Ordinance No. (17A)

Master in Computer Application

Subharti Institute of Technology & Engineering

SWAMI VIVEKANAND SUBHARTI UNIVERSITY,MEERUT

Head
Deptt. of Computer Application
Faculty of Science
S.V.S.U., MEERUT

(Dr Shashi Raj Tectia)
(Head CA)

Ordinance 17 A

Ordinance No. (17 A)

GENERAL

- This ordinance may be called **"Ordinance Relating to Master in Computer Application"** MCA (Two Years) Program, **CBCS Pattern**
- It shall come into force from academic session 2020-21.
- This supersedes the previous Ordinance relating to **Master in Computer Application.**

1.0 INTRODUCTION

MASTER IN COMPUTER APPLICATION (MCA-TWO YEARS PROGRAM)

1.1 PROGRAM OBJECTIVES:

- To progress their career productively in software industry, academia, research, entrepreneurial pursuit, government, consulting firms and other Information Technology enabled services.
- To achieve peer-recognition; as an individual or in a team; by adopting ethics and professionalism and communicate effectively to excel well in cross culture and inter-disciplinary teams.
- To continue a lifelong professional development in computing that contributes in self and societal growth.

1.2 PROGRAM OUTCOME:

After successful completion of the program, an individual will be able to:

- Apply the knowledge of mathematics and computing fundamentals to various real life applications for any given requirement. Design and develop applications to analyze and solve all computer science related problems.
- Design applications for any desired needs with appropriate considerations for any specific need on societal and environmental aspects.
- Analyze and review literatures to invoke the research skills to design, interpret and make inferences from the resulting data. Integrate and apply efficiently the contemporary IT tools to all computer applications.
- Solve and work with a professional context pertaining to ethics, social, cultural and cyber regulations. Involve in perennial learning for a continued career development and progress as a computer professional. Function effectively both as a team leader and team member on multi disciplinary projects to demonstrate computing and management skills.
- Communicate effectively and present technical information in oral and written reports. Utilize the computing knowledge efficiently in projects with concern for societal, environmental, and cultural aspects. Function competently as an individual and as a leader in multidisciplinary projects. Create and design innovative methodologies to solve complex problems for the betterment of the society. Apply the inherent skills with absolute focus to function as a successful entrepreneur.

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- This Program Improved communication and business management skills, especially in providing tech support. It gives awareness on ethics, values, sustainability and creativity aspects.
- Exhibit understanding of broad business concepts and principles. To identify and define problems and opportunities. Demonstrate the ability to identify a business problem, isolate its key components, analyze and assess the salient issues, set appropriate criteria for decision making, and draw appropriate conclusions and implications for proposed solutions.

2. RULES AND REGULATIONS FOR ADMISSION IN MASTER IN COMPUTER APPLICATION

For Admission in MCA program, A candidate should have:

1. Passed BCA/Bachelor Degree in Computer Science Engineering or equivalent Degree.

OR

2. Passed B.Sc./B.Com./B.A.with Mathematics at 10+2 level or at Graduation Level (with additional bridge Courses as per the norms of the concerned University).

3. Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying examination.

4. The entire program has to be completed within a maximum of four years from the date of original admission in the program.

3. CURRICULUM/ STRUCTURE OF PROGRAMME OF MCA (MASTER IN COMPUTER APPLICATION)

3.1 The program shall be spread over two academic years, spread over four semesters comprising an actual teaching for a minimum of 90 days in each semester.

3.2 The program focuses on the following aspects:

a) Competency
b) Entrepreneurship
c) Skill Enhancement
d) Value Added Courses
e) Extracurricular activities
f) Industrial Training

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3.3 Choice Based Credit System (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective, minor project & dissertation. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.

The curriculum offers a total of 44 courses including Project Work plus two Qualifying papers as Seminar-1 and Seminar-2. Out of which the student has to complete 32 courses and the total number of credits required for the award of MCA degree is 96 credits. The Qualifying papers must be cleared in first attempt. The courses are divided into 5 categories, i.e. Core courses, Elective Courses, Interdisciplinary Courses, Minor project & Major project/Dissertation.

3.4. Core Courses: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. The numbers of core course during the program are 21 (13 Theory & 8 Lab)

3.5. Elective Course: Generally, a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course. Elective Course will be introduced in MCA from Third Semester. There are total 16 Elective subject in both third and fourth sem. Out of which, student has to adopt only four subjects in both semesters.

3.6 Minor project & Major Project: Minor project (6 Weeks) Conducted during the summer break after II semester and will be assessed during third semester. The Course will be carried out at the Institute under the guidance of a Faculty member.

Project/Dissertation will start in MCA-IV sem, on the topic which has been chosen by the student in III sem or can chose a new topic. In this sem, the student will submit the complete project with a publication in reputed journal

3.7. Interdisciplinary Courses: The courses which can be chosen from the other department/faculty. There are total 04 Courses in MCA- First and Second semesters.

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3.8 The academic calendar shall be as follows:-

Ist, IIIrd Semester	Session – 1st Aug. to 30th Nov Exam - 1st Dec. to 15th Dec
IInd & IV thSemester	Session - 1st Jan. to 30th April Exam - 1st May to 15th May

3.9: Table of MCA program Structure under the academic year 2020-21 under CBCS-Pattern

Year – I Semester - I

	Course Code	Course Name	Course Type	Teaching Load Per Week				Credit	Evaluation Scheme				
									Sessional Exams			ESE	Total
				L	T	P	Total		CT	TA	Total		
Semester-I	MCA-101	Professional Communication	Core Course	2	0	0	2	2	20	10	30	70	100
	MCA-102	Principles of Management	Core Course	2	0	0	2	2	20	10	30	70	100
	MCA-103	Discrete Mathematics	Core Course	2	0	0	2	2	20	10	30	70	100
	MCA-104	Computer Concepts & Programming in C	Core Course	3	1	0	4	4	20	10	30	70	100
	MCA-105	Operating System	Core Course	3	1	0	4	4	20	10	30	70	100
	MCA-106	Computer Organization & Architecture	Core Course	3	1	0	4	4	20	10	30	70	100
	MCA-107	Computer Networks	Core Course	3	0	0	3	3	20	10	30	70	100
	Practical												
	MCA-151	C-Programming Lab	Lab	0	0	2	2	1	20	10	30	70	100
	MCA-152	Operating System Lab	Lab	0	0	2	2	1	20	10	30	70	100
	MCA-153	Computer Organization Lab	Lab	0	0	2	2	1	20	10	30	70	100
Total				18	3	6	27	24	200	100	300	700	1000

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Year – I Semester – II

	Course Code	Course Name	Course Type	Teaching Load Per Week				Credit	Evaluation Scheme				
									Sessional Exams			ESE	Total
				L	T	P	Total		CT	TA	Total		
Semester-II	MCA-201	Computer Graphics & Multimedia Applications	Core Course	3	0	0	3	3	20	10	30	70	100
	MCA-202	OOP's & C++	Core Course	3	0	0	3	3	20	10	30	70	100
	MCA-203	Software Engineering	Core Course	3	0	0	3	3	20	10	30	70	100
	MCA-204	Data Structure & Analysis of Algorithms	Core Course	3	0	0	3	3	20	10	30	70	100
	MCA-205	Database Management System	Core Course	3	0	0	3	3	20	10	30	70	100
	MCA-206	Combinatorics & Graph Theory	Core Course	3	0	0	3	3	20	10	30	70	100
	MCA-207	Artificial Intelligence	Core Course	3	0	0	3	3	20	10	30	70	100
	Practical												
	MCA-251	Computer Graphics & C++ Lab	Lab	0	0	2	2	1	20	10	30	70	100
	MCA-252	Data Structure Lab	Lab	0	0	2	2	1	20	10	30	70	100
	MCA-253	DBMS & SE Lab	Lab	0	0	2	2	1	20	10	30	70	100
Total				**21**	**0**	**6**	**27**	**24**	**20**	**10**	**300**	**700**	**1000**

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Year – II Semester – III

	Course Code	Course Name	Course Type	Teaching Load Per Week				Credit	Evaluation Scheme				
									Sessional Exams			ESE	Total
				L	T	P	Total		CT	TA	Total		
Semester-III	MCA-301	Internet & Java Programming	Core Course	3	1	0	4	4	20	10	30	70	100
	MCA-302	Programming in Python	Core Course	3	1	0	4	4	20	10	30	70	100
	MCA-303-A **MCA-303-B** **MCA-303-C** **MCA-303-D**	1. Cloud Computing 2. Data ware Housing& Data Mining 3. Cryptography and Network Security 4. Compiler Design	Elective	3	1	0	4	4	20	10	30	70	100
	MCA-304-A **MCA-304-B** **MCA-304-C** **MCA-304-D**	1. Web Technology 2. Big Data 3. Internet of Things 4. Simulation and Modeling	Elective	3	1	0	4	4	20	10	30	70	100
	Practical												
	MCA-351	Minor Project	Lab	3	0	5	8	6	20	10	30	70	100
	MCA-352	Java Programming Lab	Lab	0	0	2	2	1	20	10	30	70	100
	MCA-353	Python Lab	Lab	0	0	2	2	1	20	10	30	70	100
	MCA-354	***Seminar-1***	***Qualifying***	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***50***	-----
Total				**15**	**4**	**9**	**28**	**24**	**140**	**70**	**210**	**490**	700

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Year – II Semester - IV

	Course Code	Course Name	Course Type	Teaching Load Per Week				Credit	Evaluation Scheme				
									Sessional Exams			ESE	Total
				L	T	P	Total		CT	TA	Total		
Semester-IV	MCA-401	.Net Frame work & C#	Core Course	3	1	0	4	4	20	10	30	70	100
	MCA-402-A MCA-402-B MCA-402-C MCA-402-D	1. Mobile Computing 2. Software Testing and Quality Assurance 3. Distributed database System 4. Quantum Computing	Elective	3	1	0	4	4	20	10	30	70	100
	MCA-403-A MCA-403-B MCA-403-C MCA-403-D	1. Fog Computing 2. Neural Networks 3. Software Project Management 4. Software Quality Engineering	Elective	3	1	0	4	4	20	10	30	70	100
	Practical												
	MCA-451	.Net Frame work & C# Lab	Lab	0	0	4	4	2	20	10	30	70	100
	MCA-452	Major Project/Dissertation	Project	6	0	4	10	10	50	50	100	200	300
	MCA-354	***Seminar-2***	***Qualifying***	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***50***	-----
Total				**15**	**3**	**8**	**26**	**24**	**130**	**90**	**220**	**480**	**700**

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3.10 List of Core Subject and Elective Subjects

Course Type/Sem	Course Code	Course Name
Core Course First Sem	MCA-101	Professional Communication
	MCA-102	Principles of Management
	MCA-103	Discrete Mathematics
	MCA-104	Computer Concepts & Programming in C
	MCA-105	Operating System
	MCA-106	Computer Organization & Architecture
	MCA-107	Computer Networks
	MCA-151	C-Programming Lab
	MCA-152	Operating System Lab
	MCA-153	Computer Organization Lab
Core Course Second Sem	MCA-201	Computer Graphics & Multimedia Applications
	MCA-202	OOP's & C++
	MCA-203	Software Engineering
	MCA-204	Data Structure & Analysis of Algorithms
	MCA-205	Database Management System
	MCA-206	Combinatorics & Graph Theory
	MCA-207	Artificial Intelligence
	MCA-251	Computer Graphics & C++ Lab
	MCA-252	Data Structure Lab
	MCA-253	Computer Graphics & C++ Lab
Core Course Third Sem	MCA-301	Internet & Java Programming
	MCA-302	Programming in Python
	MCA-351	Minor Project
	MCA-352	Java Programming Lab
	MCA-353	Python Lab
	MCA-354	Seminar-1
Core Course Fourth Sem	MCA-401	.Net Frame work & C#
	MCA-451	.Net Frame work & C# Lab
	MCA-452	Major Project/Dissertation
	MCA-453	Seminar-2
Elective-I Third Sem	MCA-303-A	Cloud Computing
	MCA-303-B	Data ware Housing& Data Mining
	MCA-303-C	Cryptography and Network Security
	MCA-303-D	Compiler Design
Elective-2 Third Sem	MCA-304-A	Web Technology
	MCA-304-B	Big Data
	MCA-304-C	Internet of Things
	MCA-304-D	Simulation and Modeling
Elective-3 Fourth Sem	MCA-402-A	Mobile Computing
	MCA-402-B	Software Testing and Quality Assurance
	MCA-402-C	Distributed database System
	MCA-402-D	Quantum Computing

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Elective-4 Fourth Sem	MCA-403-A	Fog Computing
	MCA-403-B	Neural Networks
	MCA-403-C	Software Project Management
	MCA-403-D	Software Quality Engineering

4. EXAMINATION AND EVALUATION

The examination (BOTH THEORY & PRACTICAL) in each semester shall be conducted as 100 marks in two parts:

A: Internal assessment: **It will be of 30 marks as under:-**

1. Midterm written test including in-between snap tests if any, after three months carrying 20 marks.

2. A maximum of 10 marks shall be awarded for teacher assessment and attending classes (including practicals)

Regularly as per the following norms:

85- 100% attendance	-	10 Marks
80- 84.99% attendance	-	9 Marks
75- 79.99% attendance	-	8 Marks
70 – 74.99 % attendance	-	7 Marks
65 – 69.99% attendance	-	5 Marks
60 – 64.99% attendance	-	3 Marks
51 - 59.99% attendance	-	2 Marks
50% attendance	-	1 Mark
Less than 50% attendance	-	0 Mark

B. University Examination: It carrying 70 marks

The marks obtained in the two parts of the examination together shall be aggregated for the purpose of determining the total marks obtained by a student in a particular paper/subject of study. A special examination may be held in the month of August for the students of the first year of the course to enable them to reappear in those papers in which they had failed or could not appear due to any reason other than shortage of attendance. Students detained due to shortage of attendance may also appear in the special examination provided they make up their attendance by attending extra classes which may be arranged between 15th May to 31st July

4.1 ATTENDANCE:

The students are expected to attend all the classes and should not have less than 75 % attendance in theory as well as in practical classes, wherever held, to become eligible to appear for the university examination. Short fall in attendance can, however be condoned in deserving cases to the extent of 10% by the Principal. If the short fall is more than 10% but not more than 15%, the Principal may recommend deserving cases to the Vice Chancellor for condonation. The order of the Vice Chancellor in this regard shall be final.

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4.2 PAPER SETTING

The work of setting the end semester examination papers and evaluation of scripts and conduct of the end semester practical examination shall be assigned to the course teachers as well as to outsiders, ordinarily in the ratio of 50:50 for internal and external valuation respectively.

4.3 RESULTS

Examination results shall be prepared at the end of each academic year by taking into account the marks obtained in all the semesters till date.

1. A candidate shall be declared as passed at the end of an academic year if he/she secures minimum 40% marks in each paper and aggregate shall be promoted to the next academic year.

2. If a student fails to secure 40% marks in not more than 1/3 of the numbers of the papers of the academic year, he/she will be provisionally promoted to the next year with carryover papers (PCP) and will have to appear & obtain pass marks in carryover papers along with the subsequent regular examinations for the relevant semester.

3. A student will be promoted to the next year if he/she has cleared at least 50% of subjects of year of study/odd & even semester combined plus back paper(s) of previous years, if any.

4. If a student fails in only one subject in an academic year by not more than 5 marks, he/she will be declared pass with grace (PWG). Which, however, will not be added to the aggregate?

(i) Grace marks are not a matter of right of the student but are the discretion of the University.
(ii) Provided that the candidate has appeared in the main examination of the concerned course and falls short of pass marks by not more than five (05) marks in theory paper only. Benefit of above mentioned shall not be given to the candidate who had appeared in supplementary/special examination/carry over examination.
(iii) Further, benefit of grace marks may be given only to the candidate who will pass the entire concerned examination of the **semester*/year** after awarding the grace marks and not for the purpose of promoting the student to next year with back papers or for improvement of division or percentage.
(iv) If in a head/subject of an examination passing in Theory, Practical or sessional exams separately is mandatory, then the benefit of grace marks shall be given only in Theory examination of the University examination.
(v) The award of grace marks permissible shall be on the basis of 1 grace mark for every 05 marks secured by an examinee over and above the minimum passing aggregate marks of all subjects of the year.

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5. If a candidate fails in only one head/subject and having passed in all other heads/subjects of the given examination of a **semester*/year**, then his/her deficiency of marks may be fulfilled by grace marks under the following conditions:-

Awarding of Grace Marks shall be done as given below:-

Aggregate Marks Obtained over & above minimum passing marks	Permissible Grace Marks
1-5	1
6-10	2
11-15	3
16-20	4
21-25	5

(i) Total number of Grace Marks given to the student will be marked with asterisk (*) at the bottom of the mark sheet.

* Grace Mark in semester examination will be considered hereinafter.

6. A student not covered by clause (1) to (2) of 4.3 , above shall have the following options to complete his/her course -

(i) He/ she may take admission on payment of full annual course fee and repeat the entire year of study. He /She shall be treated as a regular student.

Or

(ii) He /She may pay only University exam fee for the End Semester Examination and appear in the End Semester University exams directly. He /She shall not be allowed to attend classes and the Sessional marks obtained earlier shall be retained.

Or

(iii) He /She may pay half of the annual course fee and attend classes. The sessional marks obtained by him/her earlier shall be retained. There will not be any requirement of minimum attendance for appearing in the University examination

7. The examination for students reappearing in any papers shall be held along with the subsequent regular examinations for the relevant semester.

8. A student will not be promoted to the next academic year if the carryover papers are more than 50% at one point of time.

9. A Student will be promoted to the next year if he/she has cleared at least 50% of subjects of year of study/odd & even semester combined plus back paper(s) of previous years, if any.

10. The final result at the end of the course shall be prepared as below by aggregating the marks obtained in all the semesters.

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11. The entire course has to be completed within a maximum of four years from the date of original admission in the course.

5. EVALUATION UNDER GRADING ASSESSMENT

The minimum Grade/ Grade Point required to pass each paper in a semester examination under CBCS shall be Grade D/ Grade Point 4 in each theory paper/ Practical/Project (wherever applicable) in External Examination and Internal Assessment separately.

6 CALCULATION CRITERIA:-

To implement the following grading system, the colleges/campuses shall use the following UGC recommended 10 point grading system:

Marks (%)	Letter Grades	Grade Points (G)
85-100	A++ (Outstanding)	10
75 to < 85	A+ (Excellent)	9
70 to <75	A (Very Good)	8
65 to <70	B+ (Good)	7
60 to <65	B (Above Average)	6
50 to <60	C (Average)	5
40 to <50	D (Pass)	4
0 to <40	F (Fail)	0
	AB (Absent)	0

7. COMPUTATION OF SGPA AND CGPA

(Si)= £ (Ci x Gi)/ £ Ci, where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

CGPA=£(Ci x Si) / £ Ci where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

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

8. POWER TO MODIFY

In the event of any emergent situation, if any deviation is considered necessary, the Hon'ble Vice Chancellor is authorized to modify the Ordinance, subject to subsequent ratification by the Executive Council.

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Swami Vivekanand Subharti University, Meerut

Uttar Pradesh

Detailed Syllabus

(CBCS-Pattern)

MCA – Two Years

(Effective from the Session: 2020-21)

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MASTER IN COMPUTER APPLICATION (MCA-TWO YEARS PROGRAM: CBCS Pattern)

PROGRAM OBJECTIVES:

- To progress their career productively in software industry, academia, research, entrepreneurial pursuit, government, consulting firms and other Information Technology enabled services.
- To achieve peer-recognition; as an individual or in a team; by adopting ethics and professionalism and communicate effectively to excel well in cross culture and inter-disciplinary teams.
- To continue a lifelong professional development in computing that contributes in self and societal growth.

PROGRAM SPECIFIC OUTCOME:

After successful completion of the program, an individual will be able to:

- Apply the knowledge of mathematics and computing fundamentals to various real life applications for any given requirement. Design and develop applications to analyze and solve all computer science related problems.
- Design applications for any desired needs with appropriate considerations for any specific need on societal and environmental aspects.
- Analyze and review literatures to invoke the research skills to design, interpret and make inferences from the resulting data. Integrate and apply efficiently the contemporary IT tools to all computer applications.
- Solve and work with a professional context pertaining to ethics, social, cultural and cyber regulations. Involve in perennial learning for a continued career development and progress as a computer professional. Function effectively both as a team leader and team member on multi disciplinary projects to demonstrate computing and management skills.
- Communicate effectively and present technical information in oral and written reports. Utilize the computing knowledge efficiently in projects with concern for societal, environmental, and cultural aspects. Function competently as an individual and as a leader in multidisciplinary projects. Create and design innovative methodologies to solve complex problems for the betterment of the society. Apply the inherent skills with absolute focus to function as a successful entrepreneur.
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- Exhibit understanding of broad business concepts and principles. To identify and define problems and opportunities. Demonstrate the ability to identify a business problem, isolate its key components, analyze and assess the salient issues, set appropriate criteria for decision making, and draw appropriate conclusions and implications for proposed solutions.

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SWAMI VIVEKANAND SUBHA

Syllabus 17 B

DETAILED SYLLABUS OF MCA FIRST SEMESTER

CORE COURSE

Course Name: PROFESSIONAL COMMUNICATION	(MCA-101)

Credits = [L+T+P : 2+0+0]	Total Hours = 30

Max Marks: [70+30=100]

Course Objectives: The purpose of commencing Professional communication skills course is to develop in students fundamental communication skills being integral to personal, social and professional interactions.

Unit -1 Basics of Technical Communication **6 hrs**

Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Importance of technical communication; Barriers to Communication.

Unit - II Constituents of Technical Written Communication **6 hrs**

Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words: Requisites of Sentence Construction: Paragraph Development: Techniques and Methods -Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps.

Unit - III Forms of Technical Communication **6 hrs**

Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order, Claim and Adjustment Letters; Job application and Resumes. Official Letters: D.O. Letters; Govt. Letters, Letters to Authorities etc. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal: Significance. Technical Paper, Project. Dissertation and Thesis Writing: Features, Methods & Writing.

Unit - IV Presentation Strategies **6 hrs**

Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery: Body Language; Space; Setting Nuances of Voice Dynamics; Time- Dimension.

Unit - V Value- Based Text Readings **6 hrs**

Following essays form the suggested text book with emphasis on Mechanics of writing,

(i) The Aims of Science and the Humanities by M.E. Prior
(ii) The Language of Literature and Science by A.Huxley
(iii) Man and Nature by J.Bronowski
(iv) The Mother of the Sciences by A.J.Bahm
(v) Science and Survival by Barry Commoner
(vi) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior
(vii) The Effect of Scientific Temper on Man by Bertrand Russell.

Text Book

1. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi .
2. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press 2007. New Delhi.

Reference Books

1. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi

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Primarily

2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
3. How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.
4. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.
6. Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.

Course Outcomes:

- The ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal.
- The present course hopes to address most of these aspects through an interactive approach of teaching learning process; focusing on various dimensions of communication skills.
- The course also focuses on enhancing the ability to handle casual and formed satiations in terms of personal and intellectual grooming.

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CORE COURSE

Course Name: PRINCIPLES OF MANAGEMENT	(MCA-102)

Credits = [L+T+P : 2+0+0]	Total Hours = 30

Max Marks: [70+30=100]

Course Objectives: Describe primary features, processes and principles of management. Explain functions of management in terms of planning, decision making.

UNIT I **6 hrs**

Management: Concept, Nature, Importance; Management Art and Science, Management as a Profession, Management Vs. Administration, Management Skills, Levels of Management, Characteristics of Quality Managers.

Evolution of Management: Early contributions, Taylor and Scientific Management, Fayol's Administrative Management, Bureaucracy, Hawthorne Experiments and Human Relations, Social System Approach, Decision Theory Approach.

Business Ethics and Social Responsibility: Concept, Shift to Ethics, Tools of Ethics.

UNIT II **6 hrs**

Introduction to Functions of Management

Planning: Nature, Scope, Objectives and Significance of Planning, Types of Planning, Process of Planning, Barriers to Effective Planning, Planning Premises and Forecasting, Key to Planning, Decision Making.

Organizing: Concept, Organisation Theories, Forms of Organisational Structure, Combining Jobs: Departmentation, Span of Control, Delegation of Authority, Authority & Responsibility, Organisational Design.

UNIT III **6 hrs**

Staffing: Concept, System Approach, Manpower Planning, Job Design, Recruitment & Selection, Training & Development, Performance Appraisal

Directing: Concept, Direction and Supervision

Motivation: Concept, Motivation and Performance, Theories Of Motivation, Approaches for Improving Motivation, Pay and Job Performance, Quality of Work Life, Morale Building.

UNIT IV **4 hrs**

Leadership: The Core of Leadership: Influence, Functions of Leaders, Leadership Style, Leadership Development.

Communication: Communication Process, Importance of Communication, Communication Channels, Barriers to Communication.

UNIT-V **8 hrs**

Controlling: Concept, Types of Control, Methods: Pre-control: Concurrent Control: Post-control, An Integrated Control System, The Quality Concept Factors affecting Quality, Developing a Quality Control System, Total Quality Control, Pre-control of Inputs, Concurrent Control of Operations. Post Control of Outputs.

Change and Development: Model for Managing Change, Forces for Change, Need for Change, Alternative Change Techniques, New Trends in Organisational Change.

Suggested Reading:

1. Stoner, Freeman & Gilbert Jr - Management (Prentice Hall of India, 6th Edition)
2. Koontz - Principles of Management (Tata Mc Graw Hill, Ist Edition 2008)
3. Robbins & Coulter - Management (Prentice Hall of India, 8th Edition)

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4. Robbins S.P. and Decenzo David A. - Fundamentals of Management: Essential Concepts and Applicat
(Pearson Education, 5th Edition)
5. Hillier Frederick S. and Hillier Mark S. - Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets (Tata Mc Graw Hill, 2nd Edition 2008)
6. Weihrich Heinz and Koontz Harold - Management: A Global and Entrepreneurial Perspective (Mc Graw Hill, 12th Edition 2008)

Course Outcomes:

- The ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal.
- The present course hopes to address most of these aspects through an interactive approach of teaching learning process; focusing on various dimensions of communication skills.
- The course also focuses on enhancing the ability to handle casual and formed satiations in terms of personal and intellectual grooming.

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CORE COURSE

Course Name: Discrete Mathematics	MCA-103

Credits = [L+T+P : 2+0+0]	Total Hours = 30

Max Marks: [70+30=100]

Course Objectives: Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contra positives using truth tables and the properties of logic.

Unit-I: **6 hrs**

Set Theory: Introduction, Size of sets and cardinals, Venn diagrams, Combination of sets, Multisets, Ordered pairs and Set identities.

Relations & Functions: Relations - Definition, Operations on relations, Composite relations, Properties of relations, Equality of relations, Partial order relation. Functions - Definition, Classification of functions, Operations on functions, Recursively defined functions.

Notion of Proof: Introduction, Mathematical Induction, Strong Induction and Induction with Nonzero base cases.

Unit-II: **6 hrs**

Lattices: Introduction, Partial order sets, Combination of partial order sets, Hasse diagram, Introduction of lattices, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.

Unit-III: **6 hrs**

Boolean algebra: Introduction, Axioms and Theorems of Boolean algebra, Boolean functions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

Unit-IV: **6 hrs**

Propositional & Predicate Logic: Propositions, Truth tables, Tautology, Contradiction, Algebra of propositions, Theory of Inference and Natural Deduction. Theory of predicates, First order predicate, predicate formulas, quantifiers, Inference theory of predicate logic.

Unit-V: 6 hrs

Recurrence Relations: Introduction, Growth of functions, Recurrences from algorithms, Methods of solving recurrences.

Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle, Pólya's Counting Theory.

Text Books:

1. Discrete Mathematics and Its Applications, Kenneth H. Rosen, McGraw-Hill, 2006.
2. Discrete Mathematical Structures, B. Kolman, R. C. Busby, and S. C. Ross, Prentice Hall, 2004.
3. Discrete and Combinatorial Mathematics, R.P. Grimaldi, Addison Wesley, 2004.
4. Discrete Mathematical Structures, Y N Singh, Wiley-India, First Edition, 2010.

Course Outcomes

- Express a logic sentence in terms of predicates, quantifiers, and logical connectives
- Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.

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CORE COURSE

COURSE NAME: COMPUTER CONCEPTS AND PROGRAMMING IN C	MCA-104

Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: This course focus on the detailed concept of programming as well as the operating system

UNIT 1: **12 hrs**

Introduction to any Operating System [Unix, Linux, Windows], Programming Environment, Write and Execute the first program, Introduction to the Digital Computer; Concept of an algorithm; termination and correctness. Algorithms to programs: specification, top-down development and stepwise refinement. Introduction to Programming, Use of high level programming language for the systematic development of programs. Introduction to the design and implementation of correct, efficient and maintainable programs, Structured Programming, Trace an algorithm to depict the logic, Number Systems and conversion methods

UNIT 2: **14 hrs**

Standard I/O in "C", **Fundamental Data Types and Storage Classes:** Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external, **Operators and Expressions:** Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity,

UNIT 3: **14 hrs**

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, **Program Loops and Iteration:** Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue, **Modular Programming:** Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

UNIT 4: **12 hrs**

Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size, **Structures:** Purpose and usage of structures, declaring structures, assigning of structures. **Pointers to Objects:** Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation, defining and using stacks and linked lists.

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UNIT 5: **08 hrs**

Sequential search, Sorting arrays, Strings, Text files, **The Standard C Preprocessor:** Defining and calling macros, utilizing conditional compilation, passing values to the compiler, **The Standard C Library:** Input/Output : fopen, fread, etc, string handling functions, Math functions : log, sin, alike Other Standard C functions.

Text Books :

1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
2. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition [India Edition], 2007.

Course Outcomes:

- Learn how to solve common types of computing problems.
- Learn data types and control structures of C
- Learn to map problems to programming features of C.
- Learn to write good portable C programs.

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CORE COURSE

Course Name: Operating System	MCA-105
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Objectives: Students should understand the data structures and algorithms used to implement an Operating System.

Unit-I **08 hrs**

Introduction: Definition and types of operating systems, Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.

Unit-II **08 hrs**

Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.

Unit-III **14 hrs**

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Unit-IV **16 hrs**

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging in MULTICS and Intel 386, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrasing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.

Unit-V **14 hrs**

Security & Case Study: Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption. Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface, Linux system-design principles, Kernel Modules, Process Management, Scheduling, Memory management, File Systems, Input and Output, Interprocess communication, Network structure, security

References

1. Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Fifth Edition, Addision-Wesley
2. Milan Milankovic, "Operating Systems, Concepts and Design", McGraw-Hill.
3. Harvey M Deital, "Operating Systems", Addison Wesley
4. Richard Peterson, "Linux: The Complete Reference", Osborne McGraw-Hill

Course Outcomes:

- To understand the services provided by and the design of an operating system.
- To understand the structure and organization of the file system.

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- To understand what a process is and how processes are synchronized and scheduled.
- To understand different approaches to memory management.
- Students should be able to use system calls for managing processes, memory and the file system.

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CORE COURSE

COURSE NAME: COMPUTER ORGANIZATION & ARCHITECTURE	MCA – 106

Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: The objective of this course is to introduce the organization of a computer and its principal components, viz, ALU, Control, Memory and Input/output. The course will also enable the student to understand the design components of a digital subsystem that required realizing various components such as ALU, Control, etc.

Unit-I (Representation of Information and Basic Building Blocks) **14 hrs**

Introduction to Computer, Computer hardware generation, Number System: Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean Algebra, K-map simplification, Half Adder, Full Adder, Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer, Carry lookahead adder, Combinational logic Design, Flip-Flops, Registers, Counters (synchronous & asynchronous), ALU, Micro-Operation. ALU-chip, Faster Algorithm and Implementation (multiplication & Division)

Unit-II (Basic Organization) **12 hrs**

Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired & micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing modes, Instruction formats, data transfer & Manipulation, I/O Organization, Bus Architecture, Programming Registers

Unit-III (Memory Organization) **10 hrs**

Memory Hierarchy, Main memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache memory, Virtual Memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

Unit-IV (I/O Organization) **10 hrs**

Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer, Strobe Control, Handshaking.

Unit-V (Process Organization) **14 hrs**

Basic Concept of 8-bit micro Processor (8085) and 16-bit Micro Processor (8086), Assembly Instruction Set, Assembly language program of (8085): Addition of two numbers, Subtraction, Block Transfer, find greatest number, Table search, Numeric Manipulation, Introductory Concept of pipeline, Flynn's and Feng's Classification, Parallel Architectural classification.

References:

1. William Stalling, "Computer Organization & Architecture", Pearson education Asia
2. Mano Morris, "Computer System Architecture", PHI
3. Zaky & Hamacher, "Computer Organization", McGraw Hill
4. B. Ram, "Computer Fundamental Architecture & Organization", New Age
5. Tannenbaum, " Structured Computer Organization", PHI.

Course Outcomes:

- Describe the fundamental organization of a computer system
- Explain the functional units of a processor
- Explain addressing modes, instruction formats and program control statements

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CORE COURSE

Course Name: COMPUTER NETWORKS	MCA - 107
Credits = [L+T+P : 3+0+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: The **course objectives** include **learning** about **computer network** organization and implementation, obtaining a theoretical understanding of data communication and **computer networks**, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems.

Unit-I **12 hrs**

Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer- transmission, switching methods, Integrated services digital networks, terminal handling.

Unit-II **14 hrs**

Medium access sub layer: Channel allocations, LAN protocols, ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, FDDI, Data Link Layer- elementary data link protocols, sliding windows protocols, error handling, High Level Data Link Control

Unit-III **12 hrs**

Network Layer: Point-to Point networks, routing algorithms, congestion control algorithms, internetworking, TCP/IP packet, IP addresses, IPv6.

Unit-IV **10 hrs**

Transport Layer: Design issues, connection management, TCP window Management, User Datagram Protocol, Transmission Control Protocol.

Unit-V **12 hrs**

Application Layer: Network Security, DES, RSA algorithms, Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol, Cryptography and compression Techniques.

References

1. A. S Tanenbaum, "Computer Networks, 3rd Edition", PHI
2. W. Stallings, "Data and Computer Communication", Macmillan Press
3. Comer, "Computer Networks & Internet", PHI.
4. Comer, "Internetworking with TCP/IP", PHI
5. Forouzan, "Data Communication and Networking", TMH

Course Outcomes:

- Recognize the technological trends of Computer Networking.
- Discuss the key technological components of the Network.
- Evaluate the challenges in building networks and solutions to those.

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CORE COURSE

COURSE NAME: PROGRAMMING LAB	MCA-151

Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Objectives: This course focus on the detailed concept of programming using "C Programming Language"

1. Write C program to find largest of three integers.
2. Write C program to check whether the given string is palindrome or not.
3. Write C program to find whether the given integer is (i) a prime number (ii) an Armstrong number.
4. Write C program for Pascal triangle.
5. Write C program to find sum and average of n integer using linear array.
6. Write C program to perform addition, multiplication, transpose on matrices.
7. Write C program to find fibbonacci series of iterative method using user-defined function.
8. Write C program to find factorial of n by recursion using user-defined functions.
9. Write C program to perform following operations by using user defined functions: (i) Concatenation (ii) Reverse (iii) String Matching
10. Write C program to find sum of n terms of series: n – n*2/2! + n*3/3! - n*4/4! + ...
11. Write C program to interchange two values using (i) Call by value. (ii) Call by reference.
12. Write C program to sort the list of integers using dynamic memory allocation.
13. Write C program to display the mark sheet of a student using structure.
14. Write C program to perform following operations on data files: (i) read from data file. (ii) write to data file.
15. Write C program to copy the content of one file to another file using command line argument.

Course Outcomes:

- Learn how to solve common types of computing problems.
- Learn data types and control structures of C
- Learn to map problems to programming features of C.
- Learn to write good portable C programs.

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CORE COURSE

COURSE NAME: OPERATING SYSTEM LAB	MCA-152

Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Objectives: Students should understand the data structures and algorithms used to implement an Operating System.

1. Implement the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority [4P]
2. Implement all file allocation strategies : Sequential ,Indexed ,Linked [4P]
3. Implement Semaphores [4P]
4. Implement File Organization Techniques : Single level directory, Two level, Hierarchical, DAG [4P]
5. Implement Banker's Algorithm for Deadlock Avoidance [4P]
6. Implement an Algorithm for Deadlock Detection [4P]
7. Implement all page replacement algorithms: FIFO, LRU, LFU [4P]
8. Implement Shared memory and IPC **[4P]**
9. Implement Paging Technique of memory management. **[4P]**
10. Implement Threading & Synchronization Applications **[4P]**

Course Outcomes:

- To understand the services provided by and the design of an operating system.
- To understand the structure and organization of the file system.
- To understand what a process is and how processes are synchronized and scheduled.
- To understand different approaches to memory management.
- Students should be able to use system calls for managing processes, memory and the file system.

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CORE COURSE

COURSE NAME: ORGANIZATION LAB	MCA-153

Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Course Objectives: The objective of this course is to introduce the organization of a computer and its principal components, viz, ALU, Control, Memory and Input/output. The course will also enable the student to understand the design components of a digital subsystem that required realizing various components such as ALU, Control, etc.

1. Study and Bread Board Realization of Logic Gates. K-Map, Flip-Flop equation, realization of characteristic and excitation table of various Flip Flops.
2. Implementation of Half Adder, Full Adder and Subtractor.
3. Implementation of Ripple Counters and Registers.
4. Implementation of Decoder and Encoder circuits.
5. Implementation of Multiplexer and D-Multiplexer circuits.

Course Outcomes:

- Describe the fundamental organization of a computer system
- Explain the functional units of a processor
- Explain addressing modes, instruction formats and program control statements

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DETAILED SYLLABUS OF MCA SECOND SEMESTER

CORE COURSE

COURSE NAME: COMPUTER GRAPHICS AND ANIMATION	MCA-201
Credits = [L+T+P : 3+0+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: **Computer Graphics** is utilized by a wide variety of fields -- including **computer** science -- as a tool to assist in the problem solving aspects of the field. The primary **objective** of this **course** is to have -you- learn the basic principles of 3-dimensional **computer graphics**.

Unit I **14 hrs**

Graphics Primitives: Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma display ,Liquid Crystal display, Plotters, Printers.

Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera.

Input Techniques: Positioning techniques, Positioning Constraints, Scales & Guidelines, Rubber-Band techniques, Dragging, Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points, defining a boundary rectangle, multiple selections, Menu selection.

Unit II **16 hrs**

Mathematics for Computer Graphics: Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors.

Line Drawing Algorithms: DDA algorithms, Bresenham's Line algorithm.

Segment & Display files: Segments, Functions for segmenting the display file, Posting and unposting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file Structure.

Graphics Operations: Clipping: Point Clipping, Line Clipping, Polygon Clipping.

Filling: Inside Tests; Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.

Unit III **10 hrs**

Conics, Curves and Surfaces: Quadric surfaces: Sphere, Ellipsoid, and Torus. Superquadrics: Superellipse, superellipsoid. Spline & Bezier Representations: Interpolation and approximation splines, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces.

Unit IV **12 hrs**

Transformation: 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, Transformation between coordinate systems.

3 D Graphics: 3 D Display Methods, 3 D modeling, 3 D transformations, Parallel projection, Perspective projection. Visible lines and surfaces identification, Hidden surface removal

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Unit V **08 hrs**

Animation : Introduction to Animation, Principles of Animation, Types of Animation, Types of Animation Systems : Scripting, Procedural, Representational, Stochastic, etc.
Animation Tools : Hardware –SGI, PC's, Amiga etc.
Software : Adobe Photoshop, Animation studio, Wave front etc.
Gif Animator : Microsoft GIF Animation, GIF Construction, GIFmation etc.
GKS: GKS Standards, GKS Primitives – Polyline, Polymarker, and Fill area, Text, GKS Workstation and Metafiles.

References:

1. Donald Hearn and M. Pauline Baker, "Computer Graphics", PHI
2. Steven Harrington, "Computer Graphics: A Programming Approach", TMH
3. Prajapati A. K, "Computer Graphics", PPM Ed 2
4. Foley James D, "Computer Graphics", AW Ed 2
5. Newman and Sproul, "Principle of to Interactive Computer Graphics", McGraw Hill
6. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
7. Rogers and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill

Course Outcomes:

- Explain the core concepts of computer graphics, including viewing, projection, perspective, modelling and transformation in two and three dimensions.
- Apply the concepts of colour models, lighting and shading models, textures, ray tracing, hidden surface elimination, anti-aliasing, and rendering.
- Interpret the mathematical foundation of the concepts of computer graphics.
- Describe the fundamentals of animation, parametric curves and surfaces, and spotlighting.
- Identify a typical graphics pipeline and apply graphics programming techniques to design and create computer graphics.

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CORE COURSE

Course Name: OBJECT ORIENTED PROGRAMMING & C++	MCA-202

Credits = [L+T+P : 3+0+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: Develop a greater understanding of the issues involved in Programming language design and implementation. Develop an in-depth understanding of functional, logic, and object- Oriented programming paradigms

Unit – I **10 hrs**

Object-Oriented Analysis and Data Modeling : Object Oriented Concepts, Object oriented Analysis Modeling, Data Modeling.

Object-Oriented Design : Origins of object-Oriented Design, Object Oriented design concepts, Object Oriented Design methods, class and object definition, Refining Operations, Program Components and Interfaces. Annotation for object-oriented Design, Implementation of Detail Design, An alternative object-oriented Design Strategy Integrating OOD with SA/SD.

Unit – II **12 hrs**

Introduction to OOP and C++ : Advantages of OOP, Need of object-oriented programming, characteristics of object-oriented languages, C++ and C.

C++ Programming Basics : Basic program construction, input/output using cin/count; Preprocessor Directives; Comments, integer, character, float data types manipulators Arithmetic operators; Library functions.

Unit – III **11 hrs**

Loops and Decisions : Relational operators, Loops, Decisions, Logical Operators, Precedence, Control statements.

Structure and Functions : Structure, Enumerated Data Types, simple functions, Passing arguments to and returning values from functions, Reference Arguments. Overloaded functions, Inline functions, Default Arguments, Variable and Storage classes, Returning by reference.

Unit – IV **13 hrs**

Objects and Classes : Specifying & using class & object, Constructors, objects as function arguments.

Arrays and Operator Overloading : Array Fundamentals, Arrays as class member data, Arrays of objects, strings, overloading Unary & Binary operators, Data conversion, Pitfalls of overloading & Conversion.

Unit – V **14 hrs**

Inheritance : Derived class and their constructs, overriding member functions, class hierarchies, Public & Private Inheritance, Inheritance levels.

Pointers : Pointers with Arrays, functions, strings, pointer to objects, new-delete, Linked-Lists Virtual Functions. files and Streams : Virtual, friend and static function; the this pointer ; streams; string, character, object I/O: I/O with Multiple objects; File pointers; Disk I/O with member function; Error Handling; Redirection; :command-line Arguments.

Reference books:

1. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publication Pvt. Ltd,4 th edition, New Delhi, 2002
2. Object Oriented Programming With C++ By Sourav Sahay Form Oxford University Press
3. Ashok N Kamathane, "Object Oriented Programming with ANSI & Turbo C++", Pearson Education, New Delhi, 2003.
4. Bjarne Stroustrup," C++ Programming language", Pearson Education, New Delhi, 2001.

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Course Outcomes:

- Understand the difference between the top-down and bottom-up approach
- Describe the object-oriented programming approach in connection with C++
- Apply the concepts of object-oriented programming
- Illustrate the process of data file manipulations using C++
- Apply virtual and pure virtual function & complex programming situations

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CORE COURSE

Course Name: Software Engineering	MCA- 203

Credits = [L+T+P : 3+0+0]	Total Hours = 60

Max Marks: [70+30]

Objectives: New **software** can be created by developing new programs, configuring generic **software** systems or reusing existing **software**. **Software engineering** is an **engineering** discipline that is concerned with all aspects of **software** production. ... A set of activities whose goal is the development or evolution of **software**.

Unit-I Introduction: **10 hrs**

Introduction to software engineering, Importance of software, The evolving role of software, Software Characteristics, Software Components, Software Applications, Software Crisis,Software engineering problems, Software Development Life Cycle, Software Process.

Unit-II Software Requirement Specification: **12 hrs**

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

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

Unit-III Coding: **11 hrs**

Top-Down and Bottom –Up programming, structured programming, information hiding, programming style and internal documentation.

Testing: Testing principles, Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, software testing strategies, Verification & validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging.

Unit-IV Software Project Management: **13 hrs**

The Management spectrum- (The people, the product, the process, the project), cost estimation, project scheduling, staffing, software configuration management, Structured Vs. Unstructured maintenance, quality assurance, project monitoring, risk management.

Unit-V Software Reliability & Quality Assurance: **14 hrs**

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

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

References

1. Pressman, Roger S., "Software Engineering: A Practitioner's Approach Ed. Boston: McGraw Hill, 2001
2. Jalote, Pankaj, "Software Engineering Ed.2", New Delhi: Narosa 2002
3. Schaum's Series, "Software Engineering", TMH
4. Ghezzi, Carlo and Others, "Fundamentals of Software Engineering", PHI
5. Alexis, Leon and Mathews Leon, "Fundamental of Software Engineering", Vikas

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6. Sommerville, Ian, "Software Engineering", AWL, 2000
7. Fairly, "Software Engineering", New Delhi: TMH
8. Pfleerger, S, "Software Engineering", Macmillan, 1987

Course Outcome:

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- An ability to communicate effectively with a range of audiences
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

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CORE COURSE

Course Name: DATA STRUCTURE & ANALYSIS OF ALGORITHM	MCA - 204

Credits = [L+T+P : 3+0+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: Develops skills in implementations and applications of data structures. Implements basic algorithms for sorting and searching. Implements basic data structures such as stacks, queues and trees. Applies algorithms and data structures in various real-life software problems.

Unit-I **14 hrs**

Introduction:

Algorithms, Analysis of Algorithms, Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort Medians and order statistics

Unit-II **16 hrs**

Elementary Data Structure: Stacks, Queues, Linked list, Binary Search Tree, Hash Table

Advanced Data Structure: Red Black Trees, Splay Trees, Augmenting Data Structure Binomial Heap, BTree, Fibonacci Heap, and Data Structure for Disjoint Sets Union-find Algorithm, Dictionaries and priority Queues, mergeable heaps, concatenable queues

Unit-III **10 hrs**

Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis

Unit-IV **10 hrs**

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem

Unit –V **10 hrs**

Randomized Algorithms, String Matching, NP-Hard and NP-Completeness Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials & the FFT, Number Theoretic Algorithms, Computational Geometry

References

1. Horowitz Sahani, " Fundamentals of Computer Algorithms", Golgotia
2. Coremen Leiserson etal. " Introduction to Algorithms", PHI
3. Brassard Bratley, "Fundamental of Algorithms", PHI
4. M T Goodrich etal, "Algorithms Design", John Wiley
5. A V Aho etal, "The Design and analysis of Algorithms", Pearson Education

Course Outcomes:

- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks , queues , lists , trees and graphs
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

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CORE COURSE

Course Name: DATABASE MANAGEMENT SYSTEM	MCA - 205

Credits = [L+T+P : 3+0+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: Upon completion, students should be able to design and implement normalized database structures by creating simple database tables, queries, reports, and forms. To develop an understanding of essential **DBMS** concepts such as: database security, integrity, concurrency,

Unit- I **14 hrs**

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Unit- II **16 hrs**

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and clusters.

Unit- III **12 hrs**

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Unit- IV **08 hrs**

Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Unit- V **10 hrs**

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version schemes. Recovery with concurrent transaction. Transaction Processing in Distributed system, data fragmentation. Replication and allocation techniques for distributed system, overview of concurrency control and recovery in distrusted database.

References

1 Date C J. "An Introduction To Database System", Addision Wesley
2 Korth, Silbertz, Sudarshan. "Database Concepts", McGraw Hill
3 Elmasri, Navathe, "Fundamentals Of Database Systems", Addision Wesley
4 Paul Beynon Davies, "Database Systems", Palgrave Macmillan
5 Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
6 Majumdar & Bhattacharya, "Database Management System", TMH

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7 Ramakrishnan, Gehrke, "Database Management System", McGraw Hill

Course Outcomes:

- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- Design ER-models to represent simple database application scenarios
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data
- Improve the database design by normalization.

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CORE COURSE

Course Name: COMBINATORICS & GRAPH THEORY	MCA - 206
Credits = [L+T+P : 3+0+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: This course introduces topics in three key areas of discrete mathematics: graph theory, combinatorics, and extremal set theory. Students will have to reason abstractly, provide proofs of mathematical statements, and work with precise definitions.

Unit I **10 hrs**

Rules of sum and products. Permutation, Combination, Permutation groups and application, Probability,Ramsey theory. Discrete numeric function and generating function, Combinatorial problems, Difference equation.

Unit II **10 hrs**

Recurrence Relation-Introduction, Linear recurrence relation with constant coefficient, Homogeneous solution, Particular solution, Total solution, Solution by the method of generating function.

Unit III **12 hrs**

Graphs, sub-graphs, some basic properties, Walks, Path & circuits, Connected graphs, Disconnected graphs and component. Eular and Hamiltonian graphs, Various operation on graphs, Tree and fundamental circuits, Distance diameters, Radius and pendent vertices, Rooted and binary trees, Counting trees, Spanning trees, Finding all spanning trees of a graph and a weighted graph.

Unit IV **14 hrs**

Cut-sets and cut vertices, some properties, All cut sets in a graph, Fundamental circuit and cut sets, Connectivity and seperatability, Network flows, mincut theorem, Planar graphs, Combinatorial and geometric dual, Kuratowski to graph detection of planarity, Geometric dual, Some more criterion of planarity, Thickness and Crossings, Vector space of a graph and vectors, basis vectors, cut set vector, circuit vector, circuit and cut set verses sub spaces, orthogonal vector and sub space. Incidence matrix of graphs, sub matrices of A(G), circuit matrix, cut set matrix, path matrix and relationship among Af, Bf, Cf, fundamental circuit matrix and range of Bf adjacency matrix, rank nullity
theorem.

Unit V **14 hrs**

Coloring and covering partitioning of graph, Chromatic number, Chromatic partitioning, Chromatic polynomials, Matching, covering, Four color problem, Directed graph, Types of directed graphs, Directed paths and connectedness. Euler digraph, Trees with directed edges, Fundamental circuit in digraph, Matrices A, B, C of digraph adjacency matrix of digraph. Enumeration and its types. Counting of labeled and unlabeled trees, Polya's theorem, Graph enumeration with polyas theorem, Graph theoretic algorithm.

References

1. Deo Narsing, "Graph Theory with applications to engineering & computer science", PHI
2. Tremblay & Manohar, " Discrete mathematical structures with applications to computer Science", TMH
3. Joshi K. D., "Fundamental of discrete mathematics", New Age International
4. John Truss, "Discrete mathematics for computer scientist"
5. C. L. Liu, "Discrete mathematics"

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Course Outcomes:

- State all of the technical definitions covered in the course (such as a graph, tree, planar graph, colouring, digraph, generating function, linear extension, and other terms).
- State all of the relevant theorems covered in the course.
- Use these definitions and theorems from memory to construct solutions to problems and/or proofs.
- Formulate graph theoretic models to solve real world problems (e.g., scheduling problems).

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CORE COURSE

Course Name: ARTIFICIAL INTELLIGENCE	MCA-207
Credits = [L+T+P : 3+0+0]	Total Hours = 60

Max Marks: [70+30]

Objectives: Objectives of artificial intelligence that build machines that think as like a human's. The basic knowledge representation of problem solving, and learning methods of Artificial Intelligence and Assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular particular engineering problems.

UNIT-I **12 hrs**

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents, Computer vision, Natural Language Possessing.

UNIT-II **12 hrs**

Introduction to Search: Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

UNIT-III **12 hrs**

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in first order logic, Resolution, Unification, Forward & Backward chaining, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

UNIT-IV **12 hrs**

Machine Learning: Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,

UNIT-V **12 hrs**

Pattern Recognition: Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, K–means clustering algorithms.

References:

1. Russell S. and Norvig P., "Artificial Intelligence – A Modern Approach", Pearson Education.
2. Rich E. and Knight K., "Artificial Intelligence", Tata McGraw Hill.
3. CharniakE.and McDermott D., "Introduction to Artificial Intelligence", Pearson Education.
4. Patterson D. W., "Artificial Intelligence and Expert Systems", Prentice Hall of India.
5. Khemnai D., "A First Course in Artificial Intelligence", McGraw Hill.
6. Winston P.H., "Artificial Intelligence", Pearson Education.
7. Thornton C. and Boulay B., "Artificial Intelligence- Strategies, Applications and Models Through Search", New Age International Publishers.

Course Outcomes:

- Apply the basic principles, models, and algorithms of AI.
- To recognize, model, and solve problems in the analysis and design of information systems. analyze the structures and algorithms of a selection of techniques related to searching, reasoning, machine learning, and language processing.

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CORE COURSE

COURSE NAME: COMPUTER GRAPHICS & C++ LAB	MCA - 251
Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Course Objectives: **Computer Graphics & C++** is utilized by a wide variety of fields -- including **computer** science -- as a tool to assist in the problem solving aspects of the field. The primary **objective** of this **course** is to have -you- learn the basic principles of 3-dimensional **computer graphics** suing C++ Programming Language.

A: Write program in any suitable language

1. Write a program to draw a line using DDA algorithm.
2. Write a program for implementing Bresenham's algorithm for line generation.
3. Write a program for generation of circle.
4. Write a program to demonstrate Cohen-Sutherland line clipping method.
5. Write a program to implement Sutherland-Hodgeman polygon clipping algorithm.
6. Write a program to rotate a triangle. (By asking the user to input the coordinates of the Triangle and the angle of rotation).
7. Write a program to perform one point perspective projection of an object.
8. Write a program to implement Depth-Buffer method to display the visible surfaces of a given polyhodron.
9. Write a program to implement 3-D rotation of an object.
10. Write a program to draw polyline using any algorithm.
11. Write a program to draw a Bezier curve and surface.

Note : Students are advised to use C, C++ language for writing program; Use of open GL is desirable.

B: Write programs in C++ for

1. Program illustrating overloading of various operators.
2. Program illustrating use of Friend, Inline, Static Member functions, default arguments.
3. Program illustrating use of destructor and various types of constructor.
4. Program illustrating various forms of Inheritance.
5. Program illustrating use of virtual functions, virtual Base Class.
6. Program illustrating how exception handling is done.

Course Outcomes:

- Explain the core concepts of computer graphics, including viewing, projection, perspective, modelling and transformation in two and three dimensions using C and C++
- Apply the concepts of colour models, lighting and shading models, textures, ray tracing, hidden surface elimination, anti-aliasing, and rendering.
- Interpret the mathematical foundation of the concepts of computer graphics.
- Apply the concepts of object-oriented programming
- Illustrate the process of data file manipulations using C++

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CORE COURSE

COURSE NAME: DESIGN & ANALYSIS OF ALGORITHMS (DAA) LAB	MCA - 252
Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Course Objectives: Develops skills in implementations and applications of data structures. Implements basic algorithms for sorting and searching. Implements basic data structures such as stacks, queues and trees. Applies algorithms and data structures in various real-life software problems.

Write Programs in C/C++ for

1. Creation of a binary search tree and insertion & deletion into it.
2. Creation of a Red Black tree and all the associated operations on it.
3. Implementing an AVL tree and all the associated operations on it.
4. Multiplication of two matrices using Strassen's Matrix Multiplication method.
5. Solving Knapsack problem.
6. Implementing shortest path algorithms (Dijkastra's and Bellman Ford Algorithm).
7. Finding the minimum cost Spanning Tree in a connected graph.
8. Solving 8 Queen's problem.
9. Finding the number of connected components in a Graph.
10. Perform Searching Operation.

Course Outcomes:

- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks , queues , lists , trees and graphs
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

CORE COURSE

COURSE NAME: DBMS & SE LAB	MCA - 253
Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Course Objectives: Upon completion, students should be able to design and implement normalized database structures by creating simple database tables, queries, reports, and forms. To develop an understanding of essential **DBMS** concepts such as: database security, integrity, concurrency,

A: The program to be implemented using SQL

1. Create Table, SQL for Insertion, Deletion, Update and Retrival using aggregating functions.
2. Write Programs in PL/SQL, Understanding the concept of Cursors.
3. Write Program for Join, Union & intersection etc.
4. Creating Views, Writing Assertions, Triggers.
5. Creating Forms, Reports etc.
6. Writing codes for generating read and update operator in a transaction using different situations.
7. Implement of 2PL concerning central algorithm.

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8. Developing code for understanding of distributed transaction processing. Students are advised to use Developer 2000 Oracle 8+ version for above experiments. However, depending on the availability of Software's students may use power builder / SQL Server / DB2 etc. for implementation.

SOFTWARE ENGINEERING LAB

B: The program to be implemented as well as written in file

1. Program for Configuration Management.
2. Perform SA/SD for the following software.
- Hotel Automation System
- Book Shop Automation Software.
- Word processing Software.
- Software Component Cataloguing Software.

3. Design and development of test cases for testing.
4. Writing program in Java for Computing Cyclomatic complexity.
5. Development of Software tool for Halstead Analysis.
6. Perform Cost/Benefit analysis.
7. Illustration of various activities of Software development using MS Project 2000.
8. Lab exercise involving development of various practical applications using software like VJ++VB, SYBASE, JDK.

Students are to be given a major assignment to be completed using one or more of these tools. Student's exposure to any CASE tool is desirable.

9. Case studies : Payroll System, Banking System, Purchase Order System, Library Management System, Railway Reservation System, Bill Tracking System, College Admission System, Sales Management System

Course Outcomes:

- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- Design ER-models to represent simple database application scenarios
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data
- Improve the database design by normalization.

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DETAILED SYLLABUS OF MCA THIRD SEMESTER

CORE COURSE

Course Name: INTERNET & JAVA PROGRAMMING	MCA - 301
Credits = [L+T+P : 3+1+0]	Total Hours =60

Max Marks: [70+30]

Course Objectives: Understand fundamentals of object-oriented **programming** in **Java**, including defining classes, invoking methods, using class libraries and also be aware of the important topics and principles of software development.

Unit-1 **10 hrs**

Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internet services, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing.

Unit- II **12 hrs**

Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Unit-III **16 hrs**

Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database.

Unit-IV **12 hrs**

Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB)

Introduction to RMI (Remote Method Invocation): A simple client-server application using RMI.

Unit-V **10 hrs**

Java Servlets: Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP).

References:

1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH
3. Balagurusamy E, "Programming in JAVA", TMH
4. Dustin R. Callway, "Inside Servlets", Addison Wesley
5. Mark Wutica, "Java Enterprise Edition", QUE
6. Steven Holzner, "Java2 Black book", dreamtech

Course Outcomes:

- Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
- Read and make elementary modifications to Java programs that solve real-world problems.
- Validate input in a Java program.
- Identify and fix defects and common security issues in code.
- Document a Java program using Javadoc.
- Use a version control system to track source code in a project.

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CORE COURSE

Course Name: PROGRAMMING in Python	MCA - 302
Credits = [L+T+P : 3+1+0]	Total Hours =60

Max Marks: [70+30]

Course Objectives: The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. Learning Outcomes: Problem solving and programming capability.

Unit-1 Introduction to Python: **10 hrs**

The basic elements of Python, Objects, expressions and numerical Types, Variables and assignments, IDLE, Branching programs, Strings and Input, Iteration

Structured Types, Mutability and Higher-order Functions:

Tuples, Lists and Mutability, Functions as Objects, Strings, Tuples and Lists, Dictionaries

Unit-2: Functions, Exception, Modules and Files **14 hrs**

Functions: Difference between a Function and a Method, Defining a Function, Calling a Function, Returning Results from a Function, Returning Multiple Values from a Function, Functions are First Class Objects, Pass by Object Reference, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Variable Length Arguments, Local and Global Variables, The Global Keyword, Passing a Group of Elements to a Function, Recursive Functions, Anonymous Functions or Lambdas (Using Lambdas with filter() Function, Using Lambdas with map() Function, Using Lambdas with reduce() Function), Function Decorators, Generators, Structured Programming, Creating our Own Modules in Python, The Special Variable __name__

Unit-3 Exceptions **10 hrs**

Errors in a Python Program (Compile-Time Errors, Runtime Errors, Logical Errors),Exceptions, Exception Handling, Types of Exceptions, The Except Block, The assert Statement, User-Defined Exceptions, Logging the Exceptions

Unit-4 :Classes and Object-oriented Programming **16 hrs**

Classes: Creating a Class, The Self Variable, Constructor, Types of Variables, Namespaces, Types of Methods (Instance Methods, Class Methods, Static Methods), Passing Members of One Class to Another Class, Inner Classes

Inheritance and Polymorphism: Constructors in Inheritance, Overriding Super Class Constructors and Methods, The super() Method, Types of Inheritance, Single Inheritance, Multiple Inheritance, Method Resolution Order (MRO), Polymorphism, Duck Typing Philosophy of Python, Operator Overloading, Method Overloading, Method Overriding

Unit-5 : Abstract Classes and Interfaces & File : **10 hrs**

Abstract Method and Abstract Class, Interfaces in Python, Abstract Classes vs. Interfaces,

Files: Types of Files in Python, Opening a File, Closing a File, Working with Text Files Containing Strings, Knowing Whether a File Exists or Not, Working with Binary Files, The with Statement, Pickle in Python, The seek() and tell() Methods, Random Accessing of Binary Files, Random Accessing of Binary Files using mmap, Zipping and Unzipping Files, Working with Directories, Running Other Programs from Python Program

Books 1.

Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016

Reference Book 1.

Mark Lutz, Programming Python, O'Reilly, 4th Edition, 2010

Course Outcomes: At the end of the course, the student will be able to

- Explain basic principles of Python programming language
- Implement object oriented concepts,
- Implement database and GUI applications.

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ELECTIVE-1 (MCA-303)

Course Name: Cloud computing	MCA-303-A
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Objectives: For an organization to adopt a sound **cloud computing** program, it is paramount to set clear **objectives** that span from the top of the line, such as productivity gains, to the bottom line, like operational expenses. Most often, **cloud computing** is viewed as a means to move from capex to opex.

Unit 1 **12 hrs**

Cloud Computing Overview – Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service , Broad network access , Location independent resource pooling , Rapid elasticity , Measured service

Unit II **12 hrs**

Cloud scenarios - Benefits: scalability , simplicity , vendors ,security. Limitations – Sensitive information - Application development – Security concerns - privacy concern with a third party - security level of third party - security benefits

Unit III **13 hrs**

Cloud architecture: Cloud delivery model – SPI framework , SPI evolution , SPI vs. traditional IT Model

Software as a Service (SaaS): SaaS service providers – Google App Engine, Salesforce.com and google platfrom – Benefits – Operational benefits - Economic benefits – Evaluating SaaS

Platform as a Service (PaaS): PaaS service providers – Right Scale – Salesforce.com – Rackspace – Force.com – Services and Benefits

Unit IV **10 hrs**

Infrastructure as a Service (IaaS): IaaS service providers – Amazon EC2 , GoGrid – Microsoft soft implementation and support – Amazon EC service level agreement – Recent developments – Benefits

Cloud deployment model : Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing

Unit V **13 hrs**

Virtualization : Virtualization and cloud computing - Need of virtualization – cost , administration , fast deployment , reduce infrastructure cost - limitations Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization

Objectives:

The key objectives of this course are for participants to be able to:

- Understand the concepts, characteristics, delivery models and benefits of cloud computing
- Understand the key security and compliance challenges of cloud computing
- Understand the key technical and organisational challenges
- Understand the different characteristics of public, private and hybrid cloud deployment models.

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ELECTIVE COURSE

Course Name: Data Warehousing & DATA Mining	MCA-303-B
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:

1. Be familiar with mathematical foundations of data mining tools..
2 Understand and implement classical models and algorithms in data warehouses and data mining 3 Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering..

Unit – I **12 hrs**

Dss-Uses, definition, Operational Database. Introduction to DATA Warehousing. Data-Mart, Concept of Data-Warehousing, Multi Dimensional Database Structures. Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems. Distributed DBMS implementations.

Unit – II **12 hrs**

DATA Warehousing. Data Warehousing Components. Building a Data Warehouse. Warehouse Database. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS Schemas for Decision Support. Data Extraction, Cleanup & Transformation Tools. Metadata.

Unit – III **13 hrs**

Business Analysis. Reporting & Query Tools & Applications. On line Analytical Processing(OLAP). Patterns & Models. Statistics. Artificial Intelligence.

Unit – IV **10 hrs**

Knowledge Discovery, Data Mining. Introduction to Data-Mining. Techniques of Data-Mining. Decision Trees. Neural Networks. Nearest Neighbor & Clustering. Genetic Algorithms. Rule Introduction. Selecting & Using the Right Technique.

Unit – V **13 hrs**

Multimedia Data-Mining, Multimedia-Databases, Mining Multimedia Data, Data-Mining and the World Wide Web, Web Data-Mining, Mining and Meta-Data. Data Visualization & Overall Perspective. Data Visualization. Applications of Data-Mining.

References:

1. Berson, "Data Warehousing, Data-Mining & OLAP", TMH
2. Mallach, "Decision Support and Data Warehousing System", TMH
3. Bhavani Thura-is-ingham, "Data-Mining Technologies, Techniques Tools & Trends", CRC Press
4. Navathe, "Fundamental of Database System", Pearson Education
5. Margaret H. Dunham, "Data-Mining. Introductory & Advanced Topics", Pearson Education
6. Pieter Adriaans, Dolf Zantinge, "Data-Mining", Pearson Education

Course Outcomes:

- Understand data mining principles and techniques: Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modelling, and identifying new trends and behaviours. Learning objectives include:
- Building basic terminology.
- Learning how to gather and analyze large sets of data to gain useful business understanding.
- Learning how to produce a quantitative analysis report/memo with the necessary information to make decisions.

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ELECTIVE COURSE

Course Name: CRYPTOGRAPHY AND NETWORK SECURITY	MCA-303-C
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:
To understand basics of Cryptography and Network Security. To be able to secure a message over insecure channel by various means. To understand various protocols for network security to protect against the threats in the networks.

Unit-I **12 hrs**

Introduction to Cryptography: Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, And Steganography. Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles. DES Standard. DES Strength. Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes Of Operation.

Unit-II **12 hrs**

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128. RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function.

Unit-III **12 hrs**

Public Key Encryption: Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSA Algorithm, Key Management, Fermat's & Euler's Theorm, Primality, The Chinese Remainder Theorem.

Unit-IV **12 hrs**

Hash Functions: Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions. Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.

Unit-V **12 hrs**

Network & System Security: Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

Text Book:

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.

Reference Books:

1. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.
2. Atul Kahate, "Cryptography and Network Security", TMH

Course Outcomes:
After successful completion of the course, the learners would be able to

- Provide security of the data over the network.
- Do research in the emerging areas of cryptography and network security.
- Implement various networking protocols.
- Protect any network from the threats in the world.

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ELECTIVE COURSE

Course Name: COMPILER DESIGN	MCA-303-D
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:
The Objectives of this course is to explore the principles, algorithms, and data structures involved in the design and construction of compilers. Topics include context-free grammars, lexical analysis, parsing techniques, symbol tables, error recovery, code generation, and code optimization.

Unit-1 **14 hrs**

Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler

Programming Languages: High level languages, The lexical and syntactic structure of a language, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission.

Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Regular Expressions , Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer

Unit-II **12 hrs**

The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG.

Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax Analyzer Generator: YACC

Unit-III **12 hrs**

Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.

Unit-IV **12 hrs**

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management

Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

Unit-V **10 hrs**

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

References:

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

Course Outcomes:

- Understand the major phases of compilation and to understand the knowledge of Lex tool & YAAC tool
- Develop the parsers and experiment the knowledge of different parsers design without automated tools
- Construct the intermediate code representations and generation
- Convert source code for a novel language into machine code for a novel computer

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ELECTIVE-2 (MCA-304)

Course Name: WEB TECHNOLOGY	MCA- 304-A
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:
This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

Unit-I **12 hrs**

History of the web, Growth of the Web, Protocols governing the web, Introduction to Cyber Laws in India, Introduction to International Cyber laws, Web project, Web Team, Team dynamics.

Unit-II **12 hrs**

Communication Issues, the Client, Multi-departmental & Large scale Websites, Quality Assurance and testing, Technological advances and Impact on Web Teams.

Unit-III **14 hrs**

HTML: Formatting Tags, Links, List, Tables, Frames, forms, Comments in HTML, DHTML. JavaScript: Introduction, Documents, Documents, forms, Statements, functions, objects in JavaScript, Events and Event Handling, Arrays, FORMS, Buttons, Checkboxes, Text fields and Text areas.

Unit IV **12 hrs**

XML: Introduction, Displaying an XML Document, Data Interchange with an XML document, Document type definitions, Parsers using XML, Client-side usage, Server Side usage.

Unit V **10 hrs**

Common Gateway Interface (CGI), PERL, RMI, COM/DCOM, VBScript, Active Server Pages (ASP).

Text Book:

1. Burdman, "Collaborative Web Development", Addison Wesley.
2. Sharma &Sharma, "Developing E-Commerce Sites", Addison Wesley
3. Ivan Bayross, "Web Technologies Part II", BPB Publications.

References:

1. Shishir Gundavarma, "CGI Programming on the World Wide Web", O'Reilly & Associate.
2. DON Box, "Essential COM", Addison Wesley.
3. Greg Buczek, "ASP Developer's Guide", TMH.

Course Objectives:
The student will be able to:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas.
- Build interactive web applications using AJAX.

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ELECTIVE COURSE

Course Name: BIG DATA ANALYTICS	MCA- 304-B
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:
To study the basic technologies that forms the foundations of Big Data. To study the programming aspects of cloud computing with a view to rapid prototyping of complex applications. To understand the specialized aspects of big data including big data application, and big data analytics.

UNIT I : INTRODUCTION TO BIG DATA AND HADOOP **14 hrs**
Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

UNIT II : HDFS (Hadoop Distributed File System) **14 hrs**
The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III : Map Reduce **10 hrs**
Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features

Unit IV : Hadoop Eco System **12 hrs**
Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.
Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.
Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.
Big SQL : Introduction

UNIT V : Data Analytics with R **10 hrs**
Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering.
Big Data Analytics with BigR.

Text Books

- Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
- Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

References

- Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
- Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
- Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.

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• Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
• Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
• Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
• Pete Warden, "Big Data Glossary", O'Reily, 2011.
• Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
• ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012
• Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

Course Outcomes:

• Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
• Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
• Ability to solve problems associated with batch learning and online learning, and the big data characteristics such as hig

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ELECTIVE COURSE

Course Name: INTERNET OF THINGS	MCA- 304-C
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices

Unit-1: Introduction & Application to Internet of Things: **12 hrs**

The Internet of Things, Importance of IoT, Towards the IoT Universe IoT Strategic Researchnd Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Iot Smart X Application: Smart Cities, Smart Energy & Smart Grid, Smart Mobility & transport, Smart Home, Smart Building & Infrastructure, Smart Factory & Manufacturing, Smart Health, Smart Logistics & Retails.

Unit-2: Embedded Suite for IoT: **12 hrs**

Introduction to ARM Processor, introduction to ARM Processor, ARM Processor Architecture, Programmer's model, Modes of operation, Interrupt Structure and Applications. Management of Power Supply, Introduction to Raspberry Pi, Understanding the Raspberry Pi board and its components, recognizing the Input/output, GPIO connectivity.

Unit-3: WIRELESS TECHNOLOGIES supporting IoT: **12 hrs**

Protocol Standardization for IoT, Machine to machine (M2M) and WSN Protocols, Basics of RFID, RFID Protocols & NFC protocols, Issues with IoT Standardization, Unified Data Standards, Protocols – IEEE 802.15.4, ZigBee, IPv6 technologies for the IoT.

Unit-4: IoT Networking: **12 hrs**

Networking Architectures: Star, Mesh, Tree, and Overview of networking Protocols: TCP/IP, 6LowPan, RPL: Routing protocol for lossy& low power network. IoT Devices Application Level Protocols: Introduction to MQTT, Quality of Service parameter in MQTT, CoAP, XMPP

Unit-5:PRIVACY, SECURITY& GOVERNANCE: **12 hrs**

Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data- Platforms for Smart Cities, First Steps towards a Secure Platform, Smart Approach. Data Aggregation for the IoT in Smart Cities, Security,**Connecting IoT to Cloud:**Introduction to cloud computing, Difference between Cloud Computing and IoT, Fog Computing: The Next Evolution of Cloud Computing, Role of Cloud Computing in IoT. Livingon the Edge, Connecting IoT to cloud, Cloud Storage for IoT. Cloud-to-Device Connectivity,Challenge in integration of IoT with Cloud.

Text Books:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

Reference Books:

1. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014.

2. Daniel Minoli John Wiley &Sons ,Building the internet of things with ipv6 and mipv6, The Evolving World of M2M Communications, ISBN: 978-1-118-47347-4

3. Cassimally, Hakim, "Designing the Internet of Things", Wiley Publications, ISBN 10: 111843062X

Course Outcomes:

- Able to understand the application areas of IOT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics.

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ELECTIVE COURSE

Course Name: SIMULATION & MODELING	MCA- 304-D
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:

Simulation & Modeling and or S & M as it is commonly referred, is becoming an important tool of industrial design and development and so, it is necessary to train the students in the techniques of S & M and this course is introduced with that aim to all the students across the disciplines. S & M has matured over the years with its own body of knowledge,

Unit-I **12 hrs**

System definition and components, stochastic activities, continuous and discrete Systems, System modeling, types of models, static and dynamic physical models, statics and dynamic mathematical models, Full corporate model, types of system study.

Unit-II **12 hrs**

System simulation, Why to simulate and when to simulate, Basic nature of simulation, technique of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem single-server queuing system and an inventory problem, Monte Carlo simulation, Distributed Lag models, Cobweb model.

Unit-III **12 hrs**

Simulation of continuous systems, analog vs. digital simulation, of water reservoir system, simulation of a servo system, simulation of an autopilot, Discrete system Simulation, Fixed time-step vs. event-to-event model, generation of random numbers, Test for randomness, Generalization of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

Unit-IV **12 hrs**

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, System dynamics diagrams, Feedback in Socio-Economic systems, world model.

Unit-V **12 hrs**

Simulation of PERT networks, Critical path computation, uncertainties in Activity duration, Resource allocation and consideration. Simulation software, Simulation languages, continuous and discrete simulation languages, Expression based languages, object-oriented simulation, general-purpose vs. application-oriented simulation packages, CSMP-III, MODSIM-III.

Course Outcomes:

- Students will understand the techniques of modeling in the context of hierarchy of knowledge about a system and develop the capability to apply the same to study systems through available software.
- Students will learn different types of simulation techniques.
- Students will learn to simulate the models for the purpose of optimum control by using

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CORE COURSE

Course Name: MINOR PROJECT	MCA- 351

Credits = [L+T+P : 3+0+5]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:
In this Student will work on a project with the technology that he /she have learned in previous semester. And submit the complete work with running project.

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CORE COURSE

Course Name: JAVA PROGRAMMING LAB	MCA- 352
Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Course Objectives: Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries and also be aware of the important topics and principles of software development.

1. Write a program in Java for illustrating, overloading, over riding and various forms of inheritance.
2. Write programs to create packages and multiple threads in Java.
3. Write programs in Java for event handling Mouse and Keyboard events.
4. Using Layout Manager create different applications.
5. Write programs in Java to create and manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using swing/AWT.
6. Using Java create Applets.
7. Use Java Language for Client Server Interaction with stream socket connections.
8. Write a program in java to read data from disk file.

Course Outcomes:

- Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
- Read and make elementary modifications to Java programs that solve real-world problems.
- Validate input in a Java program.
- Identify and fix defects and common security issues in code.
- Document a Java program using Javadoc.
- Use a version control system to track source code in a project.

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CORE COURSE

Course Name: PYTHON LAB	MCA- 353
Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Course Objectives: The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. Learning Outcomes: Problem solving and programming capability.

1. Write a Python program to print "Hello Python"
2. Write a Python program to do arithmetical operations
3. Write a Python Program to check if a Number is Odd or Even
4. Write a Python Program to Check Armstrong Number
5. Write a Python Program to Find LCM using Function.
6. Write a Python Program to Make a Simple Calculator using function.
7. Write a Python program to print the elements of an array
8. Write a Python program that implements the concept of Constructor.
9. Write a Python program that implements the concept of Inheritance.
10. Write a Python program that implements the concept of Exception Handling.
11. Write a Python program that implements the concept of Interface.
12. Write a Python program that implements the concept of Abstract Class.

Course Outcomes: At the end of the course, the student will be able to

- Explain basic principles of Python programming language
- Implement object oriented concepts,
- Implement database and GUI applications.

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QUALIFYING COURSE

Course Name: SEMINAR	MCA- 354

Credits = [L+T+P : 1+0+0]	Total Hours = 15

Max Marks: [50: Internal Only]

Course Objectives: The Seminar is a Qualifying Course , specially designed for students personality grooming.

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DETAILED SYLLABUS OF MCA FOURTH SEMESTER

CORE COURSE

Course Name: NET FRAMEWORK AND C#	MCA- 401
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: The basic objective to Provide a consistent object-oriented programming environment whether object code is stored and executed locally, executed locally but Internet-distributed, or executed remotely.

Unit-I **14 hrs**

The .NET framework: Introduction, Common Language Runtime, Common Type System, Common Language Specification, The Base Class Library, The .NET class library Intermediate language, Just-in-Time compilation, garbage collection, Application installation & Assemblies, Web Services, Unified classes.

Unit-II **12 hrs**

C# Basics: Introduction, Data Types, Identifiers, variables & constants, C# statements, Object Oriented Concept, Object and Classes, Arrays and Strings, System Collections, Delegates and Events, Indexes Attributes, versioning.

Unit-III **12 hrs**

C# Using Libraries: Namespace-System, Input Output, Multi-Threading, Networking and Sockets, Data Handling, Windows Forms, C# in Web application, Error Handling.

Unit-IV **10 hrs**

Advanced Features Using C#: Web Services, Windows services, messaging, Reflection, COM and C#, Localization.

Unit-V **12 hrs**

Advanced Features Using C#: Distributed Application in C#, XML and C#, Unsafe Mode, Graphical Device Interface with C#, Case Study (Messenger Application)

Text Books

1. Shibi Panikkar and Kumar Sanjeev, "C# with .NET Frame Work", Firewall Media.
2. Shildt, "C#: The Complete Reference", TMH

Reference Books

1. Jeffrey Richter, "Applied Microsoft .Net Framework Programming", (Microsoft)
2. Fergal Grimes, "Microsoft .Net for Programmers", (SPD)
3. TonyBaer, Jan D. Narkiewicz, Kent Tegels, Chandu Thota, Neil Whitlow, "Understanding the .Net Framework", (SPD)
4. Balagurusamy, "Programming with C#", TMH

Course Outcomes:

At the end of this Lab course students will be able to:

- Create user interactive web pages using ASP.Net.
- Create simple data binding applications using ADO.Net connectivity.
- Performing Database operations for Windows Form and web applications.

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ELECTIVE-3 (MCA-402)

ELECTIVE COURSE

Course Name: Mobile computing	MCA-402-A
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: To learn about the concepts and principles of mobile computing;

- To explore both theoretical and practical issues of mobile computing;
- To develop skills of finding solutions and building software for mobile computing applications.

Unit I **12 hrs**

Issues in Mobile Computing, Wireless Telephony, Digital Cellular Standards, Bluetooth Technology, Wireless Multiple Access Protocols, Channel Allocation in Cellular Systems.

Unit II **12 hrs**

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

Unit III **12 hrs**

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

Unit IV **12 hrs**

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

Unit V **12 hrs**

What is Ad-hoc Network? , Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Routing scheme based on signal strength, Dynamic State Routing (DSR), Route Maintenance and Routing error, Fisheye Routing (FSR), Ad-hoc on Demand Distance Vector (ADDV)

Text Books & References:

1. Shambhu Upadhyaya, Abhijeet Chaudhary, Kevin Kwiat, Mark Weises, "Mobile Computing", Kluwer Academic Publishers

2. UWE Hansmann, Lothar Merk, Martin-S-Nickious, Thomas Stohe, "Principles of Mobile Computing", Springer International Edition

Course Outcomes:

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

- Understand fundamentals of wireless communications.
- Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.
- Demonstrate basic skills for cellular networks design.
- Apply knowledge of TCP/IP extensions for mobile and wireless networking.

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ELECTIVE COURSE

Course Name: SOFTWARE TESTING AND QUALITY ASSURANCE	MCA-402-B
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: The course is designed to bring focus to QA and testing since many jobs and opportunities are available in this area. The course covers technical foundations and tools, as well as managerial and organizational aspects.

UNIT – I : Software Quality Assurance and Standards: **12 hrs**

The Software Quality challenge, What is Software Quality, Software Quality factors, The components of Software Quality Assurance system, Software Quality Metrics, Costs of Software Quality, Quality Management Standards, Management and its role in Software Quality Assurance, SQA unit and other actors in SQA system. – (Chapters: 1-4, 21-23,25, 26) of T3 Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma and other latest quality standards (Refer Internet and R11, R12, R13).

UNIT – II : Software Testing Strategy and Environment: **12 hrs**

Minimizing Risks, Writing a Policy for Software Testing, Economics of Testing, Testing-an organizational issue, Management Support for Software Testing, Building a Structured Approach to Software Testing, Developing a Test Strategy Building Software Testing Process: Software Testing Guidelines, workbench concept, Customizing
the Software Testing Process, Process Preparation checklist – (Chapters: 2,3) of T1 Software Testing Techniques: Dynamic Testing – Black Box testing techniques, White Box testing techniques, Static testing, Validation Activities, Regression testing

UNIT – III : Software Testing Tools: **12 hrs**

Selecting and Installing Software Testing tools – (Chapter 4) of T1. Automation and Testing Tools – (Chapter 15) of T2 Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, JMetra, JUNIT and Cactus. (Refer Internet and R9, R10)

UNIT – IV : Testing Process : **12 hrs**

Seven Step Testing Process – I: Overview of the Software Testing Process, Organizing of Testing, Developing the Test Plan, Verification Testing, Validation Testing. (Chapters 6, 7, 8, 9, 10) of T1

UNIT – V : Seven Step Testing Process – II: **12 hrs**

Analyzing and Reporting Test results, Acceptance and Operational Testing, Post-Implementation Analysis Specialized Testing Responsibilities: Software Development Methodologies, Testing Client/Server Systems (Chapters 12, 13, 14, 15) of T1.

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TEXT BOOKS:

- Effective Methods for Software Testing, Third edition, William E. Perry, Wiley India, 2009
- Software Testing – Principles and Practices, Naresh Chauhan, Oxford University Press, 2010.
- Software Quality Assurance – From Theory to Implementation, Daniel Galin, Pearson Education, 2009.

REFERENCE BOOKS:

1. Testing Computer Software, Cem Kaner, Jack Falk, Hung Quoc Nguyen, Wiley India, rp2012.
2. Software Testing – Principles, Techniques and Tools, M.G.Limaye, Tata McGraw-Hill, 2009.
3. Software Testing – A Craftsman's approach, Paul C. Jorgensen, Third edition, Auerbach Publications, 2010.
4. Foundations of Software Testing, Aditya P. Mathur, Pearson Education, 2008.
5. Software Testing and Quality Assurance – Theory and Practice, Kshirasagar Naik, Priyadashi Tripathy, Wiley India, 2010.
6. Software Testing, Ron Patton, Second edition, Pearson Education, 2006.
7. Software Testing and Analysis – Process, Principles and Techniques, Mauro Pezze, Michal Young, Wiley India, 2008.

Course Outcomes: The student should be able to:

- Understand software testing and quality assurance as a fundamental component of software life cycle
- Define the scope of SW T&QA projects
- Efficiently perform T&QA activities using modern software tools
- Estimate cost of a T&QA project and manage budgets
- Prepare test plans and schedules for a T&QA project
- Develop T&QA project staffing requirements
- Effectively manage a T&QA project.

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ELECTIVE COURSE

Course Name: DISTRIBUTED DATABASE SYSTEM	MCA-402-C

Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: This course covers the fundamental issues of distributed databases with focus on data fragmentation and allocation, query optimization and transaction processing. Topics include: Distributed database management systems architecture and design; data fragmentation, replication, and allocation; database security, authorization and integrity control; query optimization; transaction management; distributed concurrency control and replica control; distributed object database management systems; multidatabase systems..

Unit-1 **12 hrs**

Introduction to Distributed Data system, Distributed Database Architecture, Distributed Data base Design, Transaction processing Concurrency Control techniques, Security.

Unit-2 **12 hrs**

Types of Data Fragmentations, Fragmentation and allocation of fragments, Distribution transparency, access primitives, integrity constraints.

Unit-3 **12 hrs**

Grouping and aggregate function, Query processing , Equivalence transformation of queries.

Unit-4 **12 hrs**

Evaluation, parametric queries, Query optimization, Join and general queries.

Unit-5

Management of Distributed transaction and concurrency control: Distributed Date base Administration, Catalouge Management Authorisation, Security and protection. Examples of distributed database systems. Cost Analysis

References:

1. Ceri & Palgathi, "Distributed Database System", McGraw Hill.
2. Raghu Rama Krishnan and Johannes Gechrib, "Database Management Systems", Mc Graw Hill.
3. Date C. J, "An Introduction to Database System, Vol1 & II", Addition Wesley.
4. Korth, Silbertz, Sudarshan , "Database Concepts", McGraw Hill.
5. Elmasari , Navathe, "Fundamentals of Data Base Systems", Addition Wesley.
6. Data C. J , "An Introduction to Database System" , Addition Wesley
7. RamaKrishnan , Gehke, "Database Management System", McGraw Hill

Course Outcomes:

- Allocate replicas of fragments for best performance.
- Optimize queries for optimal performance across a distributed database.
- Add distributed transaction management control including concurrency control and replica control to a distributed database.
- Demonstrate expertise in reading peer-reviewed papers in distributed databases and explain them in writing.

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ELECTIVE COURSE

Course Name: QUANTUM COMPUTING	MCA-402-D

Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: It is still unknown whether quantum computers will ever be a reality. If such machines are possible, they will fundamentally change how we perform calculations, and the implications on many applications (including communications and computer security) will be tremendous. Leaving the issue of feasibility aside, it is interesting nonetheless to study how to do computing using a quantum computer.

Unit-1 Introduction to Quantum Computation: **12 hrs**
Quantum bits, Bloch sphere representation of a qubit, multiple qubits.

Unit-2 Background **Mathematics and Physics:** **12 hrs**
Hilber space, Probabilities and measurements, entanglement, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis.

Unit-3 **12 hrs**
Quantum Circuits:
single qubit gates, multiple qubit gates, design of quantum Circuits .

Quantum Information and Cryptography: Comparison between classical and quantum information theory. Bell states. Quantum teleportation. Quantum Cryptography, no cloning theorem.

Unit-4 Quantum Algorithms: **12 hrs**
Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor factorization, Grover search.

Unit-5 Noise and error correction: **12 hrs**
Graph states and codes, Quantum error correction, fault-tolerant computation.

Suggested Books:

Nielsen M. A., **Quantum Computation and Quantum Information**, Cambridge University Press. 2002

2 Benenti G., Casati G. and Strini G., **Principles of Quantum Computation and Information**, Vol. I: Basic Concepts, Vol II: Basic Tools and Special Topics, World Scientific. 2004

3 Pittenger A. O., **An Introduction to Quantum Computing Algorithms** 2000

Course Outcomes: On successful completion, students will gain understanding of:

- The basic principles of quantum computing.
- The fundamental differences between conventional computing and quantum computing.
- Several basic quantum computing algorithms.
- The classes of problems that can be expected to be solved well by quantum computers.

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ELECTIVE COURSE

Course Name: Fog Computing	MCA-403-A

Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives:

- To understand the protocols and standards designed for IoT and the current research on it.
- To understand the other associated technologies like cloud and fog computing in the domain of Iot

UNIT-1: **12 hrs**

Fog and Edge Computing Completing the Cloud, Advantages of FEC: SCALE, How FEC Achieves, These Advantages: SCANC, Hierarchy of Fog and Edge Computing,

UNIT-2

Addressing the Challenges in Federating Edge Resources. 12 hrs

UNIT-3:

Optimization Problems in Fog and Edge Computing, Middleware for Fog and Edge Computing: Design Issues. **12 hrs**

UNIT-4:

Data Management in Fog Computing. **12 hrs**

UNIT-5:

Applications and Issues. **12 hrs**

Books:

1. Fog and Edge Computing: Principles and Paradigms by Rajkumar Buyya, Satish Narayana Srirama.

Course Outcomes:

- Explore research, frameworks, applications in edge and fog computing.
- Review underlying technologies, limitations, and challenges along with future research direction and discuss generic conceptual framework for optimization problems in fog computing.
- Analyse the restrictions introduced by the General Data Protection Regulation (GDPR), and discuss how these legal constraints affect the design and operation of IoT applications in fog and cloud environments.
- Design and develop simulation scenarios for Edge and Fog Computing using network simulator.

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ELECTIVE COURSE

Course Name: NEURAL NETWORK	MCA-403-B

Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.

Unit – I **12 hrs**

Introduction: Neural network, Human brain, biological and artificial Neurons, model of Neuron Knowledge representation, Artificial intelligence and Neural network, Network architecture, Basic Approach of the working of ANN – training, Learning and generalization.

Unit – II **12 hrs**

Supervised learning: Single- layer networks, perception-linear separability, limitations of multi layer network architecture, back propagation algorithm (BPA) and other training algorithms, applications of adaptive multi-layer network architecture, recurrent network, feed-forword networks, radial- basis-function (RBF) networks.

Unit – III **12 hrs**

Unsupervised learning: Winner-takes-all networks, Hamming networks, maxnet, simple competitive learning vector-quantization, counter-propagation network, adaptive resonance theory, Kohonen's self organizing maps, principal component analysis.

Unit – IV **12 hrs**

Associated models: Hopfield networks, brain-in-a-box network, Boltzman machine.

Unit - V **12 hrs**

Optimization methods: Hopfield networks for-TSP, solution of simultaneous linear equations, Iterated radiant descent, simulated annealing, fenetic algorithm.

Text Books:

1. Simon Haykin, "Neural Networks – A Comprehensive Foundation", Macmillan Publishing Co., New York, 1994.
2. K. Mahrotra, C.K. Mohan and Sanjay Ranka, "Elements of Artificial Neural Networks", MIT Press, 1997 – Indian Reprint Penram International Publishing (India), 1997

Reference Books:

1. A Cichocki and R. Unbehauen, "Neural Networks for optimization and Signal processing", John Wiley and Sons, 1993.
2. J.M. Zurada, "Introduction to Artificial Neural networks", (Indian edition) Jaico Publishers, Mumbai, 1997.
3. Limin Fu. "Neural Networks in Computer Intelligence", TMH.

Course Outcomes:

- Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
- Implement deep learning algorithms and solve real-world problems.

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ELECTIVE COURSE

Course Name: SOFTWARE PROJECT MANAGEMENT	MCA-403-C

Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: This course is aimed at introducing the primary important concepts of project management related to managing software development projects. They will also get familiar with the different activities involved in Software Project Management. Further, they will also come to know how to successfully plan and implement a software project management activity, and to complete a specific project in time with the available budget.

UNIT-1: **12 hrs**

Definition – components of SPM – challenges and opportunities – tools and techniques – managing human resource and technical resource – costing and pricing of projects – training and development – project management techniques

UNIT-2: **12 hrs**

Monitoring & measurement of SW development – cost, size and time metrics – methods and tools for metrics , Classifying software measures, determining what to measure, applying the framework, Software measurement validation .

UNIT-3: **12 hrs**

Quality in SW development – quality assurance – quality standards and certifications – the process and issues in obtaining certifications – the benefits and implications for the organization and its customers – change management.

UNIT-4: **12 hrs**

The risk issues in SW development and implementation – identification of risks – resolving and avoiding risks – tools and methods for identifying risk management, SPM Tools & case study on SPM.

Books:

1. Software Engineering: A Practitioner's Approach by Pressman, MGH, 8th Ed.
2. Software Engineering Project Management by Richard H. Thayer, John Wiley & Sons, 2nd edition.
3. Software Project Management by Royce, Walker, Pearson Education.
4. Software Project Management in Practice by Pankaj Jalote, Pearson Education Inc.
5. Software Project Management by Kelker, S. A., Prentice Hal

Course Outcomes:

- Identify the different project contexts and suggest an appropriate management strategy.
- Practice the role of professional ethics in successful software development.
- Identify and describe the key phases of project management.
- Determine an appropriate project management approach through an evaluation of the business context and scope of the project

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ELECTIVE COURSE

Course Name: Software Quality and Engineering	MCA-403-D
Credits = [L+T+P : 3+1+0]	Total Hours = 60

Max Marks: [70+30]

Course Objectives: The course will train how to apply quality assurance and testing techniques in different activities of software development and maintenance. Automated software testing. Upon successful completion of this course, students will be able to • Conduct effective and efficient inspections, and quality assurance plans

Unit-1 : The software quality : **10 hrs**

Quality challenge, Meaning of software quality, Software quality factors , Software Quality Lessons Learned, The components of the software quality assurance system, Pre-project software quality components: Contract Review, Development and quality plans, SQA components in the project life cycle:

Unit-2: Introduction to software testing with Quality Factors: 12 hrs

Integrating quality activities in the project life cycle, Assuring the quality of software maintenance components, Assuring the quality of external participants' contributions, CASE tools, Software quality infrastructure components, Pareto Principles, Total Quality Management, Ishikawa's Seven Basic Tools Importance of testing, testing as a career , Difference between Project and product, Difference between Quality Assurance and Quality Control , Tool selection criteria , Manual and automation testing , Roles and Responsibilities of Business Analyst, Developers, Architects, Testing Team (Lead, Manager), Manual and Automation Testers, Project Managers, Configuration Management team, end users, clients and others.

Unit-3 : Types of testing : 14 hrs

Dynamic Testing: Black Box Testing, White box testing, Grey box testing, Functional Testing: GUI Testing, Boundary Value Analysis, Equivalence Class Partition, Error guessing, Negative testing, Back End testing, Database Testing, Compatibility Testing, Security testing, Portability testing, Configuration Testing, Recovery testing. Performance testing: Load testing, Stress testing, Soak testing, Spike testing, Scalability testing, Volume testing , Other good to know testing: Unit Testing, Integration Testing, Regression Testing, Sanity Testing, System Testing, Acceptance Testing, Non-Functional Testing, Compatibility Testing, Data Flow/Control Testing.

Unit-4: Bug/Defect/Error , 12 hrs

What is Bug? Difference between Bug and Defect, Format of Bug , Priority and Severity , Different status of bug in Bug life cycle ,Bug Reporting tools JIRA/Bugzilla/Quality Center ,

Unit 5: Test Plan & Object Repository : 12 hrs

,What is Test Plan?,,Contents of test plan,,Master test plan and testing level test plan, Entry and Exit criteria , Test Coverage,Test Responsibilities, Adhoc testing, Exploratory Testing, General risks in test environment,

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Working on test objects and object repository, Configuring Object Identification, Managing object repository, Managing shared object repository, Associating hared object repository to a test.

Course Outcomes: Upon successful completion of this course, students will be able to

- Conduct effective and efficient inspections, and quality assurance plans.
- Design and implement comprehensive test plans.
- Apply a testing technique in an effective and efficient manner.
- Perform manual and automated testing on actual projects.

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CORE COURSE

Course Name: .NET FRAMEWORK & C# LAB	MCA - 451

Credits = [L+T+P : 0+0+2]	Total Hours = 30

Max Marks: [70+30]

Course Objectives: The basic objective to Provide a consistent object-oriented programming environment whether object code is stored and executed locally, executed locally but Internet-distributed, or executed remotely.

Write programs in C# illustrating

1. The use of sequence, conditional and iteration construct.
2. Various operators like logical, arithmetical, relational, etc.
3. Overloading of various operators.
4. Use of Fried, Inline, and Static Member functions, default arguments.
5. Use of destructor and various types of constructor.
6. Various forms of Inheritance.
7. Use of virtual functions, virtual Base Class, delegates.
8. File operation.
9. Simple web application using ASP Net.
10. Use of Active X controls.

Note : Students are advised to develop a small project illustrating the handling of database & screens in order to fully understand the C#.

Course Outcomes:

At the end of this Lab course students will be able to:

- Create user interactive web pages using ASP.Net.
- Create simple data binding applications using ADO.Net connectivity.
- Performing Database operations for Windows Form and web applications.

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CORE-COURSE

Course Name: MAJOR PROJECT/DISSERTATION	**MCA - 452**

Credits = [L+T+P : 6+0+4]	**Total Hours = 30**

Max Marks: [200+100=300]

Course Objectives:

- To make them understand the concepts of Project Management for planning to execution of projects.
- To make them understand the feasibility analysis in Project Management and network analysis tools for cost and time estimation.
- To enable them to comprehend the fundamentals of Contract Administration, Costing and Budgeting.
- Make them capable to analyze, apply and appreciate contemporary project management tools and methodologies in Indian context.

In this Student will work on a project on which he /she have submit the work in previous semester. And submit the complete work with extension of that running in real life

Course Outcomes:

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

- Understand project characteristics and various stages of a project.
- Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial and Economic.
- Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.
- Apply the risk management plan and analyse the role of stakeholders.
- Understand the contract management, Project Procurement, Service level Agreements and productivity. Understand the How Subcontract Administration and Control are practiced in the Industry.

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