UNIVERSITY OF CALICUT

Abstract

General & Academic Branch - Faculty of Engineering- Regulations, Scheme and Syllabus for MCA (CBCSS) programme with effect from 2020 Admission- Implemented subject to ratification by Academic Council- Orders issued.

G & A - IV - E

U.O.No. 1489/2021/Admn Dated, Calicut University.P.O, 04.02.2021

Read:-1 Letter No 97987/CCSIT-CUC-ASST-1 /2020/Admn dated: 01.07.2020 from, Chief Co-ordinator, CCSIT-CUC

2 Item No 1 of the minutes of the meeting of the meeting of BoS Engineering (PG),held on 03.09.2020

3 Item No 8 of the minutes of the meeting of the Faculty of Engineering held on 8/9/2020

4 Minutes of the meeting of the Academic council held on 01/10/2020

5 E-mail from the Dean, Faculty of Engineering, dated 31/01/2021

6 Order of the Vice Chancellor in file of even number, dated 02/02/2021

ORDER

1. The Chief Co-ordinator, CCSIT-CUC had requested, vide paper read (1) above, for the closure of the MCA Lateral Entry programme and introduction of two year MCA programme from 2020 Admission onwards, in accordance with the latest AICTE Handbook 2020-21.
2. Vide ref. read (2) above, the online meeting of the Board of Studies in Engineering (PG) held on 03.09.2020 decided to entrust the Chairman, BoS to finalise the regulation and syllabus of 2 year MCA programme in this academic year after incorporating the suggestions made by the members in the meeting and submit it to the University for further necessary process .
3. This was approved by the Faculty of Engineering held on 8/9/2020 (Item No 8) and the Academic council held on 01/10/2020, vide ref. read (3) and (4) respectively.
4. The Chairman BoS in Engineering (PG) forwarded the Draft Regulations, Scheme and Syllabus for Degree of MCA (CBCSS) programme, with effect from 2020 Admission and the same has been approved by the Dean Faculty of Engineering, vide paper read (5),
5. Considering the urgency of commencement of the programme, the Vice chancellor has accorded sanction, vide paper read (6), to implement the Regulation, Scheme and Syllabus of the 2 year MCA programme w.e.f 2020 admission onwards, subject to ratification by the Academic council.
6. Orders are issued accordingly.

Arsad M

Assistant Registrar

To

1. The Controller of Examinations
2. All Colleges/University Centres with MCA Programme.

Copy to: PS to VC/PA to PVC/PA to Registrar/PA to CE/JCE-VII/PID A/KSAD

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

Regulations, Scheme and Syllabus for Degree of

MASTER OF COMPUTER APPLICATIONS
(CHOICE BASED CREDIT AND SEMESTER SYSTEM)

(With effect from 2020 Admission)

UNDER THE

FACULTY OF ENGINEERING

REGULATIONS FOR THE DEGREE OF

MASTER OF COMPUTER APPLICATIONS

EFFECTIVE FROM THE ACADEMIC YEAR 2020 – 21

1. PROGRAMME DURATION

Duration of the MCA Programme shall be 2 years spread over 4 semesters. Each semester shall have at least 18 weeks. The maximum duration permissible for completing the programme is fixed as 4 years.

2. SELECTION AND ELIGIBILITY FOR ADMISSION

Candidates for admission to the MCA degree course shall be required to have passed a Bachelor's Degree in any discipline of three-year duration with Mathematics (this does not include Business Mathematics or Business Statistics) as one of the subjects or BCA under University of Calicut or any other University/ Institution, recognized by this University as equivalent thereto with at least 50% marks or equivalent grade. 5% of relaxation in the marks will be allowed in the case of Candidates, belonging to socially and educationally backward classes. Candidates belonging to scheduled caste and scheduled tribe need only a pass in the qualifying examination. Candidates have to qualify the University Level Entrance examination conducted by the University of Calicut. They shall also satisfy the conditions regarding age and physical fitness as prescribed by the University of Calicut. Criteria for selection and method of admission to seats for MCA degree courses conducted by university Centres /Colleges affiliated to University of Calicut shall be governed by the rules/regulations framed by the University. In all matters related to selection and admission, the decisions of the University shall be final.

3. PROGRAMME STRUCTURE

3.1 Subjects of Study

The subjects of study, both theory, practical and project, shall be in accordance with the prescribed scheme and syllabi.

3.2 Attendance

A candidate shall be permitted to appear for the end-semester examinations only if he/she satisfies the following requirements:

a. He/she maintains not less than 80% attendance in the total number of working hours in each semester, all subjects of study in the semester put together.
b. His/her conduct and Progress must be satisfactory.

It shall be open to the Vice Chancellor to grant condonation of shortage of attendance up to 10% on the recommendation of the Head of the institution in accordance with the following norms. Shortage shall not be condoned more than twice during the entire programme.
Candidate who is not eligible for condonation of shortage of attendance shall repeat the semester.

3.2.1 Duty Leave

Students are eligible for duty leave if they perform certain kinds of duties like representing the college in sports and games, etc. On recommendation from concerned faculty members, Head of Institution/Head of MCA Department shall sanction duty leave for the period of absence. The maximum limit of duty leave that can be granted to a student during a semester is 10% of the number of working hours in that semester.

Application for duty leave should be submitted to the Head of the Institution/Head of MCA Department preferably before the duty is performed or within ten working days after returning from duty. If duty leave is sanctioned, the student shall meet the faculty members handling classes for him/her in that semester (within 2 weeks after returning from duty) and request them to mark duty leave granted in the record of attendance.

3.2.2. Registration for each Semester

Every candidate should register for all subjects of the end-semester examinations of each semester. A candidate who does not register will not be permitted to attend the end-semester examinations; he/she shall not be permitted to attend the next semester.

A candidate shall be eligible to register for any higher semester, if he/she has satisfactorily completed the course of study and registered for the examination of the immediate previous semester. He/she should register for the semester at the start of the semester before the stipulated date. University will notify the starting and closing dates for each semester.

3.3. Credit System

Each subject shall have a certain number of credits assigned to it depending upon the academic load and the nature and importance of the subject. The credit associated with each subject will be shown in the prescribed scheme and syllabi. Each course shall have an integer number of credits, which reflects its weightage.

3.4. Grading

The university shall award the letter grade to students based on the marks secured by them in both internal assessment and end-semester examinations taken together in the subjects registered. Each letter grade indicates a qualitative assessment of the student's performance and is associated with a specified number of grade points. The grading system along with the grade points for each grade, applicable to passed candidates is shown below. All passed candidate will be allotted a grade S, A, B, C or D according to the total marks scored by him/her.

Details of Grading Scheme

Range of % of Marks	Grade Points	Letter Grade
90-100	10	S
80-89	9	A
70-79	8	B
60-69	7	C
50-59	6	D
0-49	0	U

If a candidate does not pass a subject as per the conditions given in Section (3.7), he/she will be assigned an Unsatisfactory grade 'U' irrespective of his/her total marks. If a student does not pass a subject in two attempts, the maximum grade he/she can get is 'D' when he/she passes the subject in any subsequent examination, whatever be the marks scored by him/her.

A student is considered to have completed a subject successfully and earned the credits if he/she secures a letter grade other than 'U' in that course. Letter grade 'U' has zero grade point and the candidate has to write the examination again to improve the grade. A student's performance is measured by the number of credits that he/she has earned and by the cumulative grade point average (CGPA) maintained by him/her.10. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA).

a) A Semester Grade Point Average (SGPA) shall be computed for all the students for each semester, as follows:

$$SGPA = \frac{(C_1 G_1 + C_2 G_2 + C_3 G_3 + \cdots\cdots\cdots + C_n G_n)}{(C_1 + C_2 + C_3 + + C_n)}$$

where, n is the number of subjects registered during the semester, C_i is the number of credits allotted to i^{th}subject as per the scheme, and G_i is the grade points corresponding to the grade awarded to the student for the subject.

b) A Cumulative Grade Point Average (CGPA) shall be computed for all the students at the end of each semester by taking into consideration their performance in the present and the past semesters as follows:

$$CGPA = \frac{(C_1 G_1 + C_2 G_2 + C_3 G_3 + \text{-------} + C_m G_m)}{(C_1 + C_2 + C_3 + \text{----------} + C_m)}$$

Where m is the number of courses registered up to that semester, Ci is the number of credits allotted to i^{th}subject as per the scheme, and Gi is the grade points corresponding to the grade awarded to the student for the subject. An up-to-date assessment of overall performance of a student is obtained by calculating CGPA. CGPA is weighted average of the grade points obtained in all the subjects registered by the students since he entered the MCA programme.

c) Both the SGPA and CGPA shall be rounded off to the second place of decimal and recorded as such for ease of presentation. Whenever the CGPAs are to be used for the purpose of determining the merit ranking in a group of students, only the rounded off value shall be made use of.

3.5. Electives

All students shall choose three elective subjects, one in the second and two in the third semesters from a set of elective subjects prescribed in the syllabus and offered by the institution. There should be at least 25% students of the class for an elective subject to be offered. However, any student having a CGPA of not less than 7.0 shall be permitted to select an elective of his/her choice and register under a faculty, subject to the permission from the faculty and Head of Department. The student will have to study this subject on his own (self-study mode) or the classes of this subject shall be taken during off-hours.

New electives may be introduced according to the needs of emerging fields in technology. The name of the elective and its syllabus should be approved by the university before the subject is offered as an elective.

3.6. Pattern of Questions for End-Semester Examinations of Theory Subjects

The question papers of end-semester examinations of theory subjects shall be able to perform achievement testing of the students in an effective manner. The question paper shall be prepared in accordance with the following guidelines:

a. Should contain seven full questions of 20 marks each
b. Each question should have minimum two subdivisions
c. At least one question from each module and not more than two questions from any module
d. Covering all sections of the course syllabus
e. Unambiguous and free from any defects/errors
f. Emphasizing knowledge testing, problem solving &quantitative methods
g. Containing adequate data/other information on the problems assigned
h. Having clear and complete instructions to the candidates.
i. Duration of end-semester examinations will be 3 hours and the maximum mark is100.

3.7. Minimum for Pass

A candidate who secures not less than 40% marks in a subject at the end-semester examinations and not less than 50% (75 marks out of 150) of the total marks assigned to the subject, shall be declared to have passed the examination in that subject. The total marks assigned to a subject in the above calculations are the sum of maximum marks assigned to the end-semester examination (ie, 100 marks) and maximum internal assessment marks of that subject (ie, 50 marks). Candidates will be assigned grades according to the marks scored.

3.7.1. Term Paper, Project Evaluation and Viva Voce

For Term Paper (2nd semester) and Project and Viva Voce (in 4thsemester), the minimum for a pass shall be 50% of the total marks assigned to the respective examinations. A student who does not secure this pass marks in a subject will have to repeat the respective subject. If a candidate has passed all examinations of MCA Programme (at the time of publication of results of fourth semester) except project and Viva-Voce in the fourth semester, a re-examination for the Project and Viva-Voce should be conducted within one month after the publication of results. Each candidate should apply for this "Save a Semester" examination within one week after the publication of fourth semester results.

3.8. Assessment of Students

Assessment of students for each subject will be done by internal continuous assessment and end semester examinations. Internal assessment shall be conducted throughout the semester. It shall be based on internal examinations, assignments (such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.) as decided by the faculty handling the course, and other measures like regularity in the class. Assignments of every semester shall preferably be submitted in Assignment Book, which is a bound book similar to laboratory record. Course plan for each subject should be prepared by conducting a meeting at the University, inviting all the faculty members handling the subject, before each subject in the new scheme commences for the first time. This is to facilitate uniformity in the teaching and evaluation process.

End-semester examinations of theory subjects will be conducted by the University and those of all practical subjects will be conducted at institution level. Failed candidates will have to appear for the end- semester examinations along with regular students. However, end-semester examinations of each semester will be conducted once in every semester. Head of institution should take necessary steps to prevent any malpractices in the end-semester examinations. If any such instances are detected, they should be reported to the University without any delay.

Internal assessment marks of each theory and practical subject should have a class average limited to 90%. If the class average of internal assessment marks of any subject is greater than 90%, normalization procedure should be applied to limit it to 90%. If the class average is not greater than 90%, absolute marks should be given. Internal assessment marks of theory and practical subjects, both absolute and normalized, should be published in the college 10 days before sending it to the University so as to enable the students to report any corrections.

(a) Assessment in Theory Subjects

The marks allotted for internal continuous assessment and end-semester university examinations shall be 50 marks and 100 marks respectively with a maximum of 150 marks for each theory subject. The weightage to award internal continuous assessment marks should be as follows:

Sl. No	Components for Continuous Assessment	Marks (Max. Mark-50)
1	Test Paper (Average of minimum two test papers)	30
2	Assignments/Seminar/ GD/Quiz/Home work/ Problem Solving/ literature Survey/ Software Exercises	15
3	Regularity	5

Assignments (minimum two) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises etc.

Full credit for regularity in the class can be given only if the candidate has secured minimum 90% attendance in the subject. Award of marks for attendance should be as follows:

Percentage of Attendance	Marks
90 and above	5
85 to 89.9	4
80 to 84.9	3
75 to 79.9	2
Below 75	1

(b) Assessment in Practical Subjects

Practical examinations and Term Paper can be conducted internally with internal continuous assessment with 50 marks. Head of the institution/Department shall appoint two examiners for each practical subject in order to conduct end-semester examinations for practical subjects. These examiners should necessarily have minimum two years teaching experience at MCA degree level. It will be the responsibility of Head of Institution/Department to appoint only qualified examiners having prescribed teaching experience and to maintain standard of practical classes and examinations. Award of marks in the practical subjects should be as follows:

Internal Assessment for Practical Exam	Max. Marks (50)
Regularity	10
Evaluation in the lab and Rough Record	10
End-semester Test	15
Viva	5
Fair Record	10

No candidate will be permitted to attend the end-semester test unless he/she produces certified record of the laboratory.

(c) Assessment in Mini Project

A mini-project should be done in the 3rd Semester by the students based on concepts they have already learnt in the previous semesters of the MCA Programme.

Objectives of the mini project:

Working on Mini project is to get used to the larger project, which will be handled in the 4th Semester. The project work constitutes an important component of the MCA programme of the University and it is to be carried out with due care and should be executed with seriousness by the students. The objective of this mini project is to help the student develop the ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

Guidelines:

Students are expected to devote about 1-2 months in planning, analyzing, designing and implementing the project. The initiation of project should be with the project proposal that is to be treated as an assignment.

Mini-project evaluation:

The evaluation of the mini-project will be based on the project reports submitted by the student, a presentation and a demonstration.

Components for Project Evaluation (Internal examiner)	Max. Marks
First evaluation	15
Second Evaluation	15
Report	10
Viva Voce	10
Total Marks	**50**

(d) Project Evaluation and VivaVoce.

The student is expected to work on a chosen topic, under the guidance of a supervisor approved by the department, for a period of four full months. The evaluation of project and viva voce will be conducted at the end with 350 marks with the following distribution:

Components for Project Evaluation	Max. Marks
First evaluation after one month of commencement of Project(Internal examiner will evaluate this)	100
Second Evaluation before completion of Project (Internal examiner will evaluate this)	100
Thesis Evaluation and Viva Voce (External Examiner will evaluate this)	125
Viva Voce (Internal Examiner)	25
Total Marks	**350**

An Evaluation Committee consisting of two faculty members appointed by the University will evaluate the project. Guide will be the Internal Examiner.

3.9. Improvement

Candidates shall not be allowed to improve the grade already obtained. However, cancellation and reappearance will be permitted. Revaluation for each paper is also permitted.

4. EXAMINATION MONITORING CELL

Head of each institution/Department should formulate an Examination Monitoring Cell at the department level for supervising all examinations, especially the internal examinations. This cell, with a senior staff member as Convener, shall consist of minimum three members (one shall be a lady). A clerical staff having computer skills shall also be assigned for the examination monitoring cell. The collective responsibilities of the examination monitoring cell are:

a. Schedule all end-semester practical examinations as per the programme calendar
b. Officiate as the examination squad to keep a vigil on all end-semester examinations. If any malpractices are found /reported by invigilators, inform these to the Head of Institution along with a report about the incident. Head of Institution shall forward all such complaints to the University.
c. Schedule all examinations conducted as part of internal assessment of students.
d. To receive any complaint from students regarding issues like out-of-syllabus questions, printing mistakes, etc. of end-semester examinations of theory and practical subjects. The cell shall investigate these complaints and if necessary forward it to university with specific comments.
e. To receive any complaints from students regarding internal examinations, inquire such incidents, and give a report to the Head of Institution/Department for necessary action.
f. In general, to function as an extended wing of the office of the Controller of Examinations of the University, at institution level.

To conduct all the theory examinations, a Chief Superintendent and an Assistant Chief Superintendent should be appointed by the Head of Institution. At least two external Additional Chief Superintendents should also be appointed by the University as Observers for conducting theory examinations in all affiliated Institutions.

5. CLASS COMMITTEE

Head of institution shall take necessary steps to form a class committee for each class at the start of classes of each semester. This class committee shall be in existence for the concerned semester. The class committee shall consist of the Head of Department, Staff Advisor of the class, a senior faculty member of the department, and three student representatives (one of them should be a girl). There should be at least two meetings of the class committee every semester; it shall be the responsibility of the Head of Department to convene these meetings. The decisions of the Class Committee shall be recorded in a register for further reference. Each class committee will communicate its recommendations to the Head of Institution. The responsibilities of the class committee are:

a) To review periodically the progress and conduct of students in the class.

b) To discuss any problems concerning any subjects in the concerned semester.

c) To identify weaker students of the class and suggest remedial measures.

d) Discuss any other issue related to the students of the class.

6. ELIGIBILITY FOR THE DEGREE

No candidate shall be eligible for the MCA degree unless he/she has undergone the prescribed course of study for a period of not less than two academic years in an institution affiliated to the University of Calicut and has passed all subjects as per the prescribed syllabus.

7. PROCEDURE FOR COMPLETING THE COURSE

a. A candidate shall be required to complete the course and pass all the examinations with in a period of 4 years after joining the course.

b. A candidate shall not be allowed to improve the marks already obtained.

c. However, cancellation and reappearance along with the regular examination will be permitted.

8. CLASSIFICATION OF SUCCESSFULCANDIDATES

a. A candidate who qualifies for the degree, passing all the subjects of the four semesters, in 2 academic years after the commencement of this course of study and secures not less than a CGPA of 8.00 of all the semesters shall be declared to have passed the MCA degree examination in **Distinction**.

b. A candidate who qualifies for the degree, passing all the subjects of the four semesters within 2 academic years after the commencement of his course of study and secures not less than a CGPA of 6.5 of all the semesters shall be declared to have passed the MCA degree examination in **First Class.**

c. All other candidates who qualify for the degree passing all the subjects of the four semesters and not covered as per Sections 8 (a) and (b) and CGPA not less than 6.5 shall be declared to have passed the MCA examination in **Second class**.

9. GRIEVANCE CELL

Each college should setup a Grievance Cell with at least four faculty members to look into grievances of the students, if any.

10. ANTI-RAGGING CELL

Head of Institution shall take necessary steps to constitute anti-ragging committee and squad at the commencement of each academic year. The committee and the squad shall take effective steps as specified by the Honorable Supreme Court of India, to prevent ragging.

11. COLLEGE TRANSFER

A candidate shall not be eligible for college transfer and inter university transfer (Not withstanding all that has been stated above, the University has right to modify any of the above regulations from time to time as per University rules.)

12. BRIDGE PROGRAMME

12.1 Introduction

The students who have taken admission to the Programme with B.Sc./ B.Com/B.A with Mathematics at 10 + 2 Level or at Graduation Level recognized by the University of Calicut, excluding those who possess BSc Degree with Computer Science/Computer Applications as Complementary/Subsidiary, BCA/ Bachelor Degree in Computer Science/Computer Application/Engineering or equivalent degree have to undergo an additional *Bridge Programme* as per the norms of the Calicut University.

The *Bridge Programme* comprises of 40 hours teaching and learning activities. It consists of two theory papers. This course shall be conducted during the first semester of the MCA programme without affecting the actual work load of the semester. The course shall be offered in the department/college at which the candidates enroll for the MCA program. The mode of conduct of the *Bridge Programme* is completely under the strict control of the Department/College at which the MCA program is offered. Total forty (40) hours of teaching and learning activities shall be completed before the notification of Ist semester examination by the University. The Department/College has to complete the *Bridge Programme* by conducting classes and evaluation of the students before the commencement of the Ist semester MCA examination by the University. All those students who successfully complete the *Bridge Programme* shall be given completion certificate by the Department/College.

12.2 Conduct of classes

Department/College council shall schedule regular classes and complete the forty (40) hours programme before the Ist semester MCA end semester examination notification by the University. The classes shall be conducted either in the weekend mode or regular working day without affecting the actual regular teaching and learning activities of the Ist semester MCA curriculum.

12.3 Duration of the programme

The *Bridge Programme* shall comprise of two (02) theory papers. Candidate has to appear examinations for all the papers at the end of the program conducted by the Department/College at which candidate has registered for the MCA programme. The details of subjects and corresponding examination details are mentioned in the curriculum.

12.4 Conduct of examination

At the end of the course, Department/ College has to conduct the examinations on each theory paper with two (02) hours duration and complete the evaluation process of all those papers within two (02) weeks. The pattern of question papers and evaluation criteria for passing examinations are specified in the regulation.

12.5 Pattern of question paper for theory papers

Sl.	Question Type	Number Of Questions	No. Of Questions to be answered	Marks/ question	Max. Marks
5	Essay	7	5	5 × 10= 50	50

12.6 Question Paper preparation

The faculty in-charge of each course shall prepare three (03) unique set of question papers on the subject she/he taught. Faculty should give utmost care in preparing the question paper. After preparing the question paper, faculty-in-charge shall submit these question papers to the Head of the Department in sealed cover. The Head of the Department shall then constitute question paper scrutiny committee comprising of the Head of the Department and two more senior faculty members other than faculty-in charge of any course in *Bridge Programme* for scrutinizing the question papers submitted by the faculty-in-charge and finalize the question papers for the examinations.

12.7 Paper evaluation

The Head of the Department shall constitute a Board of Examiners (BoE) by including all the faculties in the Department (minimum three faculties) with the Head of the Department as the chairman. The BoE prepare the scheme and criteria for the evaluation of the answer books of the students in the Bridge course and the evaluation shall be completed within two weeks after the examinations of the *Bridge Programme*. Only single valuation is enough.

12.8 Finalizing the results of Bridge programme

The BoE shall conduct a pass board meeting soon after completing the evaluation of the answer books and related tabulation works. The students who receive (40%) marks in each subject shall be placed as successful completion of the programme. All the documents including the tabulation registers regarding the conduct of the examinations shall be kept in the Department and the same shall be produced to the University as and when needed/requested. The entire successful students list shall be forwarded to the University soon after publishing the results.

12.9 Supplementary chance

A candidate who fails to secure minimum marks (40%) for a pass in a course will be permitted to write the same examination one more time after three months of the completion of the first attempt. The students who do not complete the *Bridge Programme* within one year shall not be registered for IInd semester MCA end semester examination conducted by the University and no further promotion shall be allowed for subsequent semesters too.

12.10 Scheme and curriculum for Bridge Programme

Subject Code	Subject	Instructional Hour/Week (30 Hours/paper)			Marks	Credit
		L	P	Total		
BR01	Fundamentals of Programming	15	10	25	50	0
BR02	Mathematical Foundations	10	5	15	50	0

BR01 FUNDAMENTALS OF PROGRAMMING

UNIT I

Introduction to Programming:-Algorithms, Problem Solving aspect, Implementation of algorithms – Properties of algorithms, The efficiency of algorithms–Flow chart, Pseudo Code, Programs and Programming Languages-compiler, Interpreter, Loader and Linker, Program execution, Classification of Programming Language.

UNIT II

Features and Evolution of C, Structure of a C Program, Compiling a C Program-C Character sets, identifiers, data types, keywords, statements, variable and constants, tokens, Operators, Storage classes-auto, register, static, extern, I/O Functions. Control statements-Conditional, switch Statements- Loops and Jumping statements - break, continue and goto Statement.

UNIT III

User defined Functions-Advantages, Definition, Accessing functions, formal and Actual Parameters, Recursion, Storage Classes-Automatic, External, Static and Register Variable, Argument Passing Mechanism.
Pointers and data files- Pointers, operations on pointers, dynamic memory allocation. Data files (sequential), file handling functions (fopen (), fclose (), fputc (), fgetc (), fgets (0, fputs (), fscanf (), fprintf ().

UNIT IV

Introduction of data structures: Space and Time complexity, Asymptotic Notations (Big O, Omega, Theta), Arrays: Definition, Operations-Linear Data Structures :Stack - Definition, Operations, Queues– Definition ,Operations, Types of queues (Circular queue, Priority queue and double ended queue) ,Linked list – Definition , Types of lists (Singly, Doubly and Circular linked list).

UNIT V

Nonlinear Data Structures: trees- definition, binary trees- definition, various operations, Expression tree, Binary Search Trees, Introduction to AVL trees.
Graphs: Definition, operations, Traversals of graph, Hashing-Different hashing techniques, Sorting Techniques-Bubble Sort, insertion sort, Merge Sort, Heap Sort, Selection Sort, searching Techniques-Linear Search, Binary search.

References:

1. Balagurusamy, Programming in ANSI C, 5thedn, TMH.
2. Programming in C by C. Karthikeyan.
3. Programming with C - Schaum Series.
4. Richard F Gilberg, BehrousA Forouzan," Data Structure A Pseudocode Approach with C", Cengage Learning ISBN:9788131503140.
5. YedidyahLangsam, Moshe J.Augenstein, AaronM.Tenenbaum, "Data Structuresusing C and C++", Preintice Hall of India
6. Schaum'soutlines, "Data Structure", Seymour LipschutzTMH, SIEdition.

BR02 MATHEMATICAL FOUNDATIONS

UNIT I

Number systems: Decimal numbers, binary numbers, decimal-to-binary conversion-Binary arithmetic-1's and 2's complements-signed numbers- Octal numbers- Hexadecimal Numbers-BCD numbers- Digital codes. Binary digit-Logic Level- Basic logic operators- Basic logic functions.

UNIT II

Boolean Algebra and Logic circuits- fundamental concepts of Boolean Algebra, postulates, Principle of duality, theorems of Boolean Algebra, Boolean functions, minimization, canonicals forms.

UNIT III

Logic Gates- AND, OR, NOT, NAND, NOR, XOR and XNOR, logic circuits, converting expression to logic circuit, universal NAND and NOR gates, Exclusive OR, Design of Combinational circuits (Half Adder, Subtractor and Full Adder)

UNIT IV

Measures of Central Tendency: Mean, Median, Mode. Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Variance, Standard Deviation, Coefficient of Variation.

UNIT V

Matrices and determinants:-matrix, types of matrices, operations on matrices, Determinants-properties of determinants-inverse of a matrix- Rank of a Matrix, Trace of a Matrix. Solving Linear Equations using Matrices.

References:

1. Thomas L Flyod-Digital Fundamentals, Pearson International Edition (9th Edition), Prentice Hall. (I and II Units)
2. Balachandra Rao, C K Shantha – "Numerical Methods – with Programs in BASIC, FORTRAN, Pascal and C++". University Press
3. Babu Ram –"Numerical Methods", Pearson
4. M.K. Jain, S.R.K. Iyengar, R.K. Jain – Numerical Methods (Problems and Solutions), New Age International Publishers

UNIVERSITY OF CALICUT

MASTER OF COMPUTER APPLICATIONS

EFFECTIVE FROM THE ACADEMIC YEAR 2020 – 21

Programme Structure

Semester -I

	Subject Code	Subject Title	Instructional Hrs/week			Marks			Credit
			L	P	T	E.E	C.E	Total	
1	MCA 20 101	Design and Analysis of Algorithms	3	0	1	100	50	150	3
2	MCA 20 102	Programming in JAVA	3	0	1	100	50	150	3
3	MCA 20 103	Discrete Mathematical Structures	3	1	1	100	50	150	3
4	MCA 20 104	Computational Intelligence	3	1	1	100	50	150	4
5	MCA 20 105	Advanced Database Management Systems	3	0	1	100	50	150	3
6	MCA 20 106(P)	Practical 1- JAVA and DBMS	0	5	1	-	50	50	3
Total			**15**	**7**	**6**	**500**	**300**	**800**	**19**

Semester -II

	Subject Code	Subject Title	Instructional Hrs/week			Marks			Credit
			L	P	T	E.E	C.E	Total	
1	MCA 20 201	Computer Architecture	3	1	1	100	50	150	3
2	MCA 20 202	Machine Learning	3	1	1	100	50	150	3
3	MCA 20 203	Web Programming with Python	3	0	1	100	50	150	3
4	MCA 20 204	Software Engineering	3	1	1	100	50	150	4
5	MCA 20 205	Elective I	3	0	1	100	50	150	3
6	MCA 20 206 (P)	Practical II-Python Programming	0	4	1	-	50	50	2
7	MCA 20 207 (T)	Term Paper	0	1	0	-	50	50	1
		Total	**15**	**8**	**6**	**500**	**350**	**850**	**19**

Semester-III

	Subject Code	Subject Title	Instructional Hrs/week			Marks			Credit
			L	P	T	E.E	C.E	Total	
1	MCA 20 301	Computer Graphics	3	1	1	100	50	150	3
2	MCA 20 302	Cryptography and Network Security	3	1	1	100	50	150	3
3	MCA 20 303	Principles of Compilers	3	1	1	100	50	150	3
4	MCA 20 304	Elective II	3	0	1	100	50	150	4
5	MCA 20 305	Elective III	3	0	1	100	50	150	3
6	MCA 20 306(P)	Mini Project	0	5	1	-	50	50	3
		Total	**15**	**8**	**6**	**500**	**300**	**800**	**19**

Semester-IV

	Subject Code	Subject Title	Instructional Hrs/week			Marks			Credit
			L	P	T	E.E	C.E	Total	
1	MCA 20 401	Main Project and Viva Voce	-	25	-	125	225	350	15
		Total		**25**		**125**	**225**	**350**	**15**

List of Electives

Elective I (Semester II)	
MCA 20 205 A	Information Retrieval
MCA 20 205 B	Android Application Programming
MCA 20 205 C	Mobile Computing
MCA 20 205 D	Cloud Computing
MCA 20 205 E	Software Testing and Quality Assurance
Elective II (Semester III)	
MCA 20 304 A	Big Data Technologies
MCA 20 304 B	Digital Image Processing
MCA 20 304 C	Cyber Security
MCA 20 304 D	Operation Research
MCA 20 304 E	Introduction to Soft Computing Techniques
Elective III (Semester III)	
MCA 20 305 A	Internet Of Things
MCA 20 305 B	Advanced JAVA Programming
MCA 20 305 C	Pattern Recognition
MCA 20 305 D	Natural Language Processing
MCA 20 305 E	Bio Informatics
MCA 20 305 F	Wireless Communication

* L- Lecture Hours, P- Practical Hours, T- Tutorial, E.E- External Evaluation, I.E- Internal Evaluation.

SEMESTER-I

MCA 20 101 DESIGN AND ANAYSIS OF AGORITHMS

Objectives

- *Tointroducetheconceptofalgorithmicapproachforsolvingreallifeproblems.*
- *To teach basic principles of computational complexity.*
- *To familiarize the algorithms.*

UNIT I

Algorithm - Introduction, Steps in developing algorithm, Methods of specifying an algorithm, Decisions prior to designing- based on the capabilities of the device, based on the nature of solutions, based on the most suitable data structures. Important Problem Types: Sorting, Searching, String processing, Graph problems, combinatorial problems, Geometric problems and Numerical problems.

UNIT II

Algorithm analysis- Importance of algorithm analysis, Time and Space Complexity. Growth of Functions: Asymptotic notations, Cost estimation based on key operations- Big Oh, Big Omega, Little Oh, Little Omega and Theta notations, Solving Recurrences: Iteration Method, Substitution Method, The Recursion Tree Method, Master's Theorem, Problem solving using Master's Theorem Case 1, Case 2 and Case 3. Analysis of Strassen's algorithm for matrix multiplication, Analysis of Merge sort.

UNIT III

Basic Technique for Designing Algorithms:- Brute Force approach (String matching),Divide - and - conquer approach (merge sort, quick sort), Branch-and-Bound technique (Knapsack problem), Greedy approach (Kruskal's algorithm and Prim's Algorithm),Dynamic programming (Longest Common Subsequence), Backtracking(Sum of subsets problem).

UNIT IV

Complexity- Complexity classes: P, NP, NP Hard, NP Complete problems, Traveling sales man problem, Hamiltonian cycle, P versus NP problem.

UNIT V

Designing and analysis of Parallel Algorithm: Model of computation - PRAM models-EREW,CREW,CREW and CRCW, Analysing parallel algorithms: Cost, Number of processors, Time Complexity, speedup, Efficiency, Scalability, Amdahl's Law, Euler tour technique, Parallel prefix computation, Parallel merging and sorting

References:

1. Thomas H Cormen, Introduction to algorithms, 3rd edition. MIT Press,2009
2. Alfred V. Aho, John E. Hopcroft and Jeffery D Ullman, The Design and Analysis of Computer Algorithm, 1st Edition. AddisonWesley
3. Pallaw, V K, Design and Analysis of Algorithms, Asian Books Private Ltd, 2012, 1st Ed.
4. Sanjay Razdan, Fundamentals of Parallel Computing, NarosaPublishing House, 2014, 1st Ed.
5. Pandey H M, Design and Analysis of Algorithms, University Science Press,2013
6. Upadhyay N, Design and Analysis of Algorithms, SK Kataria&Sons, 2008.

MCA 20 102 PROGRAMMING IN JAVA

Objectives

- *To develop fundamental concepts in java.*
- *To give strong foundation for develop in interest in programming.*

UNIT I

Object oriented fundamentals: Object oriented programming, Encapsulation, Inheritance, Polymorphism. Java Fundamentals: Java features, JVM, Java program structure, keywords, Identifiers, Literals, Operators, Separators, Declaring a variable, Scope and lifetime of variables, Data types, Arrays, Strings.

UNIT II

Operators, Control Structures, Classes: creating objects, methods and classes, Constructors, Method Overloading, Static Classes, Inheritance, Method overriding, final variables, Abstract methods and classes, Packages and Interfaces.

UNIT III

Exception Handling: Exception hierarchy, Try, Catch, Finally, Throw, Throws. Multithreading: Creating threads, Thread life cycle, Thread priority, thread Exceptions, Synchronization.

UNIT IV

I/O streams: java I/O Streams, Filtered Streams, Buffered Streams, Random access file, GUI: Introduction to AWT Programming, Window fundamentals, Container Class, Creating a frame window, Layouts, Event handling, Drawing lines, Arcs, Rectangles, Polygon, Ellipse. Applets: Applets class, Applet life cycle, working with applets.

UNIT V

Database handling using JDBC: JDBC architecture, Steps connecting to JDBC and working with connection interface-drivers, connection, statements, result set. Networking: Networking basics, Inet Address, TCP/IP Client and Server Sockets, URL, Datagrams.

References:

1. Patrick N &SchildtH, Java 2 The Complete Reference, Tata McGraw Hill, 3rdEd.
2. Patrick Naughton, Java Handbook, Tata McGraw Hill, 1stEd.
3. H.M.Dietel&PJDeitelJava:Howtoprogram,PHI,10thE.,2014
4. Jamie Jaworski, Java 2 Platform Unleashed: The comprehensive solution, SAMS Techmedia, 1stEd.

MCA 20 103 DISCRETE MATHEMATICAL STRUCTURES

Objectives

- *To introduce discrete mathematics concepts necessary to understand basic foundation of Computer Science.*
- *Gain knowledge in Boolean algebra.*
- *Acquire knowledge in graph theory.*

UNIT I

Set theory: Sets operations, Types of sets, Principles of inclusion and exclusion. Functions-types, Function composition, Inverse functions. Relations-relations and their properties, functions as relations, closure of relations. Composition of relations, Equivalence relations and partitions.

UNIT II

Mathematical logic: Propositional calculus -Statement connectives, Conditional and Biconditional, Equivalence formula, Well-formed formula, Tautologies, Duality law, Normal forms, Theory of inference for statement calculus. Predicate calculus-statement functions, Variables and Quantifiers.

UNIT III

Partial ordered set- Hasse Diagram. Lattices and Boolean Algebra. Principles of Duality, Properties of Lattices. Types of lattices. Boolean functions and its representations, Simplification of Boolean Functions

UNIT IV

Group Theory-Groups and subgroups, Semi Groups, Cyclic groups ,Product and Quotients of Algebraic structures, Isomorphism, Homomorphism, Automorphism, Rings, Integral Domains, Fields, Applications of Group Theory.

UNIT V

Graph theory -Introduction, Directed and Undirected graph, connected and disconnected graphs, path, cycles and connectivity. Subgraph, Bipartiategraph, Isomorphic Graph, Circuits, Dijkstra's Algorithm, BellmannFord Algorithm, Floyed- Warshall Algorithm, Eulerian and Hamiltonian Paths, Trees-Spanning Trees. Minimum Spanning Trees- Prim's and Kruskal's Algorithm, storage representation and manipulation of graphs.

References:

1. J.K Sharma, Discrete Mathematics .4thEd. MacMillan Publishers.
2. J.P. Trembley and Manohar, Discrete Mathematical Structures with Application to Computer Science. TMH, 1stEd.
3. Kolman&BusbyR.CDiscreteMathematicalStructuresforComputerScience.PrenticeHallOf India, 5thEd.
4. Ralph P Grimaldi, Discrete and Computational Mathematics: An Applied Introduction. Pearson Education
5. Clark J &Holton D A, A first look at Graph Theory, Allied Publishers.

MCA 20 104 COMPUTATIONAL INTELLIGENCE

Objectives

- *To introduce concepts of Artificial Intelligence.*
- *Identify problems where artificial intelligence techniques are applicable.*
- *Apply selected basic AI techniques; judge applicability of more advanced techniques.*

UNIT I

Introduction - Artificial Intelligence - problems, scope and applications, problem space and search - production system- characteristics - the predicate calculus, inference rules, structures and strategies for state space search, strategies for space search, using state space to represent reasoning with the predicate calculus.

UNIT II

Heuristics Search: control and implementation of state space search, generate and test, hill climbing, Best– first search, problem reduction, constraint satisfaction, means-ends analysis, heuristic in games, complexity issues.

UNIT III

Knowledge representation issues, representation and mappings, representing simple facts in logic, representing instances and ISA relationships, computable functions and predicates, resolution, natural deduction, knowledge representation using rules, logic programming, forward versus backward reasoning, symbolic reasoning under uncertainty- nonmonotonic reasoning, depth first search, breadth first search.

UNIT IV

Knowledge and Reasoning: Logical Agents, First-order Logic, Inference in First-Order Logic, Knowledge Representation Planning: Planning, Planning and Acting in the Real World-Uncertain Knowledge: Uncertainty, Probabilistic reasoning, Making simple decisions. Learning: Learning from Observations, Knowledge in learning, Statistical learning Methods, Reinforcement Learning.

UNIT V

Game playing – the Minimax search procedure, adding Alpha-beta cutoffs, additional refinement, iterative deepening, planning system and its components, understanding, understanding as constrained satisfaction. Slot and filler structures: semantic nets, frames, conceptual dependency, scripts. Definition and characteristics of expert system, representing and using domain knowledge, expert system shells-Knowledge engineering, knowledge acquisition, expert system life cycle & expert system tools, MYCIN & DENDRAL examples of expert system.

References:

1. Elaine Rich, Kevin Knight and Shivshankar B. Nair, Artificial Intelligence , 3rd Edition, Tata – McGraw Hill, New Delhi, ISBN:0070087709.
2. V S Janakiraman, K Sarukesi and P Gopalakrishnan, Foundations of Artificial Intelligence and Expert System, Macmillan India Limited, ISBN:0333926250.
3. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, ISBN:0136042597.
4. G. F. Luger and W.A Stubblefield, Artificial Intelligence – Structures and Strategies for Complex Problem Solving, Addison-Wesley, 6th Edition, ISBN:9780321545893.
5. P. H. Winston, Artificial Intelligence, Addison-Wesley, 3rd Edition, ISBN:0201533774.
6. 6.Nils J. Nilsson, Artificial Intelligence, A New Synthesis , 1st Edition, Morgan Kaufmann Publishers, Inc,

MCA 20 105 ADVANCED DATABASE MANAGEMENT SYSTEMS

Objectives

This course will help the students to acquire the basic knowledge and practical skills relating to Database Management Systems. After going through this course a student should be able to:

- *Critically assess new developments in database technologies.*
- *Interpret and explain the impact of emerging database standards*
- *Evaluate the contribution of database theory to practical implementation of DBMS.*

UNIT I

Introduction to Database Management Concepts- The need of database. Three level Architecture of databases. Overview of relational, network, hierarchical data models. The ER and EER. Relational Algebra and Relational calculus. Relational database design - 1st, 2nd, 3rd, 4th, BCNF, 5th Normal form.

UNIT II

Structured Query Language (SQL)-DDL, DML. Views, Embedded SQL, Postgres SQL, SQLlite. Spatial Databases-Concept Design and Management

UNIT III

Transaction processing-desirable properties of transaction. Transactions and Schedules –Characterising Schedules based on Recoverability, Serializability of schedules. Concurrency Control in databases: Locking Techniques-time stamp ordering, multi version concurrency Control –granularity of data items.

UNIT IV

Object oriented Database concepts: Characteristics of an object relational database management. Object definition language, Object query language, Distributed database concepts- data fragmentation, replication and allocation. Introduction to data science– data warehousing, data mining and big data.

UNIT V

Database in web service – Firebase, AWS. No SQL- database that bridges SQL and No SQL. Database in cloud/platform as a service. Automated database management-database security

References

1. Silbersehatz, Korth and Sudarshan, Database system concepts, 6th edition MGH2011
2. Ramakrishnan and Gehrke, Database Management Systems, 3rd Edn, Mc Graw Hill,2003
3. Elmasriand Navathe, Fundementalsof Database systems, 5th Edition, Pearson2009
4. C.J.Date-A.Kannan, S.Swamynathan "An introduction to Database System" 8th Edition, Pearson education O'Reilly, Practical PostgreSQL Shroff Publishers(SPD)2002.
5. Carlo Zaniolo,StefanoCeri, Christos Faloat ,V.S.Subrahmanian,RobertoZiart"Advanced Database System", Morn Kaufmann publishers 2005, 1st Ed.

MCA 106(P) - Practical I

List of Sample Programs

JAVA

1. Simple Java programs like computing formula expressions.
2. Programs involving loops and decisions like generating Fibonacci, prime strange series.
3. Illustrate method overloading.
4. Illustrate single level inheritance.
5. Illustrate multiple inheritances using interface.
6. String sorting, pattern matching etc.
7. Illustrate threads and thread priorities.
8. Illustrate the use of Packages.
9. Exception handling (user-defined).
10. Method overriding.
11. Illustrate usage of Applets like moving ball, face etc.
12. Create an AWT application for a simple calculator.
13. Frame application to illustrate the window events.
14. Create a JDBC application to add the details of a student into a table (Use MySQL as the RDBMS).
15. Socket Programming.

DBMS

Lab assignment shall be carried out to include the following:

- SQL: Data definition in SQL, basic data retrieval, condition specification, arithmetic and aggregate operators, SQL join, set manipulation, categorization, updates, views, views and updates.
- The student is required to develop database design for the given problem.
- The logical design performs the following tasks:
    1. Map the ER/EER diagrams to a relational schema. Identify primary keys, include all necessary foreign keys and indicate referential integrity constraints.
    2. Identify the functional dependencies in each relation,
    3. Normalize to the highest normal form possible.
- Perform DML and DLL using PL/SQL for the above problems

SEMESTER-II

MCA 20 201 COMPUTER ARCHITECTURE

Objectives

- *To teach ideas on parallel computing based computer architectures with a quantitative approach.*
- *To impart concepts in new design paradigms to achieve parallelism, memory hierarchy design and inter-connection networks.*

UNIT I

Introduction to Parallel Processing: Evolution of Computer system, Parallelism in uniprocessor systems, Parallel Computer structures, Architectural Classification schemes, Parallel processing Applications.

UNIT II

Principles of Pipelining and Vector processing: Pipelining, Instruction and arithmetic pipelines, Principles of designing pipelined processors, Vector processing requirements, Pipeline computers and victimization methods.

UNIT III

Structures and algorithms for Array Processors: SIMD Array processors, SIMD interconnection networks, Parallel algorithms for array processors, Associative array processing, SIMD Computers and performance enhancement.

UNIT IV

Multiprocessor architecture: Functional structures, Interconnection networks, Parallel memory organizations, Multiprocessor operating systems, Exploiting concurrency for multiprocessing.

UNIT V

Dataflow computers and VLSI Computations: Data driven computing and languages, Dataflow computer architectures, VLSI computing structures, VLSI matrix arithmetic processors.

References:

1. Computer Architecture and Parallel processing, Authors: Kai Hwang,FayeA. Briggs, Mcgraw-Hill, 1st Ed.
2. Computer Architecture A quantitative Approach Authors: John L Hennessy, David A Patterson. Morgan Kaufmann Publishers an Imprint of Elsevier, 3rd Ed.
3. Computer System Architecture, Author: M.Morris Mano, Pearson; 3edition

MCA 20 202 - MACHINE LEARNING

Objectives

- *Be able to formulate machine learning problems corresponding to different applications.*
- *Understand arrange of machine learning algorithms along with their strengths and weaknesses.*
- *Understand the basic theory underlying machine learning.*
- *Be able to apply machine learning algorithms to solve problems of moderate complexity.*
- *Be able to read current research papers and understand the issues raised by current research.*

UNIT I

Introduction to Machine Learning: Concept of learning task, inductive learning and the concepts of hypothesis space, introduction to different types of machine learning approaches, examples of machine learning applications, different types of learning; supervised learning, unsupervised learning, reinforcement learning. Setting up your machine learning platform; training, validation and testing, over-fitting and under-fitting, different types of error calculation.

UNIT II

Supervised Learning: Introduction, learning a class from example, learning multiple classes, model selection and generalization, linear regression and feature selection, Bayesian and Decision Tree learning; classification tree and regression tree, multivariate methods for learning; multivariate classification and regression.

UNIT III

Unsupervised Learning: Introduction, clustering; mixture densities, k-means clustering, expectation maximization algorithm, mixture latent variable models, Latent Dirichlet Allocation, spectraland hierarchical clustering, Dimensionality reduction; principal component allocation, linear discriminant analysis, canonical correlation analysis.

UNIT IV

Introduction to Artificial Neural Network: Understanding brain, perceptron, Multi-Layer perceptron as universal approximator, general architecture of artificial neural network, feed forward and back-propagation, different linear and nonlinear activation functions for binary and multi class classification.

UNIT V

Introduction to Deep Learning: Fundamentals of deep learning, Deep Feed forward Networks, Regularization for Deep Learning, Optimization for Training Deep Models, Introduction to Convolutional Networks, Sequence Modeling using Recurrent Nets, overview of LSTM, fundamentals of Generative adversarial network.

References:

1. EthemAlpaydin, Introduction to Machine Learning- 3rd Edition,PHI.
2. Tom M. Mitchell, Machine Learning, McGraw-Hill, 1stEd.
3. Ian Goodfellow and YoshuaBengioand Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning), MIT Press, 2016.
4. KuntalGanguly, Learning Generative Adversarial Networks, PacktPublishing,2017

MCA 20 203 WEB PROGRAMMING WITH PYTHON

Objectives

- *To familiarize the concepts of PHP and Python programming*
- *Familiarize with functions and modules in python*
- *Understand object-oriented programming concepts in Python*

UNIT I

Internet and WWW, HTML, Introduction to XHTML, Dynamic HTML, Cascading Style Sheets.

UNIT II

PHP: designing dynamic web pages using PHP, defining PHP variables, variable types, operators, control flow constructs in PHP, passing form data between pages, establishing connection with MySQL database, Overview of content management system ,additional CMS features.

UNIT III

Introduction to Python, installation, Python interpreter ,usage and customization, editorsetup,variables, expressions and statements,functions,Strings,lists,tuples,dictionaries,sets,modules,I/Oandexception handling ,modules ,search path,compiledmodules,standardmodules, packages, inputandoutputfunctions files – read and write .

UNIT IV

Object-Oriented Programming- Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attribute versus Data Attribute, Encapsulation, Inheritance, Polymorphism. Exceptions: Errors in python program-Compile time errors, Runtime errors, logical errors- Exception handling-types of exception- The except block- assert statement- User-defined Exceptions- Logging the exceptions.

UNIT V

Python-SQLite integration - features of SQLite, data types, introduction to SQL commands - SELECT, DELETE, UPDATE, INSERT. Python functions for SQLite operations – database connection, database and table creation, selection, query, fetching results - insertion and deletion of data using Python - displaying data from SQLite in webpage.

References:

1. H. M. Deitel, P. J. Deitel and T. R. Nieto, Internet and World Wide Web: How to Program, Pearson Education,2000.
2. Allen Downey, Jeffrey Elknerand Chris Meyers, How to Think Like a Computer Scientist: Learning with Python, Createspace,2009.
3. Wesley J Chun, Core Python Programming, 2nd Edition, PearsonEducation.
4. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
5. Dr. R Nageswara Rao, Core Python Programming, 2nd edition, Dreamtech Publisher, 2019

MCA 20 204 SOFTWARE ENGINEERING

Objectives

- *To give an overview of the development of methodologies and steps to be followed in software development and to apply these concepts and theoretical principles in designing a quality software.*
- *To assistthestudentinunderstandingthebasictheoriesofsoftwareengineering*
- *To give the basic concepts of unified modeling language.*

UNIT I

Introduction -what is software Engineering-why it is needed? -importance of software engineering-- Software lifecycle – The Software process- Software Process Models - Predicative and Adaptive based Methodologies: Waterfall model, Iterative Models, Incremental Models, RAD Principles-Agile view of process- XP Model, ASD, DSDM, Scrum Frame work – About Scrum, Scrum Process- Sprint planning, Product Backlog- Burn down chart. – CASE tools.

UNIT II

Software Requirements and Specification: Functional and Non-Functional Requirements, User and System Requirements, Requirements Gathering, Prototyping Approach, Requirements Engineering process: Feasibility study, Elicitation and Analysis, requirements Validation, Requirements Management, SRS. Formal System Specification. System Models: Context oriented Models, Flow Oriented Models, Data Oriented Models – Object Oriented Models. Design Process and Design Strategies: Design by Template and Design Reuse, The Design Pattern, Software Architectural Design: About Software Architecture, Architectural Styles, Architectural Design, Modular decomposition and Domain Specific Architectures

UNIT III

Object Oriented Design- Objects and Classes- objects-module-cohesion-coupling Functional Independence. Object modelling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Deployment Diagrams – Data Flow Diagrams. Reusability, portability &interoperability-Design with reuse concepts, Component-Level Design: About the Component, Designing Class-Based Components. Component based development- User Interface Design-Design Principles-Interface Evaluation. – COTS.

UNIT IV

Software Quality and Software Testing- Software quality concepts and attributes- Software Quality Assurance-SQA Activities-Software Reviews-Software Inspections- Verification and Validation-Clean Room Approach Testing: Testing Strategies, Different types and Levels of Testing, Black Box and White Box testing, testing object Oriented applications, Testing Web applications. - Software Maintenance and evolutions- Software Re-engineering. Software Configuration Management & Release Management.

UNIT V

Software Project Management-Planning and Scheduling, Staffing and Group working, People Capability Maturity Model, Process and Product Quality, Process measurement, Process CMM, Software Costing and Pricing, Cost Estimation Techniques, COCOMO Emerging Trends in Software Engineering: Continuous Integration (CI) ,Software Engineering Methodologies for Mobile and CloudEnvironments.

References:

1. Ian Sommerville, Software Engineering, 7/e, Pearson Education Asia.
2. Pressman R. S., Software Engineering, 5/e, McGraw Hill.
3. Mall R., Fundamentals of Software Engineering, Prentice Hall of India.
4. Behferooz A. & Hudson F.J., Software Engineering Fundamentals, Oxford University Press.
5. Jalote P., An Integrated Approach to Software Engineering, Narosa.

ELECTIVE I

MCA 20 205 A- INFORMATION RETRIEVAL

Objectives

- *This course aims at introducing the area of information retrieval and examining the theoretical and practical issues involved in designing, implementing and evaluating IR systems.*

UNIT I

Concepts of IR, Data Retrieval & Information Retrieval, IR system block diagram. Automatic Text Analysis, Luhn's ideas, Conflation Algorithm, Indexing and Index Term Weighing, Probabilistic Indexing, Automatic Classification. Measures of Association, Different Matching Coefficient, Classification Methods, Cluster Hypothesis. Clustering Algorithms, Single Pass Algorithm, Single Link Algorithm, Rochhio's Algorithm and Dendograms.

UNIT II

File Structures, Inverted file, Suffix trees &suffix arrays, Signature files, Ring Structure, IR Models, Basic concepts, Boolean Model, Vector Model, and Fuzzy Set Model. Search Strategies, Boolean search, serial search, and cluster-based retrieval, Matching Function.

UNIT III

Performance Evaluation- Precision and recall, alternative measures reference collection (TREC Collection), Libraries &Bibliographical system- Online IR system, OPACs, Digital libraries - Architecture issues, document models, representation &access, Prototypes, projects & interfaces, standards.

UNIT IV

Taxonomy and Ontology: Creating domain specific ontology, Ontology life cycle. Distributed and Parallel IR: Relationships between documents, identify appropriate networked collections, Multiple distributed collections simultaneously, Parallel IR –MIMD Architectures, Distributed IR–Collection Partitioning, Source Selection, Query Processing.

UNIT V

Multimedia IR models &languages- data modeling, Techniques to represent audio and visual document, query languages Indexing &searching- generic multimedia indexing approach, Query databases of multimedia documents, Display the results of multimedia searches, one dimensional time series, two dimensional colour images, automatic feature extraction.

References:

1. Yates & Neto, "Modern Information Retrieval", Pearson Education,
2. I. Witten, A. Moffat, and T. Bell, "ManagingGigabytes"
3. D. Grossman and O. Frieder "Information Retrieval: Algorithms and Heuristics"
4. Mark leven,"Introduction to search engines and web navigation", John Wiley &SonsInc.
5. V. S. Subrahamanian, Satish K. Tripathi "Multimedia information System", Kluwer Academic Publisher
6. ChabaneDjeraba," Multimedia mining A highway to intelligent multimedia documents", Kulwer Academic Publisher.

MCA 20 205 B -ANDROID APPLICATION PROGRAMMING

Objectives

- *This course introduces mobile application development for the Android platform.*

UNIT I

Getting Started with Android Programming - Android SDK installation and configuration, Anatomy of an Android application, Activities, Fragments and Intents-Understanding Activities, Linking Activities using intents, Fragments, Calling Built in applications using intents, Displaying Notifications.

UNIT II

The Android User Interface- Understanding the components of a screen, adapting to display orientation, managing changes to screen orientation, Creating the user interface programmatically, Listening for UI notifications, Designing User Interface with Views- Using basic views, Using Picker Views, Understanding, Specialized fragments.

UNIT III

Data Persistence – Saving and Loading User Preferences, Persisting Data to Files, Creating and sing Databases. Content Providers - Sharing Data in Android, using a Content Provider, Creating Your Own Content Providers.

UNIT IV

Messaging – SMS Messaging, Sending Email. Location-Based Services – Displaying Maps, Getting Location Data, Monitoring a Location.

UNIT V

Networking – Consuming Web services using HTTP, Consuming JSON Services, Sockets Programming, Developing Android Services – Creating Your Own Services, Establishing Communication between a service and an activity, Binding Activities to Services, Understanding Threading, Publishing Android Applications.

References:

1. Wei-Meng Lee," Beginning Android 4 Application Development", Wrox publications, 2012, 1st Ed.
2. The Android Developer's Cookbook: Building Applications with the Android SDK James Steele, Nelson to Addison Wesley Publications 2010 First Edition.
3. Professional Android Application Development. RetoMeier, Wroxpublications, 2009, Second Edition

MCA 20205 C -MOBILE COMPUTING

Objectives

- *To give an overview of mobile architecture and communication principles.*
- *To introduce mobile computing application development.*

UNIT I

Cellular architecture, Mobile computing issues and challenges, architecture issues, communication issues, bandwidth management issues, energy issues, information management issues, reliability issues, security issues, social issues, trust management and anonymity issues, applications (horizontal and vertical), wireless mobile network characteristics, portable characteristics, mobility characteristics.

UNIT II

Wireless Communication principles: Multiplexing (SDM, FDM, TDM, CDM),modulation, hidden terminal, exposed terminal Channel allocation: Fixed channel allocation, dynamic channel allocation, hybrid channel allocation, flexible channel allocation.

UNIT III

Location Management: Location management problem, location management update principles (no, update, full, update, lazy, update, selective, update), location management architecture (two tier, tree, based, hierarchical etc.), location management algorithms (two locations, reporting cell, profile, based)

UNIT IV

Mobility Model: Individual mobility model (random walk, random way-point, random-direction, smooth random, gauss-markovmodel), group-based mobility model (column, nomadic, pursue, reference point group, mobility model). Mobile Protocols: Mobile, IPv.4, Ipv.6, Mobile TCP (m-TCP) Information Dissemination: Information dissemination through wireless medium, broadcasting, Push- Pull Periodic, on-demand, real-time, variable-sized data broadcasting schemes 17Mobile Payment Models: Payments in Mobile environment, E-cash, M-pay, Pay-box, EMPS,E-Ticket.

UNIT V

Mobile Computing application development using J2ME platform. Sensor Network: wireless sensor network, WSN applications, sensor network issues and challenges, energy management in WSN, sensor network routing protocols (data aggregation, clustering, data fusion).

References:

1. Jochen Schiller , Mobile Communications , Pearson Publications, 2nd Ed.
2. Tomasz Imielinski& Henry F. Korth, Kluwer, Mobile Computing, Academic Publishers,1996
3. AsokeTalukder, Roopa Yavagal, Mobile Computing – Technology, Application &Service Creation, McGraw Hill Publications, 2nd Ed.
4. Mohammad Ilyas, Mobile Computing Hand Book, AuerbuchPublications,2005
5. C. S. Raghavendra, Krishna M. Sivalingam, Taieb F. Znati, Wireless Sensor Networks, Springer Publications,2004
6. TolgaOnel, ErtanOnur, CemErsoy and HakanDelic, "Wireless Sensor Networks for Security: Issues and Challenges", Book Chapter, Advances in Sensing with Security Applications, Springer Publications,2006

MCA 20 205 D- CLOUD COMPUTING

Objectives:

- *To impart knowledge on Introduction to Cloud Computing, The Evolution of SaaS, The Anatomy of Cloud Infrastructure, Workflow Management Systems and Clouds.*
- *Understandthetechnicalcapabilitiesandbusinessbenefitsofvisualizationandcloudcomputing.*
- *Describe the landscape of different types of visualization and understand the different types of cloud.*

UNIT I

Introduction to Cloud Computing: Roots of Cloud Computing – Layers and Types of Cloud - Features of a cloud- Infrastructure Management- Infrastructure as a Service Providers-Platform as a Service Providers- Challenges and Risks. Broad Approaches to Migrating into the Cloud - Seven Step Model of Migration into a Cloud.

UNIT II

The Evolution of SaaS-The Challenges of SaaS Paradigm- Approaching the SaaS Integration Enigma-New Integration Scenarios- The Integration Methodologies- SaaS Integration Products, Platforms and Services- B2Bi Services -. Background of Enterprise cloud computing paradigm- Issues for Enterprise Applications on the Cloud- Transition Challenges- Enterprise Cloud Technology and Market Evolution- Business drivers toward a marketplace for Enterprise cloud computing- The Cloud Supply Chain.

UNIT III

The Anatomy of Cloud Infrastructure- Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- RVWS Design - Cluster as a Service: The Logical Design
-Cloud Storage : from LANs TO WANs- Technologies for Data Security in Cloud Computing.

UNIT IV

Workflow Management Systems and Clouds - Architecture of Workflow Management Systems – Utilizing Clouds for Workflow Execution- A Classification of Scientific Applications and Services in the Cloud- SAGA based Scientific Applications that Utilize Clouds. Map Reduce Programming Model- Major Map Reduce Implementations for the Cloud- Map Reduce Impacts and Research Directions. A Model for Federated Cloud Computing - Traditional Approaches to SLO Management- Types of SLA -Life Cycle of SLA - SLA Management in Cloud- Automated Policy based Management.

UNIT V

Grid and Cloud- HPC in the Cloud: Performance related Issues -Data Security in the Cloud- The Current State of Data Security in the Cloud- Homo Sapiens and Digital Information- Risk- Identity- The Cloud, Digital Identity and Data Security - Content Level Security :Pros and Cons- Legal Issues in Cloud Computing - Data Privacy and Security Issues- Cloud Contracting models- Case Studies : Aneka and Comet Cloud.

References:

1. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, "Cloud Computing - Principles and Paradigms", 2011, Addison-wily, 1st Ed.
2. GeorgeReese,"Book for ReferenceCloud Application Architectures, Shroff /O'Reilly,2009.
3. Toby Velte, Robert Elsenpeter and Anthony Velte, "Cloud Computing, A Practical Approach", TMH., 1st Ed.2009
4. George Reese, "Cloud Application Architectures", 1st Edition, Shroff/O'Reilly,
5. Ravi Nair and Jim Smith, "Virtual Machines: Versatile Platforms for Systems and Processes", 1st Edition, Elsevier Science / MorganKaufmann

MCA 20 205 E - SOFTWARE TESTING AND QUALITY ASSURANCE

Objectives:

- *To impart knowledge on software testing, quality assurance and various quality standards.*

UNIT I

Software, Criteria for the success of a software project, Phases in Software Development Life Cycle, Testing Overview, Purpose of Software Testing, Software Quality-The meaning of Quality, the quality challenge, Cost of Quality, Quality control vs. Quality Assurance a teach phase of SLDC, Quality Assurance in Software Support projects.

UNIT II

Levels of testing, Testing Approaches, Testing Techniques- Black-Box Testing, White-Box Testing, Gorilla testing, Beta testing, Field trial, Performance Testing, Stress testing, Acceptance Testing, Gray Box Testing, Extreme testing, Manual versus Automated Testing, Static versus Dynamic Testing, Taxonomy of Software Testing Techniques.

UNIT III

Test plan, Testing team and Development team, Criteria for completion of Testing, Software testing, Trends, Manual Testing and its Limitations, Use of Software Testing Tools, Software Testing Tools- Win Runner, Silk Test.

UNIT IV

Software Quality Assurance- Software Quality Assurance Background issues, SQA Activities, Formal Approaches to SQA, Formal Technical Reviews, Software Reliability – Measures of Reliability and Availability, Software Safety, The SQA plan, Product Quality and process Quality, Software Measurement and Metrics.

UNIT V

Quality Management Systems, Quality Standards, ISO 9000 Series Standards, Software CMM and other process improvement models: CMM for software- an overview. Types of CMMs, CMM- Integrated model, Process Change Management.

References:

1. Dr. KVKK Prasad, Software TestingTools,DreamTechpress,2005
2. William E Lewis Software Testing and Continuous Quality Improvement Third Edition, Auerbach Publications,2009
3. Aditya P. Mathur, Foundations of Software Testing Second Edition, Pearson2014
4. Anirban Basu, Software Quality Assurance, Testing and Metrics by, Prentice-Hall of India Pvt.Ltd, 2015
5. Roger S. Pressman, 'Software Engineering: A practitioner's Approach, 6th Edition (International Edition, 2005) Tata McGraw-Hill

MCA 20 206 (P) - Practical II

Python Programming

1. Write a python program to reverse a string and check the given string is palindrome or not.
2. Insert n elements to a list using python
   a) Find the third highest element from the list
   b) Find the length of the list
   c) Sort the list
3. Write a python program to append text to a file and display the text. Count the number of lines in the appended text file.
4. Write a python function to multiply all numbers in a list.
5. Accept a number using textbox and print its factorial on clicking the button using python script.
6. Create two textboxes and accept the upper limit and lower limit. List the Fibonacci numbers between these values on clicking the button.
7. Create a text area. Enter some text into it. Print the number of words in the text on clicking the button.
8. Create a database with a table having fields username and password.
   a. Insert values to the table
   b. Create a login page with two textboxes and a button.
   c. Redirect to a home page on successful login.
9. Using Python and SQL, develop a program to accept book information viz. acc_no, title and author from a web page and store the information in a database. Search for a book with title specified by the user and display the search results with proper headings.
10. Using python and sql, develop a program to accept student information viz. id_no, name , mark1,mark2 and mark3 from a web page and store the information in a database. Create another web page with a textbox accepting id_no and on clicking the button calculate the average of three marks and grade of the student. Print results.
    Grade: >80:A >60:B >40:C else D

MCA 20 207 (T) - Term Paper

- The student is expected to do an extensive literature survey and analysis in an area related to computer science, chosen by him/her, under the supervision of a faculty member from the department. Evaluation of term paper should be done internally. A faculty member can be appointed as a guide/supervisor.
- The student has to choose an area for his/her work after due consultation and approval from the guide. The study should preferably result in a critical review of the present works/design ideas/ designs/ algorithms/ theoretical contributions in the form of theorems and proofs/ new methods of proof/new techniques or heuristics with analytical studies/implementations and analysis of results.
- Articles from ACM/IEEE/INFLIBNET Journals/Conference Proceedings and/or equivalent documents, standard textbooks and web based material, approved by the supervisor.
- The student should submit a technical report and report should be prepared in TEX in IEEE conference style format.

SEMESTER III

MCA 20 301- COMPUTER GRAPHICS

Objectives:

- *To understand the fundamentals of modern computer graphics including algorithms for drawing2D,3D object transformations, basics of computer animation.*

UNIT I

Introduction – Application of computer graphics, Video Display Devices- refresh CRT, raster and random scan display, color CRT, flat panel, LCD, LED, DVST. Raster -Scan Systems-video controller, display processor, Random-Scan Systems-Graphic workstations and viewing systems, Input devices, Graphics software.

UNIT II

Output primitives and its algorithms: Points and Lines, Line drawing algorithms -DDA, Bresenham's drawing algorithm – Circle generating algorithms-Midpoint Circle drawing algorithm and Bresenham's, Midpoint ellipse algorithm – Filled Area primitives-Scan line polygon fill algorithm, Inside outside tests, boundary fill algorithm, flood fill algorithm. Character Generation.

UNIT III

2D Transformations and Clipping: Basic transformations -translation, rotation, scaling, shearing and reflection. Matrix representation and homogeneous Coordinates, composite transformations. 2D Viewing – the viewing pipeline, window-to- viewport coordinates transformation. Clipping- point clipping, Cohen Sutherland line clipping, Sutherland Hodgeman polygon clipping, text clipping.

UNIT IV

3D Concepts: Three Dimensional Display Methods. 3D Transformations- translation, rotation (coordinate axis rotation, General 3-d rotation, Quaternion methods for 3D rotation), scaling, shear and reflection. 3D Viewing-viewing pipeline, viewing coordinates, projections- parallel projection-orthogonal projections(axonometric and isometric, orthogonal projection coordinates, clipping window and orthogonal projection view volume, Normalization transformation),Oblique parallel projections (Cavalier and cabinet projections, Clipping window and Oblique parallel-projection view volume, Oblique parallel projection transformation matrix, normalization transformation), Perspective projections- concept of vanishing points . Visible Surface detection-Back face detection, Depth buffer method, A- buffer method.

UNIT V

Computer Animation: Design of animation sequences, Raster animations, Computer animation languages, Key-frame systems- Morphing, Simulating Accelerations. Motion Specification-Direct motion specification, Goal directed systems, Kinematics and dynamics.

References:

1. DonaldHearnandM.PaulineBaker"ComputerGraphics",2nd Edition:PrenticehallIndia,2008
2. Foley J D, Van Dam A, Feineer S K &Hughes J F, Computer Graphics Principles and Practices, Addison Wesley, 2nd Ed.
3. RogersD.F,ProceduralElementsforComputerGraphics,McGrawHill,2nd Ed.1997
4. Steven J Gortler, Foundations of 3DComputer Graphics, The MITPress,20121st Ed.

MCA 20 302 CRYPTOGRAPHY AND NETWORK SECURITY

Objectives

- *Tointroducetheprinciplesandpracticesofcryptographyandnetworksecurity.*
- *To discuss algorithms and schemes to handle the security issues.*
- *To introduce web security.*

UNIT I

Introduction to cryptography: services, mechanisms and attacks- The OSI security architecture- A model for network security, Classical Encryption Techniques: Symmetric cipher Model-Substitution techniques- transposition Techniques-Rotor machine-steganography,

UNIT II

Divisibility: gcd and lcm, prime numbers, Fermat's theorem- Euler theorem, testing of primality, Chinese remainder theorem, discrete logarithms fundamental theorem of arithmetic, modular arithmetic.

UNIT III

Modern Techniques: Simplified DES- DES- block cipher principles- cryptanalysis- block cipher design principles. Triple DES- AES, IDEA- blowfish. Confidentiality: placement of encryption function- traffic confidentiality- key distribution- random number generation. Public key encryption: RSA algorithm- key management and exchange- Elliptic curve cryptography.

UNIT IV

Message Authentication: requirements- functions and codes- hash functions- security of hash functions and MACS. Hash Algorithms: MD5 message digest algorithm- secure hash algorithm. Digital Signatures: authentication protocols- digital signature standard. Authentication Applications: Kerberos.

UNIT V

Electronic Mail Security: Pretty Good Privacy – S/MIME IP Security: Architecture- authentication Header- Encapsulating Security payload- Combining Security associations- Key management, Web Security: SSL and Transport Layer Security- Secure electronic transaction, Firewalls: Design Principles- Trusted Systems, intruders, malicious software.

References:

1. W. Stallings, Cryptography and Network Security, Principles and Practices, Pearson education Asia, 6thEd.
2. C.Y Hsiung, Elementary Theory of Numbers, Allied Publishers (World Scientific), New Delhi, 1992, 1stEd.
3. Niven and H.S .Zuckerman, An introduction to the Theory of Numbers, 3/e, John Wiley and Sons,NewYork,1992
4. B. Schiner, Applied Cryptography: Protocols, Algorithms, and Source code in C, 2/e, John Wiley and Sons, NewYork,1996.

MCA 20 303 PRINCIPLES OF COMPILERS

Objectives

- *To introduce the various techniques involved in the translation of source programs into object programs by a compiler.*
- *To understand the inner working of a compiler using the various data structures used in the translation process.*

UNIT I

Introduction to compiling - definition of compiler, translator, interpreter, analysis of the source program, the phases of a compiler, compiler construction tools - programming language basics -lexical analysis – role of lexical analyser–input buffering - specification of tokens – recognition of tokens using finite automata - regular expressions and finite automata -from NFA to DFA - Regular Expression to an NFA

UNIT II

Syntax analysis –role of parser–error handling and recovery –definitions of parsing, top -down parsing and bottom-up parsing-context free grammars –derivations -parse tree–ambiguity–associativity and precedence of operators -recursive descent parsing-LL (1) Grammars–non-recursive predictive parsing-reductions– handle pruning–shift reduce parsing-operator precedence parsing, simple LR parsing.

UNIT III

Syntax Directed translation: Syntax Directed definitions- S-Attributed definitions- L-Attributed definitions – Bottom up and top down translations. Type checking, Type systems, specification of a type checker and symbol table. Intermediate code generation –DAG–three address code–addresses and instructions – quadruples – triples–Indirect triples.

UNIT IV

Run time environments – storage optimization – static Vs dynamic allocation – stack allocation of space - activation trees and records – calling sequences – access to non-local data on the stack – data access without nested procedures – issues with nested procedures – heap management – the memory manager – the memory hierarchy.

UNIT V

Code generation – issues in the design of a code generator – the target language – a simple target machine model – the program and instruction costs – address in the target code – static allocation – stack allocation– run-time address for names –basic blocks and flow graphs – representation of flow graphs. Code optimization - the principal sources of optimization – data flow analysis – abstraction – data flow analysis schema – data flow schemas on basic blocks – reaching definitions – live variable analysis – available expressions. Region based analysis – regions – region hierarchies for reducible flow graphs – overview of a region based analysis.

References:

1. Aho, A. V, Sethi, R. and Ullman, J. D. Compilers: Principles, Techniques and Tools, Person, 2nd Ed.
2. StevenSMuchnick,AdvancedCompilerDesignImplementation,1st Ed.,morgankaufmann,1997
3. Allen I Holub, Compiler Design in C, 1st Edition, PHI Learning Pvt Ltd.,1992
4. Tremblay and Sorenson, The Theory and Practice of Compiler Writing, 1st Ed. BSP Books Pvt Ltd, 1985
5. Torben Ægidius Mogensen, Basics of Compiler Design, Department of Computer Science, University of Copenhagen (Online Edition).

ELECTIVE II

MCA 20 304 A - BIG DATA TECHNOLOGIES

Objectives

- *To understand the basic concepts of Big Data.*
- *To familiarize with Big Data technology and tools.*
- *To cover the basics of R Programming.*

UNIT I

Introduction to Big Data – definition &importance of Big Data ,four dimensions of Big Data - volume, velocity, variety, veracity. Importance of big data, structured data, unstructured data, Technology Foundation for Big Data. Big Datastack – layer 0,1,2,3and 4 – Big Data Applications-Understanding the Basics of Virtualization-The cloud and BigData- Big Data management – operational databases ,relational databases –,non relational databases – NoSQL - key-value pair databases – document databases - columnar databases - graph databases - spatial databases.

UNIT II

Big Data analysis - basic analytics , advanced analytics-operationalized analytics ,monetizing analytics-modifying business intelligence products to handle Big Data - Big Data analytics examples- Analytics solutions - text analytics - exploring unstructured data ,analysis and extraction techniques - the extracted information - text analytics tools for Big Data – New models and Approaches to support Big Data– Characteristics - Google Prediction API - Characteristics of a Big Data Analysis Framework.

UNIT III

Introduction to R Programming – Evolution ,Features, Basic Syntax , Data Types ,Variables ,Operators, Decision Making Loops, Functions, Strings ,Vectors ,Lists, Matrices, Arrays, Factors ,Data Frames ,Web Data, Databases ,Pie Charts ,Bar Charts ,Boxplots, Histograms ,Line graphs, Scatterplots, Linear Regression, Multiple Regression, Normal Distribution, Binomial Distribution, Time Series Analysis.

UNIT IV

Hadoop – history – components – Hadoop Distributed File System –Analyzing Data with Hadoop - Application Development in Hadoop – Hadoop Streaming - getting our data into Hadoop - Map Reduce Basics – origins of MapReduce - map function – reduce function – putting them together– Map Reduce Applications – How Map Reduce Works – Map Reduce Types And Formats – Map Reduce Features.

UNIT V

Application of Big Data Using Pig and Hive – Data Processing Operators in Pig – Hive Services – HiveQL _Querying Data in Hive – Fundamentals of HBase and Zookeeper – Visualization – Visual data analysis Techniques, interaction techniques; Systems and applications.

References:

1. Hurwitz, Alan Nugent, Fern Halper and Marcia Kaufman, Big Data for Dummies, Wiley,2013
2. Bill Franks Taming the Big Data Tidal wave: Finding Opportunities in Huge Data Streams with Advanced Analytics ,John Wiley &sons,2012.
3. Chris Elaton, Derk Deroos, Tom Deutsch, George Lapis and PualZikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill,2012
4. Garry Turkington, Hadoop Beginner's Guide, PacktPublishing Ltd.,213
5. Tom White, Hadoop: The Definitive Guide, 4thEd. O'Reilly Media,2015
6. Pete Warden, Big Data Glossary, O'Reilly Media, 2011.

MCA 20 304 B- DIGITAL IMAGE PROCESSING

Objectives

- *To be familiar with processing of the images, recognition of the pattern and their applications.*

UNIT I

Introduction, Digital Image Fundamentals: elements of visual perception, light and electromagnetic spectrum, image sensing and acquisition, image sampling and quantization, some basic relationship between pixels. Intensity Transformations: Basics of intensity transformations, some basic intensity transformation functions, histogram processing.

UNIT II

Spatial Filtering: fundamentals of spatial filtering, smoothing and sharpening filters. Frequency domain Filtering: Background, preliminary concepts, sampling, Fourier transforms and DFT, 2-D DFT and properties, frequency domain filtering, low pass filters, high pass filters, implementation.

UNIT III

Image restoration and Reconstruction: Noise models, restoration in the presence of noise, linear- positive invariant degradations, inverse filtering, Wiener filtering, constrained least square filtering, geometric mean filter.

UNIT IV

Image Compression: fundamentals, basic compression methods. Morphological Image Processing: preliminaries, erosion and dilation, opening and closing, basic morphological algorithms.

UNIT V

Image Segmentation: fundamentals, point, line and edge detection, thresholding, region based segmentation, use of motion in segmentation.

References:

1. DigitalImageProcessing,byRafaelC.Gonzalez&RichardE.Woods,3rdedition, PHI2008
2. Fundamentals of Digital Image Processing, by Anil K. Jain, Prentice Hall, 1995, 1st Ed.
3. Digital Image Processing, by William K. Pratt, John Wiley &Sons Inc., 3rd edition,2001.
4. Milan Sonka, Vaclav Hlavacand Roger Boyle, Image Processing Analysis and Machine Vision, 3rd Edition, Ceneage Learning India PvtLtd

MCA 20 304 C– CYBER SECURITY

Objectives

- *To give an overview of security issues.*
- *Also give an overview in cloud and biometric security.*

UNIT I

Security Elements: Authorization and Authentication - types, policies and techniques – Security certification - Security monitoring and Auditing - Security Requirements Specifications - Security Policies and Procedures, Firewalls, IDS, Log Files, Honey Pots Human factors – Security awareness, training , Email and Internet use policies. Web application security- Key Problem factors–Core defense mechanisms- Handling user access- handling user input- Handling Attackers Fundamental security mechanism Off-the shelf Technologies: Bluetooth security, Wi-Fi security, Wi-Max security, Security in mobile telecommunication network

UNIT II

Emerging Technologies- Security in Next Generation Mobile network, Security of IP-based network, security in Adhoc network, key management in Adhoc network. Research direction in security and privacy of mobile networks, Applying trust in mobile and wireless network, mobile security Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft.

UNIT III

Secure Coding: Buffer Overrun, Format String Problems, Integer Overflow, and Software Security Fundamentals, Ethical Hacking: Hacking Fundamentals, Reconnaissance, Scanning and Enumeration, Sniffers, ARP poisoning and MAC Flooding, Denial of Service, Session Hijacking, Social Engineering Web server-working, vulnerability and attack, Web Application Penetration Testing, Structure of Penetration Testing, reverse engineering (using debuggers such ollydbgor immunity debugger)

UNIT IV

Web application andCloudSecurity:WebApplicationTechnologies-HTTPprotocol,Attacking, Session Management- Weaknesses in Session Token Generation, Weaknesses in Session Token Handling, Securing Session Management, Attacking Access Controls-vulnerabilities, attacks and countermeasures, Attacking Application Logic- Fooling a Password Change Function, Abusinga Search Function, Cloud architecture model – Cloud delivery model, SPI framework, SaaS, PaaS, Iaas, Deployment models – Public, community, Private, Hybrid Cloud, Cloud security design principles, Secure cloud software requirements, Secure development practice, Virtualization security Management- virtual threats, VM security recommendations, VM security techniques – hardening, securing VM remote access

UNIT V

Biometric Security: Biometric Security: The Need for Strong Authentication. The role of Strong Authentication with Single Sign-On (SSO), Biometric Technologies: Finger-representation of finger image, types of algorithms for interpretation, Face- representation of face image, types of algorithms for interpretation, Voice- voice capturing, types of algorithms for interpretation, Iris capturing iris image, types of algorithms for interpretation, general spoofing techniques.

References:

1. Kaveh Pahlavan, Prashant Krishnamurthy., Principles of Wireless Networks. - PearsonEdu.2002
2. Stallings, William., Wireless Communications and Networks.- Pearson Education, 2002. 2nd Ed.
3. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Paperback
4. Howard, LeBlanc, and Viega, "24 Deadly Sins of Software Security, Mc GrawHill
5. CEH: Certified Ethical Hacker Study Guide, Kimberly Graves, SERIOUS SKILLS, Paper back2016
6. D. Stuttard and M. Pinto, "The Web Application Hacker's Handbook", Wiley, 2008, 2nd Ed.
7. Biometrics and Network Security, Paul Reid, PrenticeHal,
8. Ronald L. Krutz, Russell Dean Vines, Cloud Security, Wiley publication,2010

MCA 20 304 D –OPERATION RESEARCH

Objectives

- *To give an exposure for the student to the area of modeling techniques, numerical methods and algorithms.*
- *To realize the importance of various aspects of optimization techniques in industries like IT.*
- *To implement the knowledge of optimization techniques in real life problems.*

UNIT I

Linear programming and sensitivity analysis – two variable LP model, graphical and algebraic LP solutions, some LP applications, the simplex method and sensitivity analysis, primal- dual relationships and economic interpretation, dual simplex and generalized simplex algorithms and post- optimal analysis.

UNIT II

Transportation and Network models - The transportation models and algorithm, the assignment and transshipment models, minimum spanning tree algorithm, shortest- route problem, maximum flow and min- cost models, critical path method and algorithms for matching.

UNIT III

Advanced linear programming and applications- simplex method fundamentals, revised simplex method and computational considerations, bounded variables algorithm, duality, parametric linear programming, goal programming formulations and algorithms.

UNIT IV

Integer linear programming- illustrative applications, integer programming algorithms, unimodularity and cutting- plane methods, travelling sales person problem.

UNIT V

Dynamic programming (DP) and its application - recursive nature of computations in DP, forward and backward recursion, selected DP applications, problem of dimensionality, branch and bound method and dynamic programming, some deterministic inventory models. Nonlinear programming – convex programming problems, unconstrained problems and algorithms, constrained problems and algorithms.

References:

1. H.A. Taha, Operations Research: An Introduction,9th Edition, Pearson Prentice Hall.
2. C. H. Papadimitriou, K. Steiglitz, Combinatorial Optimization: Algorithms and Complexity, Dover Publications.

MCA 20 304 E- INTRODUCTION TO SOFT COMPUTING TECHNIQUES

Objectives

- *To give abroad, yet in- depth over view of the field of soft computing techniques.*

UNIT I

Soft Computing: Introduction of soft computing, soft computing vs. Hard computing, various types of soft computing techniques, applications of soft computing. Soft Computing Constituents –From Conventional AI to Computational Intelligence-Adaptive Networks – Feed forward Networks – Supervised Learning.

UNIT II

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations–Fuzzy If-Then Rules–Fuzzy Reasoning – Fuzzy Inference Systems –MamdaniFuzzy Models–SugenoFuzzy Models– Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT III

Artificial intelligence systems– Neural networks, genetic algorithms. Artificial neural networks: Biological neural networks, model of an artificial neuron, Activation functions, architectures, characteristics-learning methods, brief history of ANN Research-Early ANN architectures (basics only)-McCulloch &Pitts model, Perceptron, ADALINE,MADALINE

UNIT IV

Back propagation networks: architecture, multilayer perceptron, back propagation learning-input layer, hidden layer, output layer computations, calculation of error, training of ANN, BP algorithm, momentum and learning rate, Selection of various parameters in BP networks. Variations in standard BP Algorithms-Adaptive learning rate BP, resilient BP, Levenberg-Marquardt, and conjugate gradient BP algorithms (basic principle only)-Applications of ANN.

UNIT V

Genetic algorithms – basic concepts, encoding, fitness function, Reproduction-Roulette wheel, Boltzmann, tournament, rank, and Steady State selections, Elitism. Inheritance operators, Crossover- different types, Mutation, Bit-wise operators, Generational cycle, Convergence of GA, Applications of GA – case studies.

References:

1. R. Rajasekaran and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesisand applications, Prentice Hall of India, New Delhi, 2003, 1st Ed.
2. L.Fausett Fundamentals of Neural Networks,PrenticeHall,UpperSaddleRiver,N.J,1994,1st Ed.
3. Digital Neural Network ,S.Y Kung , Prentice Hall of India, 1st Ed.1993
4. D. E. Goldberg, Genetic Algorithms in Search, Optimisation, and Machine Learning, Addison-Wesley, Reading, MA, 1989, 1st Ed.
5. M. T. Hagan, H. B. Demuth, and M. H. Beale, Neural Network Design, PWS Publishing, Boston, MA, 1996, 2nd Ed.

ELECTIVE III

MCA 20 305 A- INTERNET OF THINGS

Objectives

- *This course presents the communication technologies used in IoT, Web of Things, Structural models and applications of IoT*

UNIT I

Introduction: Internet Layers - Protocols - Packets - Services - Performance parameters - Peer-to peer networks - Sensor networks - Multimedia - IOT Definitions and Functional Requirements – Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security.

UNIT II

IoT protocols: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – point-to-point protocols - Ethernet protocals- cellular Internet access protocal- Machine-to-machine protocal- Modbus – KNX – Zigbee Architecture – Network layer – APS layer –Security.

UNIT III

Web of Things: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT– Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT IV

Integrating IOT: Integrated Billing Solutions in the IoT, Business Models for the IoT - Network Dynamics: Population Models – Information Cascades – Network Effects - Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small World Phenomenon.

UNIT V

Applications: The Role of the IoT for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging - Case studies: Sensor body-area-network and Control of a smart home.

References:

1. HonboZhou, The Internet of Things in the Cloud:AMiddleware Perspective-CRC Press2012.
2. Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.), Architecting the Internet of Things-– Springer – 2011
3. David Easley and Jon Kleinberg, Networks, Crowds, and Markets: Reasoning About a Highly Connected World, Cambridge University Press -2010.
4. Olivier Hersent, Omar Elloumiand David Boswarthick, The Internet of Things: Applications to the Smart Grid and Building Automation, Wiley-2012
5. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley,2012.

MCA 20 305 B- ADVANCED JAVA PROGRAMMING

Objectives

- *To learn the advanced features of java programming language that equips the students to develop web based applications to develop web based applications.*

UNIT I

J2ME Overview: Inside J2ME ,J2ME and Wireless Devices, Small Computing Technology: Wireless Technology-Mobile Radio Networks, Messaging, PDAs, Mobile Power, set Top Boxes, smart cards. J2ME Architecture and Development Environments: J2ME Architecture, Small computing Device Requirements, MID let programming, J2ME Software Development Kits, HelloworldJ2ME Style, J2ME Wireless Toolkit.

UNIT II

J2ME Best Practices and Patterns, Commands, Items and Event Processing: J2ME User Interfaces-Display class, Command Class, Item Class, Exception handling. High-Level Display: Screens: Alert Class, Form Class, Item Class, List Class, Text Box Class. Low-Level Display: Canvas: The Canvas, User Interactions, Graphics

UNIT III

Record Management System: Record Storage, Writing and Reading Records, Sorting and Searching Records.J2ME Database Concepts: Database Schema, Foreign keys, The Art of Indexing-Drawbacks of Using an Index. JDBC Objects

UNIT IV

JDBC and Embedded SQL; tables, Indexing, Inserting Data into Tables-Insert a Row, Selecting Data from a Table-Select All data, Request One column and multiple columns, Request Rows, Request Rows and Columns. Metadata, Updating and Deleting Data from a table. Views: Rules for using Views Create a view, Group and Sort Views:

UNIT V

Personal Information Manager: PIM Databases, The Contact databases, The Event databases, Error Handling. Introduction to Web services: Basics, J2EE Multitier Web Services Architecture, Inside WSDL, J2ME MIDlets and Web services, RMI Concept, SOAP Basics, WSDL and SOAP.

Reference:

1. J2ME- The Complete Reference- James Keogh- TATA McGRAW-HILL, 1st Ed.

MCA 20 305 C- PATTERN RECOGNITION

Objectives

- *To understand different pattern recognition methods this can be adopted in web access and image processing.*

UNIT I

Introduction and General Pattern recognition Concerns: Pattern Recognition, Classification and Description, Patterns and Feature extraction with examples, Training and Learning in PR Systems, Pattern recognition Approaches, Other Approaches to PR, Overview to PR Literature and Recourses.

UNIT II

Statistical Pattern Recognition: Introduction to Statistical Pattern Recognition, The Gaussian Case and Class Dependence, Discriminant functions, Additional examples, Extensions, Classifier Performance , Risk, and Errors Supervised Learning (Training) Using Parametric and Nonparametric Approaches: Introduction, Parametric Estimation and Supervised Learning, Maximum Likelihood (ML) Estimation, The Bayesian Parametric Estimation Approach Supervised Learning Using Nonparametric Approaches, Parzen Windows, K-NN Nonparametric Estimation.

UNIT III

Linear discriminant Functions and The discrete and Binary Feature Cases: Introduction, Discrete and Binary Classification Problems, Techniques to directly Obtain Linear Classifiers Unsupervised Learning and Clustering: Formulation of Unsupervised learning Problems, Clustering for Unsupervised Learning And Classification.

UNIT IV

Introduction to neural Pattern Associators and Matrix Approaches: Neural Network- Based Pattern Associators, matrix Approaches (Linear Associative mappings) and examples, Feed forward networks and Training by Back propagation: Multilayer, Feed forward Network Structure, training the Feed forward Network: The Delta rule (DR) and Generalized Delta Rule (GRD), Extension of the DR for Units in the Hidden Layers [The Generalized Delta Rule (GRD)], Extended Example: Pattern Associator for Character Classification.

UNIT V

Content Addressable Memory Approaches and Unsupervised Learning in NeurPR: Introduction, The Hopfield Approach to Neural Computing, Additional Examples of CAM Applications in PR, Unsupervised Learning in NeurPR: Self-Organizing Networks.

References:

1. LawrenceRabiner,Biing-HwangJuang,FundamentalsofSpeechRecognition,PrenticeHall,1st Ed.
2. Robert Schalkoff, Pattern Recognition, Willey 1991, 1st Ed.
3. Ben Gold and Nelson Morgan, Speech and Audio Signal Processing, Willey, 2nd Ed.2011

MCA 20 305 D -NATURAL LANGUAGE PROCESSING

Objectives

- *To give an overview of natural language processing based on various probabilistic language models.*

UNIT I

Natural Language Processing : Introduction and Overview, Ambiguity and uncertainty in language, Regular Expressions, Chomsky hierarchy, Regular languages and their limitations, Finite-state automata, Practical regular expressions for finding and counting language phenomena, Morphology, Inflectional Morphology, Derivational Morphology, Finite-State Morphological Parsing, Combining an FST Lexicon and Rules, Porter Stemmer, Exploring a large corpus with regextools.

UNIT II

Context Free Grammars, CFG definition, use and limitations, Chomsky Normal Form, Top- down parsing, bottom-up parsing, and the problems with each. The desirability of combining evidence, from both directions Non-Probabilistic Parsing Efficient CFG parsing with CYK, Earley parser, Designing a little grammar and parsing with it on some test data.

UNIT III

Probabilistic language modeling and its applications, Markov models, N-grams, Estimating the probability of a word and smoothing, Generative models of language, Part of Speech Tagging and Hidden Markov Models, Viterbi Algorithm for Finding Most Likely HMM Path, Dynamic programming with Hidden Markov Models and its use for part-of-speech tagging.

UNIT IV

Probabilistic Context Free Grammars, Weighted context free grammars, Weighted CYK, Pruning and beam search, Parsing with PCFGs, Probabilistic version of CYK, Modern parsers, Maximum Entropy Classifiers, Maximum entropy principle and its relation to maximum likelihood, Maximumentropy classifiers and their application to document classification, sentence segmentation and other language processing tasks.

UNIT V

Maximum Entropy Markov Models &Conditional Random Fields, Part-of-speech tagging, noun- phrase segmentation and information extraction models that combine maximum entropy and finite- state machines, State-of-the-art models for NLP, Lexical Semantics, Mathematics of Multinomial and Dirichlet distributions, Dirichlet as a smoothing for multinomial, Information Extraction & Reference Resolution, Various methods, Machine learning methods for coreference.

References:

1. D. Jurafsky and J. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, 2nd Edition, PrenticeHall2008.
2. C. Manning and H. Schutze, Foundations of Statistical Natural Language Processing", MIT,1999
3. James Allen, Natural Language Understanding, The Benajmins/Cummings Publishing Company,2nd Ed.1994
4. Cover, T. M. and J. A. Thomas, Elements of Information Theory. Wiley.
5. Charniak, E, Statistical Language Learning, The MIT Press,1993

MCA 20 305 E -BIO INFORMATICS

Objectives

- *Expose students to the popular genomic and proteomic databases and to impart knowledge in processing and analyzing genomic data.*
- *Introduce advanced topics in Bioinformatics.*

UNIT I

Bioinformatics - introduction to - nature and scope of computational biology and Bioinformatics. Cells - prokaryotes and eukaryotes - DNA double helix – central dogma – RNA, Amino acids, Proteins - string representations. A glossary of Bioinformatics terms - file format for bio-molecular sequences, sequence alignment, phylogeny, gene finding, microarray analysis, homology and evolutionary relationships.

UNIT II

Basic algorithms in Computational Biology - exhaustive search methods and their applications in Computational Biology - string matching algorithms. Motif finding – tandem repeats– concept of dynamic programming - graph algorithms – clustering algorithms.

UNIT III

Sequence alignment - pair-wise sequence alignment, need of scoring schemes -penalizing gaps, scoring matrices for amino acid sequence alignment, PAM probability matrix and log odds matrix, BLOSUM, Dot-plot visualization, Needleman- Wunsch algorithm- effect of scoring schemes –evalues

- BLAST and FASTA, Smith – Waterman algorithm for local alignment.

UNIT IV

Multiple sequence alignment- sequence alignment using dynamic programming, N-dimensional dynamic programming. Tools for MSA - muscle and T-Coffee. Phylogenetic algorithms - evaluation of phylogenetic trees, significance.

UNIT V

Introduction to the major resources - NCBI, EBI and ExPASy - nucleic acid sequence databases - GenBank, EMBL, DDBJ – Protein sequence databases – SWISS-PROT, TrEMBL, PIR_PSD - genome databases at NCBI, EBI, TIGR, SANGER – procedures to access these databases and to make use of the tools available.

References:

1. Mount D, Bioinformatics: Sequence &Genome Analysis, 2 ndEdition, Cold spring HarborPress.
2. Dan Gusfield, Algorithms on Strings Trees and Sequences, 1st Edition, Cambridge UniversityPress.
3. Pevzner P A, Computational Molecular Biology: An Algorithmic Approach, MITPress, Cambridge, MA.
4. Jeremy J. Ramsden, Bioinformatics: An Introduction, Springer, 1st Ed.
5. Sushmita M and TinkuA, Data Mining: Multimedia, Soft Computing and Bioinformatics, Wiley-Interscience, 1st Ed.

MCA 20 305 F-WIRELESS COMMUNICATION

Objectives

- *To understand the fundamental concepts of wireless and mobile networks.*
- *To familiarize with wireless application Protocols to develop mobile content applications.*
- *To understand about the security aspects of wireless networks.*

UNIT I

Introduction, wireless transmission – History,1G,2G,3G,4G, and above 4G frequencies for radio transmission - signals - antennas - signal propagation - multiplexing - modulation - spread spectrum - medium access control - specialized MAC - SDMA - FDMA - TDMA - aloha - CSMA - collision avoidance - polling - CDMA - comparison of S/T/F/CDMA

UNIT II

Telecommunication systems - mobile services -3G and 4G Wireless Standards-GSM, GPRS, WCDMA, LTE, WiMAX system architecture - radio interface - protocols - localization and calling - handover - security - satellite systems- GPS broadcast systems - digital audio broadcasting - digital video broadcasting, WDM Optical networks.

UNIT III

Mobile network layer - mobile IP - packet delivery - registration – tunneling and encapsulation - optimizations - reverse tunneling - dynamic host configuration protocol-Mobile Transport Layer-TCP-Indirect TCP-Snooping TCP-Mobile TCP-retransmission-recovery-transaction oriented TACP

UNIT IV

Wireless LAN-Infra red Vs radio transmission -infra structure and adhoc networks-IEEE 802.11 b/a/g-IEEE 802.16, adhoc networks - routing - algorithms-- case study: emergent Wireless Lan Technologies.

UNIT V

WAP-Design and principles of operations,WAP architecture Overview-WAP model-WAP architecture components-WAE overview-WWW model-WAE model-WTA architecture overview- Wireless session protocol specifications-Wireless transaction protocol specification Wireless transport layer security specification-Wireless datagram protocol-wireless control message protocol specification.

References:

1. Schiller J.Mobile Communications, 2/e, Pearson Education,2003.2. Gray.S.Rogers,John Edwards An Introduction to Wireless Technology, Pearson Education
2. S.G. Glisic, "Advanced Wireless Communications", 4G Technologies, Wiley,2004.
3. C.SivaRam Murthy, Ad Hoc Wireless Networks: Architectures and Protocols, Pearson Education, 2004.
4. Singhal et.al S., The Wireless Application Protocol, Addison Wesley,2002
5. C. Siva Ram Murthy, WDM Optical Networks: Concepts, Design, and Algorithms, Pearson Education,2015

MCA 20 306(P) - Mini Project

A mini-project should be done by the students based on concepts they have already learnt in the previous semesters of the MCA programme. It may be based on database concepts, object oriented concepts, computational intelligence, optimization tools, compiler design, Android application programs, Information retrieval etc.

General Pattern of Question Paper

Core and Elective courses in MCA

(with effect from 2020 Admission)

Reg.No:……..

Code: Name:……

First Semester MCA) Degree Examination – 2020

Course Code: (eg: MCA 20 101)
Course : (Eg: Design and Analysis of Algorithm)

Time: 3Hours Total Marks:100

Answer five full questions; Each Question carries 20 marks.

Question Numbers 1to7 Total Marks = 5 x 20 Marks = 100 Marks

NOTE: Minimum one question from each of the five modules. Remaining two questions can be from any module. There should not be more than two questions from the same module.