course is to
1. Understand the basic concepts in Operations Research Techniques for Analysis and Modeling in Computer Applications.
2. Develop and solve mathematical model of linear programming problems.
3. Exposure to solve Transport and assignment problems.
4. Introduce network modeling for planning and scheduling the project activities.
5. Study the Characteristics and Different types of Queueing Models.

UNIT I LINEAR PROGRAMMING MODELS 12
Mathematical Formulation of LPP -Graphical solution to Linear Programming Problems - Simplex method – Big M method – Two phase method.

UNIT II DUALITY 10
Dual simplex method - Principles of Duality - Sensitivity Analysis.

UNIT- III TRANSPORTATION AND ASSIGNMENT PROBLEM 14
Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy –Mathematical formulation of assignment models – Hungarian Algorithm.

UNIT IV NETWORK ANALYSIS 12
Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.

UNIT V QUEUEING MODELS 12
Characteristics of Queueing Models – Poisson Queues - $(M/M/1) : (FIFO/\infty/\infty)$, $(M/M/1) : (FIFO/N/\infty)$, $(M/M/C) : (FIFO/\infty/\infty)$, $(M/M/C) : (FIFO/N/\infty)$ models.

Course Outcomes:
Students will be able to

CO1: Apply the concept of linear programming in Formulation, Graphical method, Simplex and Artificial techniques.
CO2: Develop the concept of linear programming using Duality.
CO3: Solve the problems of transportation and assignment problem to get the optimal solutions.
CO4: Construct the network modeling for planning and scheduling the project activities.
CO5: Identify and analyze appropriate queuing model to reduce the waiting time in queue.

Reference Books:
1. Gupta Prem Kumar and Hira D.S., Operations Research, Sultan Chand, Revised Edition,2017.
2. Donald Gross, John F. Shortle, James M. Thompson, Carl M. Harris, "Fundamentals of Queueing Theory", John Wiley & Sons, 5th Edition, New Jersy, 2020.
3. Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 2 nd Edition, 2014.
4. John W. Chinneck "Feasibility and Infeasibility in Optimization Algorithms and Computational Methods' Springer, 2015.
5. N. D Vohra, Quantitative Techniques in Management,TataMcgraw Hill, 5 th Edition 2017.
6. Natarajan A M, Balasubramanie P, Tamilarasi R,"Operations Research", 2nd Edition, Pearson Education 2014.
7. Taha H.A., "Operations Research : An Introduction " 10th Edition, Pearson Education, 2017.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

Total Instructional hours: 60

M.C.A	M20CAT301- INTERNET OF THINGS	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To understand the fundamentals of Internet of Things
2. To learn about the basics of IOT protocols
3. To build a small low-cost embedded system using Raspberry Pi.
4. To apply the concept of Internet of Things in the real-world scenario

UNIT I   INTRODUCTION TO IoT   9
Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

UNIT II   IoT ARCHITECTURE   9
M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNIT III   IoT PROTOCOLS AND SENSORS   9
Link Layer Protocols, Network Layer Protocols, Transport Layer and Application Layer Protocols – IoT Levels – IoT versus M2M – Temperature Sensors - Humidity Sensors - Pressure Sensors - Proximity Sensors- Level Sensors- Accelerometers- Gyroscope- Gas Sensors-Infrared Sensors- Optical Sensors – Power Sources.

UNIT IV   BUILDING IOT   9
Open Hardware Platforms: Interfaces, Programming, APIs and Hacks – Web Services – Integration of Sensors and Actuators with Arduino/ Raspberry Pi/ Other Light Weight Boards.

UNIT V   APPLICATIONS   9
Complete Design of Embedded Systems – Smart Cities: Smart Parking, Smart Traffic Control, Surveillance – Home Automation: Smart Appliances, Intrusion Detection, Smoke/Gas Detectors – Cloud Storage and Communication APIs: WAMP, Xively, Django – Data and Analytics for IoT.

Course Outcomes:
Upon completion of the course, the student should be able to:
CO1: Analyze various protocols for IoT
CO2: Develop web services to access/control IoT devices.
CO3: Design a portable IoT using Raspberry Pi
CO4: Deploy an IoT application and connect to the cloud.
CO5: Analyze applications of IoT in real time scenario

Total Instructional hours: 45

Reference Books:
1. RMD SundaramShriram K Vasudevan, Abhishek S Nagarajan"Internet of things" Wiley (1 January 2019)
2. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015
3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things",

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402,

Springer, 2011.

4.Jan Ho¨ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan   Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things -   Introduction to a New Age of Intelligence", Elsevier, 2014.

5. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.

BoS Chairman

M.C.A	M20CAT302-CYBER SECURITY	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To learn the principles of cyber security and to identify threats and risks.
2. To learn how to secure physical assets and develop system security controls.
3. To understand how to apply security for Business applications and Network Communications.
4. To learn the technical means to achieve security.
5. To learn to monitor and audit security measures.

UNIT I PLANNING FOR CYBER SECURITY   9

Best Practices-Standards and a plan of Action-Security Governance Principles, components and Approach-Information Risk Management-Asset Identification-Threat IdentificationVulnerability Identification-Risk Assessment Approaches-Likelihood and Impact Assessment-Risk Determination, Evaluation and Treatment-Security Management FunctionSecurity Policy-Acceptable Use Policy-Security Management Best Practices.

UNIT II SECURITY CONTROLS   9

People Management-Human Resource Security-Security Awareness and EducationInformation Management- Information Classification and handling-Privacy-Documents and Record Management-Physical Asset Management-Office Equipment-Industrial Control Systems-Mobile Device Security-System Development-Incorporating Security into SDLC- Case study on information security policies.

UNIT III CYBER SECURITY FOR BUSINESS APPLICATIONS AND NETWORKS   9

Business Application Management-Corporate Business Application Security-End user Developed Applications-System Access- Authentication Mechanisms-Access ControlSystem Management-Virtual Servers-Network Storage Systems-Network Management Concepts-Firewall-IP Security-Electronic Communications – Case study on OWASP vulnerabilities using OWASP ZAP tool.

UNIT IV TECHNICAL SECURITY   9

Supply Chain Management-Cloud Security-Security Architecture-Malware ProtectionIntrusion Detection-Digital Rights Management-Cryptographic Techniques-Threat and Incident Management-Vulnerability Management-Security Event Management-Forensic Investigations-Local Environment Management-Business Continuity. – Case study on cloud and cryptographic vulnerabilities.

UNIT V SECURITY ASSESSMENT   9

Security Monitoring and Improvement-Security Audit-Security Performance-Information Risk Reporting-Information Security Compliance Monitoring-Security Monitoring and Improvement Best Practices. – Case study on vulnerability assessment using ACUNETIX.

Total Instructional hours: 45

Course Outcomes:
On completion of the course, the student will be able to
CO1: Develop a set of risk and security requirements to ensure that there are no gaps in an organization's security practices.
CO2: Achieve management, operational and technical means for effective cyber security. ● Audit and monitor the performance of cyber security controls.
CO3: To spot gaps in the system and devise improvements
CO4: Identify and report vulnerabilities in the system

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology.
Coimbatore - 641 402.

Reference Books:

1. William Stallings, "Effective Cyber Security- A guide to using Best Practices and Standards", Addison-Wesley Professional, First Edition,2018.

2. Adam Shostack, "Threat Modelling- Designing for Security", Wiley Publications,First Edition,2014.

3. Gregory J. Touhill and C. Joseph Touhill, "Cyber Security for Executives- A Practical guide", Wiley Publications, First Edition,2014.

4. RaefMeeuwisse, "Cyber Security for Beginners", Second Edition, Cyber Simplicity Ltd, 2017.

5. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", 2nd Edition, Syngress, 2013.

6. OWASP ZAP : https://owasp.org/www-project-zap/ 7. ACUNETIX:https://www.acunetix.com/

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAT303 - MACHINE LEARNING	T	P	TU	C
		3	0	0	3

Course Objectives:

UNIT I FOUNDATIONS FOR ML   9
ML Techniques Overview-Validation Techniques-Cross Validations-Feature Reduction/ Dimensionality reduction - Principal components analysis - Eigen vectors

UNIT II CLUSTERING & CLASSIFICATION   9
Distance measures-Different clustering methods Distance, Density, Hierarchical-Iterative distance-based clustering-Dealing with continuous, categorical values in K-Means ModelAssumptions, Probability estimation-Required data processing-M-estimates, Feature selection: Mutual information-Classifier

UNIT III   BAYESIAN LEARNING   9
Basic Probability Notation- Inference – Independence - Bayes' Rule. Bayesian Learning: Maximum Likelihood and Least Squared error hypothesis-Maximum Likelihood hypotheses for predicting probabilities- Minimum description Length principle -Bayes optimal classifier - Naïve Bayes classifier - Bayesian Belief networks -EM algorithm.

UNIT IV PARAMETRIC MACHINE LEARNING   9
Logistic Regression: Classification and representation – Cost function – Gradient descent – Advanced optimization – Regularization - Solving the problems on overfitting. Perceptron – Neural Networks – Multi – class Classification - Backpropagation – Non-linearity with activation functions (Tanh, Sigmoid, Relu, PRelu) - Dropout as regularization.

UNIT V NON-PARAMETRIC MACHINE LEARNING   9
k- Nearest Neighbors- Decision Trees – Branching – Greedy Algorithm - Multiple Branches – Continuous attributes – Pruning. Random Forests: ensemble learning. Boosting – Adaboost algorithm. Support Vector Machines – Large Margin Intuition – Loss Function - Hinge Loss – SVM Kernels.

Total Instructional hours: 45

Course Outcomes:
CO1: Apply the techniques of Problem Solving in Artificial Intelligence.
CO2: Implement Knowledge and Reasoning for real world problems.
CO3: Model the various Learning features of Artificial Intelligence
CO4: Analyze the working model and features of Decision tree
CO5: Apply k-nearest algorithm for appropriate research problem.

Reference Books:
1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , Third Edition Pearson Education Limited, 2015
2. CalumChace , "Surviving AI: The Promise and Peril of Artificial Intelligence", Three CS publication, Second Edition, 2015.
3. Tom M. Mitchell, "Machine Learning", India Edition, 1st Edition, McGraw-Hill Education Private Limited, 2013
4. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw-Hill Education, 2012
5. Christopher M Bishop, "Pattern Recognition and Machine Learning", Spring 2011 Edition.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAP301-MOBILE APPLICATION DEVELOPMENT LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. Know the components and structure of mobile application development frameworks like Android /windows/ios.
2. Understand how to work with various mobile application developmentframeworks.
3. Learn the basic and important design concepts and issues of development of mobile applications.
4. Understand the capabilities and limitations of mobiledevices.
5. Write applications for the platforms used, simulate them, and test them on the mobile hardware where possible.

LIST OF EXPERIMENTS

1. Develop an application that uses LayoutManagers.
2. Develop an application that uses eventlisteners.
3. Develop an application that uses Adapters,Toast.
4. Develop an application that makes use ofdatabase.
5. Develop an application that makes use of RSSFeed.
6. Implement an application that implements Multi-threading.
7. Develop a native application that uses GPS locationinformation.
8. Implement an application that writes data to the SDcard.
9. Implement an application that creates an alert upon receiving amessage.
10. Develop a gameapplication.

Total Instructional hours: 60

Course Outcomes:

Upon Completion of the course, the students will be able to: **CO1:** Install and configure Android application development tools. **CO2:** Design and develop user Interfaces for the Androidplatform.
CO3: Apply Java programming concepts to Android application development. **CO4:** Familiar with technology and business trends impacting mobile applications. **CO5:** competent with the characterization and architecture of mobile applications

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAP302 - OPEN LABORATORY	T	P	TU	C
		0	4	0	2

Note: Students can do either projects or paper presentation on the following list of domain. Periodic evaluation should be done.

LIST OF DOMAINS:
1. Animation
2. Bio-informatics DB
3. Artificial Intelligent
4. Web GIS
5. Image Processing
6. Machine Learning

SUGGESTED SOFTWARE:
1. 3ds Max (Autodesk),After Effects (Adobe),Animate (Adobe)
2. ArrayExpress,BLAST,Biopython
3. Amazon Web Services, AI-one, OpenNN
4. Esri ArcGIS, Google Earth Pro, ArcGIS Online
5. OpenCV, ImageJ, Photoshop(Adobe)
6. pandas, matplotlib, Tableau

Total Instructional hours: 60

BoS Chairman
Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAP304 - RESEARCH METHODOLOGY	T	P	TU	C
		0	2	0	1

Course Objectives:
The course should enable the students to:
1. Identify an appropriate research problem in their interesting domain.
2. Understand ethical issues; understand the Preparation of a research project thesis report.
3. Understand the Preparation of a research project thesis report

UNIT I RESEARCH METHODOLOGY   9
Research Methodology – An Introduction, Objectives, Types of research, Research approaches, Significance, Research methods versus Methodology, Research and Scientific method, Importance, Research process, Criteria, Problems encountered by researchers.

UNIT II DEFINING THE RESEARCH PROBLEM   9
Research problem, Selecting the problem, Necessity, Technique involved, An illustration. Reviewing the Literature – The place of the literature review in research, How to review the Literature, Writing about the literature reviewed.

UNIT III RESEARCH DESIGN   9
Research Design – Meaning, Need, Features, Different research design, Basic principles of experimental designs, Important experimental designs. Measurement & Scaling techniques – Sampling Design, Measurement in research, Measurement scales, Error, Measurement tools, Scaling, Meaning, Scale classification, Scale construction techniques Data Collection – Collection of primary data, Collection of secondary data, Selection of appropriate method for data collection.

UNIT IV RESEARCH TECHNIQUE   9
Testing of Hypothesis – Basic concepts, Procedure, Test of Hypothesis, Important parametric Tests, Hypothesis Testing unifications. Interpretation & Report writing – Meaning, techniques, Precaution in Interpretation, Significance of Report writing, steps, Layout, types, mechanics, precautions.

UNIT V RESEARCH TOOLS   9
Use of Encyclopedias, Research Guides, Handbook, Academic Databases for Computer Science Discipline, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism

Total Instructional hours: 45

Course Outcomes:
On completion of the course the student would be able to :
CO1: Understand the research problem and Literature review.
CO2: Understand the various research designs and their characteristics.
CO3: Prepare a well-structured research paper and scientific presentations.

Reference Books:

1. Research Methodology: Methods and Techniques by C.R.Kothari, GauravGarg, New Age International 4th Edition 2018
2. Research Methodology a step-by-step guide for beginners by Ranjit Kumar, SAGE publications Ltd 3rd Edition 2011
3. Stuart Melville and Wayne Goddard, "Research Methodology: An Introduction for Science & engineering students.Juta and Co., Limited, 1996, First edition
4. Research methods: The concise knowledge base-Trochim, Atomic Dog publishing, First edition,2005..
    5. John W. Best & James V. Khan, "Research in Education", Pearson 8thEdition year

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

PROFESSIONAL ELECTIVES (PE)
Semester – II
Elective – I

M.C.A	M20CAE301-MOBILE COMPUTING	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.
2. To have an exposure about wireless protocols -WLN, Bluetooth, WAP.
3. To Know the Network, Data management Functionalities of Mobile computing.
4. To impart knowledge about Transaction Processing in Mobile Computing
5. To impart the knowledge about basic Routing protocols and its components

UNIT I   WIRELESS COMMUNICATION FUNDAMENTALS, ARCHITECTURE   9
Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

UNIT II   WIRELESS NETWORKS   9
Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

UNIT III   DATA MANAGEMENT   9
Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

UNIT IV   TRANSACTION PROCESSING   9
Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment. Ad Hoc networks, localization, MAC issues,

UNIT V   ROUTING PROTOCOLS   9
Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Total Instructional hours: 45

Course Outcomes:
CO1: Gain the knowledge about various types of Wireless Data Networks and Voice Networks.
CO2:understand the architectures, the challenges and the Solutions of Wireless Communication
CO3: Realize the role of Wireless Protocols in shaping the future Internet.
CO4: Able to understand the Transaction Processing in Mobile Computing

Reference Books:
1. Barry A. Burd ,'Android Application Development For Dummies All in One", Wiley, 2015.
2. Raj Kamal "Mobile Computing" Oxford Higher Education, Second Edition, 2012.
3. Jochen Schillar "Mobile Communications" Pearson Education second Edition.
4. MaritnSauter, —From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadbandll, John Wiley and Sons, 2011 .
5. Jerome(J.F) DiMarzio "Android A programmer's Guide" Tata McGraw-Hill 2010 Edition.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAE302 - CLOUD COMPUTING	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To introduce the broad perceptive of cloud architecture and model
2. To understand the concept of Virtualization and design of cloud Services
3. To be familiar with the lead players in cloud.
4. To understand the features of cloud simulator
5. To apply different cloud programming model as per need.
6. To learn to design the trusted cloud Computing system

UNIT I   CLOUD ARCHITECTURE AND MODEL   9

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

UNIT II   VIRTUALIZATION   9

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation

UNIT III   CLOUD INFRASTRUCTURE AND IoT   9

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources-Enabling Technologies for the Internet of Things – Innovative Applications of the Internet of Things.

UNIT IV   PROGRAMMING MODEL   9

Parallel and Distributed Programming Paradigms – MapReduce, Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

UNIT V   SECURITY IN THE CLOUD   9

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – DataSecurity – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security

Total Instructional hours: 45

Course Outcomes:
CO1: Compare the strengths and limitations of cloud computing
CO2: Identify the architecture, infrastructure and delivery models of cloud computing
CO3: Apply suitable virtualization concept.
CO4: Choose the appropriate cloud player, Programming Models and approach.
CO5: Address the core issues of cloud computing such as security, privacy and interoperability.
CO6: Design Cloud Services and Set a private cloud

Reference Books:
1. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, 'Mastering Cloud Computing", TMGH,2013
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

ParallelProcessing to the Internet of Things", Morgan Kaufmann Publishers, 2012
3.   . Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011
4.   Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010
5.   Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAE303 - HUMAN RESOURCE MANAGEMENT	T	P	TU	C
		3	0	0	3

Course Objectives:
1. To understand the importance of human resources.
2. To describe the steps involved in the human resource planning process
3. To understand the stages of employee socialization and training needs.
4. To know about the purposes of performance management systems and appraisal.
5. To know the list of occupational safety and health administration enforcement priorities

UNIT I   UNDERSTANDING HRM WITH LEGAL & ETHICAL CONTEXT   9
Introduction- Importance of HRM – functions – Structure of HRM Department-Trends and opportunities – External Influences Affect HRM- HRM in global environment – The Changing World of Technology-HR & Corporate Ethics – Equal Employment Opportunities -Laws Affecting discriminatory practices – Enforcing Equal Opportunity Employment-Discipline & Employee Rights.

UNIT II   STAFFING, RECRUITING AND FOUNDATIONS OF SELECTION   9
Introduction – An Organizational Framework- Job analysis -Methods -Purpose– Recruiting Goals – Recruiting Sources – Recruiting A Global Perspective- Selection Process – Selection from Global Perspective- job offers – Avoiding hiring mistakes - key element for successful predictors.

UNIT III   TRAINING AND DEVELOPMENT   9
Introduction – Socialization Process-Purpose of New employee orientation, Employee training-Employee Development– Organization development Calm Waters Metaphor – White-Water Rapids Metaphor – Evaluating training and Development Effectiveness- international training and development issues – Career Development -Value for organization and individual – mentoring and coaching – traditional career stages.

UNIT IV   PERFORMANCE EVALUATION, REWARDS AND BENEFITS   9
Appraisal process – methods – factors distort appraisal – team appraisal – international appraisal – rewards –Theories of motivation - compensation administration – job evaluation and pay structure – special cases of compensation – executive compensation programs – employee benefits Voluntary Benefits- International Compensation.

UNIT V   SAFE AND HEALTHY WORK ENVIRONMENT   9
Occupational safety and health act -Contemporary Health and Safety Issues –Employee assistance program – International Safety & Health -labor management - employee unions – labor legislation-Unionizing Employees- Collective Bargaining.

Total Instructional hours: 45

Course Outcomes:
CO1:Identify the primary external influences affecting HRM.
CO2:Outline the components and the goals of staffing, training and development.
CO3:Understand the selection procedure in various organizations.
CO4:Understand the practices used to retain the employees and able to evaluate their
CO5:performance. Able to identify the stress and the cause of burn out

Reference Books:
1. Taxmann Publications Pvt. Ltd.; 2nd edition (18 August 2020); Taxmann Publications Pvt. Ltd.
2. Vibrant Publishers; First edition (1 January 2020); Vibrant Publishers
3. BijuVarkkey, IIM Ahmedabad. Pearson; Fifteenth edition (26 December 2017)
4. Decenzo and Robbins, Human Resource Management, Wilsey, 10th edition, 2010
5. Ivancevich, Human Resource Management, McGraw Hill 2002.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.

M.C.A	M20CAE304 - ARTIFICIAL INTELLIGENCE	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To familiarize with the principles of Artificial intelligence like problem solving, inference, perception, knowledge representation, and learning.
2. To understand the various characteristics of Intelligent agents
3. To design and implement the machine learning techniques for real world problems
4. To gain experience in doing research using Artificial intelligence and Machinelearning techniques.

UNIT I   INTELLIGENT AGENTS ANDKNOWLEDGE REPRESENTATION   9

Foundation of AI-History of AI-State of Art.-Intelligent Agents: Agents and Environments – Good Behavior: The Concepts of Rationality – The Nature of Environments – The Structure of Agents – Knowledge Representation – Object Oriented Approach – Semantic Nets – Frames – Semantic Web – Ontology.

UNITII   SEARCH   TECHNIQUES   9

Problem Solving by Search – Uninformed Search – Searching with Costs – Informed State Space Search – Heuristic Search – Problem Reduction Search – Game Search – Constraint Satisfaction Problems.

UNITIII   REASONING WITH LOWERORDER LOGICS   9
Logical Agents: Knowledge Based Agents-Logic-Propositional Logic-Propositional Theorem Proving-Model Checking-Agent based on Propositional Logic. First-Order Logic: Syntax and Semantics- Using First-Order Logic-Knowledge Engineering. Inference in First-Order Logic: Prepositional Vs. First-Order Inference-Unification and Lifting-Forward Chaining-Backward Chaining – Resolution.

UNITIV   ARTIFICIAL INTELLIGENCEPLANNING   9

Classical Planning – Partial Order Planning – Graph Plan and SAT Plan – Hierarchical Planning – Planning and Acting in Nondeterministic Domains – Multi Agent Planning.

UNITV   LEARNINGTECHNIQUES   9

Logical Formulation of Learning – Knowledge in Learning – Explanation-Based Learning - Learning using Relevance Information – Inductive Logic Programming – Statistical Learning – Learning with Complete Data – Learning with Hidden Data –Applications.

Total Instructional hours: 45

Course Outcomes:
On completion of the course, the students will be able to:
CO1: Understand the search techniques.
CO2: Apply the search techniques to real-time problems. **CO3:** Apply the reasoning techniques to real world problems. **CO4:** Understand the representation of knowledge.
CO5: Understand the learning techniques.
CO6: Apply AI techniques in developing real world applications.

BoS Chairman

Reference Books:
1. Stuart J. Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Third Edition, Pearson Publishers,2015.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw-Hill Education, 2008.
3. DheepakKhemani, "A first course in Artificial Intelligence", McGraw-Hill Education,2013.
4. NPTEL, "Artificial Intelligence",http://nptel.ac.in/courses/106105079.

5. Sebastian Thrun, Peter Norvig, Udacity: "Introduction to Artificial Intelligence", https://in.udacity.com/course/intro–to–artificial–intelligence –cs271.

BoS Chairman

Head of the Department,
Department of Computer Applications,
Kalaignar Karunanidhi Institute of Technology,
Coimbatore - 641 402.