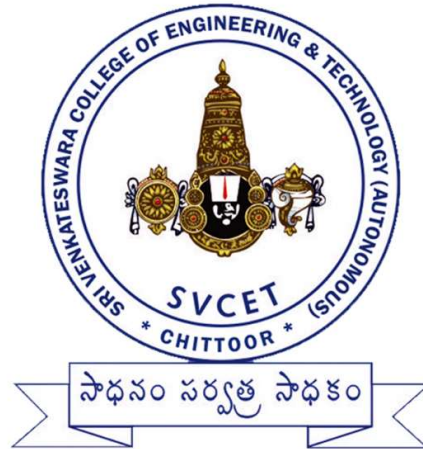# ACADEMIC REGULATIONS
COURSE STRUCTURE & SYLLABI

M.C.A REGULAR 3 YEAR DEGREE PROGRAMME
(FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2015-16)
&
M.C.A 2nd YEAR DIRECT REGULAR PROGRAMME
(FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2016-17)

MASTER OF COMPUTER APPLICATIONS

SRI VENKATESWARA COLLEGE OF ENGINEERING
AND TECHNOLOGY (AUTONOMOUS)

R.V.S. Nagar, CHITTOOR – 517 127, A.P

Phones: (08572) 246339, 245044 Fax: (08572) – 245211

PROGRAMME OBJECTIVES

- The broad objective of the **MCA programme** is to prepare graduate students for productive **careers in software industry and academia** by providing an **outstanding environment for teaching and research** in the core and emerging areas of the discipline.

- The programme's thrust is on giving the students a thorough and sound background in theoretical and application-oriented courses relevant to the **latest computer software development**.

- The programme emphasizes the application of software technology to solve mathematical, computing, communications / networking and commercial problems.

PROGRAMME OUTCOMES

- Graduates from the MCA find employment in a variety of positions within the software and hardware centered professions.

- Students who specialize in system programming, networking, embedded systems, web applications, database management and allied streams can make a mark in the wide spectrum of opportunities presented by demanding area of Information technology.

SRI VENKATESWARA COLLEGE OF ENGINNERING & TECHNOLOGY
(AUTONOMOUS)
(AFFILIATED TO JNTUA, ANANTAPUR)
ACADEMIC REGULATIONS

M.C.A REGULAR 3 YEAR DEGREE PROGRAMME
(FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2015-16)
&
M.C.A 2ndYEAR DIRECT REGULAR PROGRAMME
(FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2016-17)

The Jawaharlal Nehru Technological University Anantapur shall confer M.C.A Post Graduate degree to candidates who are admitted to the Master of Computer Applications Programs and fulfill all the requirements for the award of the degree.

1.0   ELIGIBILITY FOR ADMISSIONS:
Admission to the above programme shall be made subject to the eligibility, qualifications and specialization prescribed by the competent authority for each programme, from time to time.
Admissions shall be made either on the basis of merit rank obtained by the qualified candidates at an Entrance Test conducted by the University or on the basis of ICET score, subject to reservations and policies prescribed by the Government from time to time.

2.0   ADMISSION PROCEDURE:
MCA 3Yrs Programme
As per the existing stipulations of AP State Council for Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year as follows:
 a) Category–A seats are to be filled by Convenor through ICET score.
 b) Category-B seats are to be filled by Management as per the norms stipulated by Government of A.P.

MCA 2ⁿᵈ Year Direct Programme
A – Category & B – Category seats under second year direct entry into MCA program are filled as per the norms prescribed by the Government of A.P from time to time.

3.0   COURSE WORK:
3.1. A Candidate after securing admission into MCA 3 Years Programmemust pursue the course of study for Six Semesters duration.
3.2. A Candidate after securing admission into MCA 2ⁿᵈ Year Direct Programmemust pursue the course of study for four Semesters duration.
3.3. Each semester shall have a minimum of 16 instructional weeks.
3.4. A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

4.0   ATTENDANCE:
4.1. A candidate shall be deemed to have eligibility to write end semester examinations if he has put in at least 75% of attendance on cumulative basis of all subjects/courses in the semester.
4.2. Condonation of shortage of attendance up to 10% i.e., from 65% and above and less than 75% may be given by the college on the recommendation of the Principal.
4.3. Condonation of shortage of attendance shall be granted only on medical grounds and on representation by the candidate with supporting evidence.
4.4. If the candidate does not satisfy the attendance requirement he is detained for want of attendance and shall reregister for that semester. He shall not be promoted to the next semester.

5.0 EVALUATION:

The performance of the candidate in each semester shall be evaluated subject wise, with a maximum of 100 marks for Theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

5.1. For the theory subjects 60% of the marks will be for the External End Examination. While 40% of the marks will be for Internal Evaluation, based on the average of the marks secured in the two Mid Term-Examinations held, one in the middle of the Semester (I-II units) and another immediately after the completion of instruction (III-V units) with four questions to be answered out of five in 2 hours, evaluated for 40 marks.

5.2. For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day to day performance (25marks) and practical test at the end of the semester (15marks).

5.3. For Seminar there will be an internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful. The assessment will be made by a board consisting of HOD and two internal experts.

5.4. A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

5.5. In case the candidate does not secure the minimum academic requirement in any of the subjects (as specified in 5.4) he has to reappear for the Semester Examination either supplementary or regular in that subject, or repeat the subject when next offered or do any other specified subject as may be required.

5.6. **Revaluation / Recounting:**

Students shall be permitted for request for recounting/revaluation of the year / Semester-End examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student will be issued a revised grade sheet. If there are no changes, the same will be intimated to the students.

5.7 **Supplementary Examination:**

In addition to the regular year/ Semester- End examinations conducted, the College may also schedule and conduct supplementary examinations for all the subjects of other year/ semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

6.0 RE-REGISTRATION:
Following are the conditions to avail the benefit of improvement of internal evaluation marks

6.1. The candidate should have completed the course work and obtained examinations results for six semesters.

6.2. He should have passed all the subjects for which the internal evaluation marks secured are more than or equal to 50%.

6.3. Out of the subjects the candidate has failed in the examination due to Internal evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of **three** Theory subjects for Improvement of Internal evaluation marks.

6.4. The candidate has to re-register for the chosen subjects and fulfill the academic requirements.

7.0   EVALUATION OF PROJECT WORK:
Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the college/ institute.

7.1.   **Registration of Project work:** A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of I to V Sem)

7.2.   An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor and one internal senior teacher shall monitor the progress of the project work.

7.3.   The work on the project shall be initiated in the penultimate semester and continued in the final semester. The candidate can submit Project thesis with the approval of I.D.C. at the end of the VI semester instruction as per the schedule. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.

7.4.   The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C before submission of the Project Report and award internal assessment marks for 120.

7.5.   The viva voce examination may be conducted once in two months for all the candidates who have submitted thesis during that period.

7.6.   Three copies of the Thesis / Dissertation certified in the prescribed form by the supervisor and HOD shall be presented to the HOD. One copy is to be forwarded to the Controller Of Examinations and one copy to be sent to the examiner.

7.7.   The Dept shall submit a panel of three experts for a maximum of 5 students at a time. However, the Thesis / Dissertation will be adjudicated by one examiner nominated by the Chief Controller Of Examinations.

7.8.   If the report of the examiner is favorable viva-voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the thesis / dissertation. The board shall jointly award the marks for 180.

7.9   A candidate shall be deemed to have secured the minimum academic requirement in the project work if he secures a minimum of 50% marks in the viva-voce examination and a minimum aggregate of 50% of the total marks in the end viva-voce examination and the internal project report taken together. If he fails to get the minimum academic requirement he has to appear for the viva-voce examination again to get the minimum marks. If he fails to get the minimum marks at the second viva-voce examination he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit. If the candidate fails to secure minimum marks again, the project shall be summarily rejected.

8.0   Grades, Grade point Average, Cumulative Grade point Average:
8.1   Grade System: After all the components and sub-components of any subject (including laboratory subjects) are evaluated, the final total marks obtained will be converted to letter grades on a "10 point scale" described below.

% of marks obtained	Grade	Grade Points(GP)
90 to 100	A+	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
50 to 59	D	6
Less than 50 in Sum of Internal & External (or) Less than 24 in External	F	0
Not Appeared	N	0

8.2 **GPA:** Grade Point Average (GPA) will be calculated as given below on a "10 Point scale" as an Index of the student's performance at the end of each semester:

$$\text{GPA} = \frac{\sum(CXGP)}{\sum C}$$

Where C denotes the credits assigned to the subjects undertaken in that semester and GP denotes the grade points earned by the student in the respective subjects

8.3 **CGPA:** At the end of every semester, a Cumulative Grade Point Average (CGPA) on a 10 Point scale is computed considering all the subjects passed up to that point as an index of overall Performance up to that Point as given below:

$$\text{CGPA} = \frac{\sum(CXGP)}{\sum C}$$

Where C denotes the credits assigned to subjects undertaken upto the end of the current semester and GP denotes the grade points earned by the student in the respective courses.

8.4 **Grade sheet:** A grade sheet (Marks Memorandum) will be issued to each student Indicating his performance in all subjects registered in that semester indicating the GPA and CGPA. GPA and CGPA will be rounded off to the second place of decimal.

9.0 **Transcripts:** After successful completion of the entire Program of study, a transcript containing performance of all semesters will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee.

10.0 **Award of Degree:** The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Anantapur on the recommendation of The Principal of SVCET (Autonomous).

MCA 3Yrs Programme
Student admitted in MCA 3Yrs programme shall register for all 144 credits and earn all the 144 credits. Marks obtained in all the 144 credits shall be considered for the award of the class based on CGPA.

MCA 2nd Year Direct Programme
Student admitted in MCA 2nd Year Direct Programme shall register for all 91 credits and earn all the 91 credits. Marks obtained in all the 91 credits shall be considered for the award of the class based on CGPA.

10.1 **Eligibility:** A student shall be eligible for the award of M.C.A Degree if he fulfills all the following conditions:
- Registered and successfully completed all the components prescribed in the program of study for which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 6.0 (Minimum requirement for declaring as passed.)

10.2 **Award of Class:** Declaration of Class is based on CGPA.

Cumulative Grade Point Average	Class
≥7.75	First Class with Distinction
≥6.75 and <7.75	First Class
≥6.0 and <6.75	Second Class

11.0 WITH – HOLDING OF RESULTS:
If the candidate has not paid dues to the University/College or if any case of in-discipline is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

12.0 TRANSITORY REGULATIONS:
Candidates who have discontinued or have been detained for want of attendance or who have failed after having undergone the course in earlier regulations and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to 5.5 and 3.3 sections. Whereas they continue to be in the academic regulations of the batch they join later.

13.0 GENERAL:
i.   The academic regulations should be read as a whole for purpose of any interpretation.
ii. Disciplinary action for Malpractice/improper conduct in examinations is appended.
iii. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
v.   The college may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the college.

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Identification of Courses
M.C.A

Each course shall be uniquely identified by an alphanumeric code of width 7 characters as given below.

No. of digits	Description
First two digits	Year of regulations Ex:15
Next one letter	**Type of program:** A: B.Tech B: M.Tech C: M.B.A D: M.C.A M: Master of Applied Management (**Dual Degree**) N: Masters Degree in Computer Applications (**Dual Degree**)
Next two letters	Code of department: HS/CE/CS/EE/EC/IT/ME/MB/MC/BM/CA
Next two digits	Indicate serial numbers: ≥ 01

Ex:
15DMC01
15DHS01

SRI VENKATESWARA COLLEGE OF ENGINNERING & TECHNOLOGY
(AUTONOMOUS)
(AFFILIATED TO JNTUA, ANANTAPUR)
RULES FOR DISCIPLINARYACTION FOR MALPRACTICE/IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices / Improper conduct	**Punishment**
	If the candidate	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
6.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits of seat.
7.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.

8.	Refuses to obey the orders of the Chief Superintendent / Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction or property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Examination committee for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators
1. Punishments to the candidates as per the above guidelines.

**Sri Venkateswara College of Engineering & Technology
[Autonomous]
RVS Nagar, Chittoor – 517127.A.P**

Department of MCA

<u>Course Structure for Master of Computer Applications</u>

MCA I-Semester

S.No.	SUB.CODE	Subject	Periods			Credits	Scheme of Examination (Max. Marks)		
			L	T	P		INT	EXT	TOT
1	15DMB01	Accounting and Financial Management	4	1		4	40	60	100
2	15DHS02	English Language Communication Skills	4	1		3	40	60	100
3	15DHS03	Probability and Statistics	4	1		4	40	60	100
4	15DMC04	Computer Fundamentals	4	1		3	40	60	100
5	15DMC05	Computer Organization	4	1		3	40	60	100
6	15DMC06	Problem Solving and Programming	4	1		4	40	60	100
7	15DHS07	English Language Communication Skills Lab	-	-	3	2	40	60	100
8	15DMC08	Computer Fundamentals Lab	-	-	3	2	40	60	100
9	15DMC09	Programming in C Lab	-	-	3	2	40	60	100
		TOTAL	**24**	**6**	**9**	**27**	**360**	**540**	**900**

MCA II-Semester

S.No.	SUB.CODE	Subject	Periods			Credits	Scheme of Examination (Max. Marks)		
			L	T	P		INT	EXT	TOT
1	15DHS10	Discrete Mathematics	4	1		3	40	60	100
2	15DMC11	Object Oriented Programming using JAVA	4	1		4	40	60	100
3	15DMC12	Data Structures & Algorithms	4	1		4	40	60	100
4	15DMC13	Operating System	4	1		4	40	60	100
5	15DME14	Operations Research	4	1		3	40	60	100
6	15DMC15	Database Management Systems	4	1		4	40	60	100
7	15DMC16	DBMS Lab	-	-	3	2	40	60	100
8	15DMC17	Data Structures Lab	-	-	3	2	40	60	100
		TOTAL	**24**	**6**	**6**	**26**	**320**	**480**	**800**

MCA III-Semester

S.No.	SUB.CODE	Subject	Periods			Credits	Scheme of Examination (Max. Marks)		
			L	T	P		INT	EXT	TOT
1	15DMC18	Linux Programming	4	1		4	40	60	100
2	15DMC19	Computer Networks	4	1		4	40	60	100
3	15DMC20	Software Engineering	4	1		4	40	60	100
4	15DMC21	Data Warehousing & Mining	4	1		4	40	60	100
5	15DMC22	Principles of Programming Languages	4	1		4	40	60	100
6	15DMC23	Organizational Structure and Personnel Management	4	1		4	40	60	100
7	15DMC24	Linux Programming Lab	-	-	3	2	40	60	100
8	15DMC25	Data Warehousing & Mining Lab	-	-	3	2	40	60	100
		TOTAL	24	6	6	28	320	480	800

MCA IV-Semester

S.No.	SUB.CODE	Subject	Periods			Credits	Scheme of Examination (Max. Marks)		
			L	T	P		INT	EXT	TOT
1	15DMC26	Web Technologies	4	1		4	40	60	100
2	15DMC27	Multimedia and Application Development	4	1		4	40	60	100
3	15DMC28	Professional Ethics	4	1		4	40	60	100
4	15DMC29	Big Data Analytics	4	1		4	40	60	100
5		**Elective-I**	4	1		3	40	60	100
6		**Elective-II**	4	1		3	40	60	100
7	15DMC36	Web Technologies Lab	-	-	3	2	40	60	100
8	15DMC37	Multimedia and Application Development Lab	-	-	3	2	40	60	100
		TOTAL	24	6	6	26	320	480	800

Elective – I
15DMC30-- E-Commerce
15DMC31 -- Network Security & Cryptography
15DMC32 -- Artificial Intelligence

Elective – II
15DMC33 –Software Project Management
15DMC34– Scripting Languages
15DMC35 –Advanced Linux Programming

MCA V-Semester

S.No.	SUB. CODE	Subject	Periods			Credits	Scheme of Examination (Max. Marks)		
			L	T	P		INT	EXT	TOT
1	15DMC38	Android Application Development	4	1		4	40	60	100
2	15DMC39	C# Programming	4	1		4	40	60	100
3	15DMC40	Object Oriented Analysis & Design Using UML	4	1		4	40	60	100
4	15DMC41	Cloud Computing	4	1		4	40	60	100
5		**Elective-III**	4	1		3	40	60	100
6		**Elective – IV**	4	1		3	40	60	100
7	15DMC48	Android Lab	-	-	3	2	40	60	100
8	15DMC49	C# Programming Lab	-	-	3	2	40	60	100
		TOTAL	24	6	6	26	320	480	800

Elective – III
15DMC42 -- Human Computer Interaction
15DMC43 -- Theory of Computation
15DMC44 -- Geographical Information Systems

Elective – IV
15DMC45 -- Compiler Design
15DMC46 -- Software Testing Methodologies
15DMC47 -- Semantic Web

MCAVI-Semester

S.No.	SUB.CODE	Subject	Periods			Credits	Scheme of Examination (Max. Marks)		
			L	T	P		INT	EXT	TOT
1	15DMC51	Project Work	-	-	-	11	170	180	350
		TOTAL	-	-	-	**11**	**170**	**180**	**350**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY, Chittoor.
(AUTONOMOUS)

			L	T	P	C
MCA – I Semester			4	1	0	4

15DMB01 –ACCOUNTING AND FINANCIAL MANAGEMENT

Course Outcomes:
After Completion of the course the student will be able to
1. Use of accounting information to managers within the organization
2. It has helpful for business Decisions.
3. It controls the management functions.
4. Application of Accounting & financial techniques in software industry.
5. Able to do budgeting for companies

UNIT I:
Introduction to Accounting & Financial Statements: Accounting Principles, Double entry system of accounting, classification of accounts and debit-credit rules.
Financial Statements: Introduction to basic books of accounts, journal and ledger – trial balance – preparation of final accounts: trading account, profit and loss account and balance sheet.

UNIT II:
Introduction to Financial Management: Meaning and scope, role of financial manager, Goals of financial management, leverages: operation, financial and combined leverage.
Cost of capital: cost of equity, preference shares, bonds – weighted average cost of capital – capital gearing and sources of finance.

UNIT III:
Financial Analysis: Ratio Analysis – classification of ratios – solvency ratios, profitability ratios, Activity ratios – analysis and interpretation of financial statements.
Funds Flow and Cash Flow Analysis: Meaning, Importance, statement of changes in working capital, statement of sources and application of funds.
Cash flow analysis: cash flow statements: preparation, analysis and interpretation.

UNIT IV:
Break Even Analysis: Concept of Break Even Point, Cost-Volume-Profit Analysis, Determination of Break Even Point, Graphical representation of Break Even Analysis, Margin of Safety and P/V ratio, Impact of changes in cost or selling price on BEP, Practical applications of Break Even Analysis.

UNIT V:
Capital Budgeting: Capital and its significance, types of capital, estimation of fixed and working capital requirements, methods and sources of raising capital. Capital budgeting: features, proposals, methods of capital budgeting, payback method, accounting rate of return (AAR), Net Present Value Method (NPV) and Internal Rate of Return (IRR), Profitability Index-simple problems.

TEXT BOOKS:
1. S.N.Maheshwari, Financial Accounting, Sultan Chand, 2009.
2. Van Horne, James,C., Financial Management and Policy, Pearson ,2009.
3. R.L. Gupta & M. Radhaswamy, Advanced Accountancy, Sultan Chand

REFERENCES:
1. Tulsian, Financial Accounting, S Chand, 2009.
2. Khan and Jain, Financial Statement Analysis, PHI, 2009
3. I.M.Pandey, Financial Management, Vikas Publications
4. Bhat Sundhindra, Financial Management, Excel: 2009
5. Prasanna Chandra, Financial Management, T.M.H, 2009.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1												1
CO2						2						
CO3		3										1
CO4											1	1
CO5						1			1			

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	L	T	P	C
MCA – I Semester	4	1	0	3

15DHS02 -ENGLISH LANGUAGE COMMUNICATION SKILLS

Course Outcomes:
After Completion of the course the student will be able to
1. The students will improve the language proficiency in LSRW.
2. The students will comprehend the English proficiency to meet the demand of English in the modern world.
3. The students will expose to self-instructional and learner friendly modes of language learning.
4. The students will learn how to compete with interviews, group discussions & public speaking.
5. Able to write any kind of Business Letters.

UNIT I
Vocabulary building-Synonyms and Antonyms, Word roots, One-word substitutes, Prefixes and Suffixes, Idioms and phrases
Informal conversation Vs Formal expression - Verbal and non-verbal communication, barriers to effective communication – kinesics

UNITII
Types of Communication - Oral, aural, Writing and reading - Word-Power - Jargons - rate of speech, pitch, tone - Clarity of voiceTechnical presentations - types of presentation –video conferencing-- participation in meetings - chairing sessions.

UNITIII
Formal and informal interviews – Pre-interviewing planning - ambiance and polemics - interviewing in different settings and for different purposes e.g., eliciting and giving information, interview through teleconferencing and video conferencing, recruiting, performance appraisal

UNITIV
Written communication - differences between spoken and written communication - features of effective writing such "as clarity, brevity, appropriate tone clarity, balance etc.- GRE, TOEFL models

UNIT V
Letter-writing - business letters – pro forma culture - format - style – effectiveness, promptness - Analysis of sample letters collected from industry - email, fax. Technical Report writing - Business and Technical Reports – Types of reports - progress reports, routine reports - Annual reports - formats - Analysis of sample reports from industry - Synopsis and thesis writing

TEXTBOOKS:
1. M Ashraf Rizvi, Effective Technical Communication, Tata Mc.Graw-Hill Pub, company Ltd
2. Andrea J. Rutherford: Basic Communication Skills for Technology, Pearson Education Asia, New Delhi.
3. "Business Communication" by Dr.Urmila Rai &S.M.Rai, Himalaya Publishing House, Mumbai.

REFERENCES:
1. Herbert Puchta and Jeff Stranks, GRE and TOEFL; Kaplan and Baron's English in Mind, Cambridge
2. Meenakshi Raman and Sangeetasharma, Technical Communication, Oxford Univ.Press.
3. Lenne Sen, Communication Skills, Prentice –Hall of India Pvt. Ltd., New Delhi.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1				3						2		
CO2	3							3				
CO3				3							3	
CO4	2											2
CO5										1	1	

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		L	T	P	C
MCA – I Semester		4	1	0	4

15DHS03 -PROBABILITY AND STATISTICS

Course Outcomes:
After Completion of the course the student will be able to
1. To apply probabilities and its Distributions to the data
2. To sample the data and do the Estimations on parameters
3. To analyze the data and apply various test of hypothesis
4. To fit a curve to the given data and predict the future values
5. To construct the control charts and be able to analyze the given Queuing system

UNIT I
RANDOM VARIABLES: Introduction of Probability, Random variables- Discrete & Continuous Random variables – Distribution functions – Binomial, Poisson and Normal Distribution.

UNIT II
SAMPLING THEORY: Populations and Samples – Sampling distributions of mean (known and unknown) proportions -Point Estimation – Interval estimation – Bayesian estimation.

UNIT III
TESTS OF HYPOTHESIS: Type I error and Type II errors, One tail, two tail tests - Hypothesis concerning one and two means – Hypothesis concerning one and two proportions. Student- t-test, F-test, Chi-square **[X^2]** test**:** X^2 test goodness of fit – the analysis of RxC tables. ANOVA I & II way classification.

UNIT IV
CURVE FITTING: The method of least squares – Interfaces based on the least squares estimations –Curvilinear regression – multiple regressions- correlation for univariate and bivariate distributions.

UNIT V
QUALITY CONTROL & QUEUEING THEORY: Pure Birth and Death process- M/M/1 Model – Problems on M/M/1 Model. Introduction to Quality Control, Construction of $\overline{X}$, Range chart, C chart and P charts.

TEXT BOOKS:
1. Iyengar. T.K.V., Krishna Gandhi B., Probability & Statistics, New Delhi, S.Chand& Company,2012.
2. S.C.Gupta and Kapoor, A text book of Probability and Statistics , Sultan Chand publications, New Delhi.

REFERENCES:
1. Miller and John Freund. E., Probability & Statistics for Engineers, New Delhi, Pearson Education,2004
2. J.L.Devora, Probability & Statistics, Thomson publications.
3. R.E.Walpole, R.H.Mayer, S.L.Mayer&K.Ye, Pearson Education.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3										
CO3				2								
CO4		3		2								
CO5		3										

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	L	T	P	C
MCA – I Semester	4	1	0	3

15DMC04–COMPUTER FUNDAMENTALS

Course Outcomes:
After Completion of the course the student will be able to
1. Assemble and Disassemble the PC and prepare word document
2. Analyze data using Functions, Pivot Table, Charts and Macros.
3. Animate the presentation using Power Point
4. Develop basic programs using animation techniques.
5. Animate the Sprite using Music Tool and Audacity

UNIT I
PC Hardware: Peripherals of a computer, components in a CPU and its functions. CPU block diagram, Assemble the PC, Hardware & Software Troubleshooting

MS Word: Basics of MS Word, Templates, Paragraphs, Graphs, Frames, Borders, Styles, Tables, Inserting Watermarks, , Graphics, Page Layouts , Calculations, Page Setup, Mail Merge

UNIT II
MS- Excel: Basics of MS Excel, Overview of Toolbars, Gridlines, Formatting Cells, Summation, Auto fill, Formatting Text, Conditional Formatting, Functions, Filters, Sorting, Totals and Sub Totals, Managing Windows, Multiple Windows, Splitting Windows, Freezing panes, Linking data, Tool pack, Goal seek, pivot table, Charting, Macros

UNIT III
MS-PowerPoint: Basics of MS PowerPoint, Creating & Formatting a Presentation, Drawing Toolbars, Inserting and Formatting text   with in a Shape, Ordering and Grouping Object, Flow Diagrams, Linking and Embedding Objects, Speaker Notes and Handouts.

UNIT IV
Introducing Scratch and Creating Sprite: Learn What Can You Do with Scratch - First Look at Scratch - Create Your First Sprite - CREATE BACK, LEFT SIDE, and RIGHT SIDE VIEWS
Animating a Sprite (Dance): Dance - Finishing and Testing - Kick Up a Notch Adding Music(Dance to the Beat):Dancing and Popping - Hip-Popping - Wrapping it up

UNIT V
Create a Music Sprite: Create a Music Sprite - Move Music Loop to the Music Sprite - Turn Music On and Off
Working with the Stage: Create a Simple Scene -Adding Simple Movement Scripts to Sprites - Do the same for Donut Man and Donut - Test
Create Music with Music Tool Kit &Audacity: Create a Tune using Sound Tool Kit - Create a Sound Clip using Audacity

TEXT BOOKS:
1. Anitha Goel, Computer Fundamentals, Pearson Education.
2. "Scratch Programming" by Jessica Chiang
3. V.Rajaraman, "Fundamentals of Computers" – 4th edition PHI.

REFERENCES:
1. Introduction to information technology, ITL Education solution Ltd, Pearson education
2. David Anfinson and Ken Quamme , IT Essentials PC Hardware and Software Companion Guide,Third Edition – CISCO Press, Pearson education
3. "Super Scratch Programming Adventure! (Covers Version 1.4): Learn to Program By Making Cool Games" by The LEAD Project

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3			3								
CO2		3										
CO3		3										
CO4					2							
CO5				2	1							

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		L	T	P	C
MCA – I Semester		4	1	0	3

15DMC05 - COMPUTER ORGANIZATION

Course Outcomes:
After Completion of the course the student will be able to
1. Understand Number System and how data is manipulated using various circuits.
2. Know how data is stored in different types of memory
3. Develop basic programs using Intel 8086
4. Know how data is interfaced between peripherals
5. Understand Inter process Communication and Synchronization

UNIT I
Number Systems And Computer Arithmetic: Signed and unsigned numbers, Addition and subtraction, multiplication, division, Floating point representation, logical operation, Gray code, BCD codes, Error detecting codes, Boolean algebra, Simplification of Boolean Expressions , K-Maps.
Combinational And Sequential Circuits: decoders, Encoders, Multiplexers, Half and Full adders, Shift registers, Sequential circuits- flip-flops.

UNIT II
Memory Organization: Memory hierarchy, Main memory-RAM, ROM chips, Memory address map, memory contention to CPU, Associative Memory-Hardware logic, match, read and write logic, Cache Memory-Associative mapping, Direct mapping, Set-associative mapping, hit and miss ratio.

UNIT III
Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit, Hard wired control, Micro programmed control BASIC CPU ORGANIZATION-Introduction to CPU, Instruction formats-INTEL-8086 CPU architecture-Addressing modes - generation of physical address- code segment registers, Zero, one, two, and three address instructions.

UNIT IV
Input-Output Organization: Peripheral devices, input-output interface-I/O Bus and interface modules, I/O versus Memory bus, isolated versus memory mapped I/O, Modes of transfer-Programmed I/O, Interrupt-initiated I/O, priority interrupts-Daisy chaining, parallel priority, interrupt cycle, DMA- DMA control, DMA transfer, Input output processor-CPU-IOP communication.

UNIT V
Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor Arbitration. Inter Processor Communication and Synchronization, Cache-Coherence, Shared Memory Multiprocessors.

TEXT BOOKS:
1. M. Morris Mano, Computer System Architecture,3rd Edition, PHI/Pearson Education, 2008.
2. Douglas Hall, Microprocessors and Interfacing, Tata McGraw-Hill.
3. M. Morris Mano, Digital Design, PHI/Pearson Education.

REFERENCES:
1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, Vth Edition, McGraw Hill.
2. Sivarama P. Dandamudi, Fundamentals of Computer Organization and Design, Springer Int. Edition.
3. William Stallings, Computer Organization and Architecture, 7th Ed, Pearson/PHI, 2007.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		2										
CO2	3											
CO3				3								
CO4			3	2	3							
CO5	3											

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	L	T	P	C
MCA – I Semester	4	1	0	4

15DMC06 - PROBLEM SOLVING AND PROGRAMMING

Course Outcomes:

After Completion of the course the student will be able to

1. Design a computational solution for a given problem.
2. Transform a problem solution into programs involving programming constructs
3. Introduce modularity using functions and pointers which permit ad hoc run-time polymorphism
4. Develop programs using structures, strings, arrays, pointers and files for solving complex computational problem.
5. Use preprocessors and to write basic animation programs.

UNIT I

Problem Solving: Problem-Solving Techniques, Steps for Problem-Solving, Using Computer as a Problem-Solving Tool, Design of Algorithms, Definition, Features of Algorithm, Criteria to be followed by an Algorithm, Top Down Design, Analysis of Algorithm Efficiency, Analysis of Algorithm Complexity, Flowcharts, Basic Symbols used in Flowchart Design

Basics of C: What is a Program and what is a Programming Language? C Language, History of C, Salient Features of C, Structure of a C Program, A Simple C Program, Writing a C Program, Compiling a C Program, Link and Run the C Program, Run the C Program through the Menu, Run from an Executable File, Linker Errors, Logical and Runtime Errors, Diagrammatic Representation of Program, Execution Process

UNIT II

Variables and Constants: Character Set, Identifiers and Keywords, Rules for Forming Identifiers, Keywords, Data Types and Storage, Data Type Qualifiers, Variables, Declaring Variables, Initializing Variables, Constants, Types of Constants
Expressions and Operators: Assignment Statements, Arithmetic Operators, Relational Operators, Logical Operators, Comma and Conditional Operators, Type Cast Operator, Size of Operator, C Shorthand, Priority of Operators
Decision and Loop Control Statements: Decision Control Statements, The if Statement, The switch Statement, Loop Control Statements, The while Loop, The do-while Statement, The for Loop, The Nested Loop, The goto Statement, The Break Statement, The Continue Statement

UNIT III

Arrays: Array Declaration, Syntax of Array Declaration, Size Specification , Array Initialization, Initialization of Array Elements in the Declaration, Character Array Initialization, Subscript, Processing the Arrays, Multi-Dimensional Arrays, Multi-Dimensional Array Declaration, Initialization of Two-Dimensional Arrays
String: Declaration and Initialization of Strings, Display of Strings Using Different Formatting Techniques, Array of Strings, Built-in String Functions and Applications, Strlen Function, Strcpy Function, Strcmp Function, Strcat Function, Strlwr Function, Strrev Function, Strspn Function, Other String Functions
Functions: Definition of a Function, Declaration of a Function, Function Prototypes, The Return Statement, Types of Variables and Storage Classes, Automatic Variables, External Variables, Static Variables, Register Variables, Types of Function Invoking, Call by Value, Recursion

UNIT IV

Structures and Unions: Declaration of Structures, Accessing the Members of a Structure, Initializing Structures, Structures as Function Arguments, Structures and Arrays, Unions, Initializing an Union, Accessing the Members of an Union.

Pointers: Pointers and their Characteristics, Address and Indirection Operators, Pointer Type Declaration and Assignment, Pointer Arithmetic, Passing Pointers to Functions, A Function Returning More than One Value, Function Returning a Pointer, Arrays and Pointers, Array of Pointers, Pointers and Strings

UNIT V

The C Preprocessor: # define to Implement Constants, # define to Create Functional Macros, Reading from Other Files using #include, Conditional Selection of Code using #ifdef, Using #ifdef for different computer types Using #ifdef to temporarily remove program statements, Other Preprocessor Commands, Predefined Names Defined by Preprocessor, Macros Vs Functions

Files: File Handling in C Using File Pointers, Open a file using the function fopen(), Close a file using the function fclose(), Input and Output using file pointers, Character Input and Output in Files, String Input / Output Functions, Formatted Input / Output Functions, Block Input / Output Functions, Sequential Vs Random Access Files, Positioning the File Pointer, The Unbuffered I/O - The UNIX like File Routines

C Graphics: Graphics mode Initialization, arc, bar, bar3d, circle, cleardevice, closegraph, drawpoly, ellipse, fillellipse, fillpoly, floodfill, getarccords, getbkcolor, getcolor, getdrivername, getimage, getmaxcolor, getmaxx, getmaxy, getpixel, getx, gety, graphdefaults, grapherrormsg, imagesize, line, lineto, linerel, moveto, moverel, outtext, outtextxy, pieslice, putimage, putpixel, rectangle, sector, setbkcolor, setcolor, setfillstyle, setlinestyle, settextstyle, setviewport, textheight, textwidth.

TEXT BOOKS:
1. How to solve it by computer, R.G .Dromey, Pearson education, fifth edition, 2007.
2. PradipDey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009
3. Yashavant Kanetkar , "Understanding Pointers In C", 4th Revised & Updated Edition, 2008, Bpb Publications

REFERENCES:
1. Kamthane, A.N., "Programming with ANSI and Turbo C", Pearson Education, Delhi,2006
2. Deitel and Deitel,"C How to Program", Pearson Education. 2010 6Th edition
3. Brian W. Kernighan and Dennis M. Ritchie, "The C programming Language", 2006, Prentice-Hall

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3			2							
CO3				2								
CO4	3				2							
CO5					2							

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	L	T	P	C
MCA – I Semester	0	0	3	2

15DHS07–ENGLISH LANGUAGE COMMUNCATION SKILLS LAB

The following course content is prescribed for the English Language Laboratory Practice
1. Phonetics- Introduction to the Sounds of English – vowels, Diphthongs and consonants
2. Introduction to Stress, Accent, Intonation and Rhythm
3. Interpersonal communications and Situational Dialogues/Role play
4. Oral Presentations/Public speaking
5. Debate
6. Group Discussions
7. Facing interviews
8. Resume preparation

Exercise 1: Phonetics –English pronunciation– basics in phonetics- introduction to sounds of English – vowels – diphthongs – consonants – phonetic transcription
Exercise 2: Techniques to develop effective word accent- various stress patterns– developing voice quality and tone– intonation– rhythm– rhythm in connected speech
Exercise 3: Fundamentals of interpersonal communication– starting a conversation- responding appropriately and relevantly
Exercise 4: Dialogues- Formal and informal– using the right body language– role play in different situations.
Exercise 5: Importance of Oral Presentations- developing and organizing the presentations– verbal and visual support in presentations– delivering the presentation
Exercise 6: Informative, group and special occasion presentations– persuasive presentations
Exercise 7: Formal and Informal debate– theory for debating– art of debating
Exercise 8: Debate on various topics
Exercise 9: Nature of group discussion– characteristics of successful GD's– strategies– techniques for individual contribution- intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
Exercise 10: Organizing Group Discussions
Exercise 11: Interview Skills– concept and process, pre-interview planning, opening strategies, answering strategies, projecting a positive image, interview through tele and video-conferencing.
Exercise 12: Organizing mock interviews
Exercise 13: Resume design– structure and presentation, planning, defining the career objective, projecting one's strengths and skill-sets, summary.
Exercise 14: Resume styles– job application letters

<u>Minimum Requirements</u>
Computer aided multimedia language lab equipped with Computer systems in LAN facility. Conventional Language Lab. with audio and video systems, speakers, headphones and a teacher console so as to accommodate at least 60 students.

PRESCRIBED SOFTWARE: GLOBARENA
Suggested Software:
- Cambridge Advanced Learners' Dictionary with exercises
- The Rosetta Stone English Library
- Clarity Pronunciation Power
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Oxford Advanced Learner's Compass, 7th Edition
- Language in Use, Foundation Books Pvt Ltd
- Learning to Speak English - 4 CDs
- Microsoft Encarta
- Murphy's English Grammar, Cambridge
- Time series of IQ Test, Brain-teasers, Aptitude Test etc. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Books Suggested for English lab:
- Krishna Mohan & MeeraBenerji Developing Communication Skills by (Macmillan)
- Krishna Mohan & NP Singh Speaking English Effectively by (Macmillan)
- John Eastwood, Oxford Practice Grammar with Answers, Oxford
- Mark Lester and Larry Beason, Handbook of English Grammar and Usage, Tata McGraw-Hill
- T.Balasubramanian A text book of English Phonetics for Indian Students by (Macmillan)
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- English Skills for Technical Students, WBSCTE with British Council, OL
- Robert J Dixson, Everyday Dialogues in English by Prentice – Hall of India Ltd.
- Koneru, Professional Communication by McGraw Hill.

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	L	T	P	C
MCA – I Semester	0	0	3	2

15DMC08 – COMPUTER FUNDAMENTALS LAB

MS Word
The mentor needs to give an overview of Microsoft (MS) word 2007: Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. Give a task covering to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Inserting table, using Drawing toolbar in word.

MS Excel
The mentor needs to tell the importance of MS office 2007 Excel as a Spreadsheet tool covering Accessing, overview of toolbars, saving excel files, Using help and resources., Also give a task that is covering the features like Gridlines, Format Cells, Summation, auto fill, Formatting Text.

MS Power Point
Students will be working on MS power point that helps them create basic power point presentation. Topics covered during this Exercise include :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power point. Students shall be given a model power point presentation which needs to be replicated (exactly how it's asked).

SCRATCH
1. Create a Scratch Application to move sprite ten steps in forward direction
2. Create a Scratch Application for Moving Sprite To Different Directions
3. Create a Scratch Application for changing Skin Color of a Sprite and moving sprite based on Arrow Keys.
4. Create a Scratch Application give voice for Sprite

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	L	T	P	C
MCA – I Semester	0	0	3	2

15DMC09–PROGRAMMING IN C LAB

1. Write a C program to find the sum of individual digits of a positive integer.
2. Write a C program to find A Fibonacci sequence
3. Write a C program to generate all the prime numbers between 1 and n, where value of n is supplied.
4. Write a C program to find the roots of a quadratic equation.
5. Write C program to find the factorial of a given integer that uses both recursive and non-recursive functions
6. Write C program To find the GCD (greatest common divisor) of two given integers that uses both recursive and non-recursive functions
7. Write a C program to find both the largest and smallest number in a list of integers.
8. Write a C program that uses functions to perform the following:
   a. Addition of Two Matrices
   b. Multiplication of Two Matrices
9. Write a C program to determine if the given string is a palindrome or not
10. Write a C program to count the lines, words and characters in a given text.
11. Write a C program to construct a pyramid of numbers.
12. Write a C program which copies one file to another.
13. Write a C program to display the contents of a file.
14. Write a C program to draw a filled circle with color using Graphics.
15. Write a C program to draw a polygon using Graphics.
16. Write a C program to simulate text effects using C Graphics.
17. Write a C program to simulate marquee effect using C Graphics.

REFERENCES:
1. M.Cooper, The Spirit of C, an introduction to modern programming, Jaico Publishing House.
2. K.R. Venugopal and S.R. Prasad, Mastering C, TMH Publications.
3. V. Rajaraman, Computer Basics and C Programming, PHI Publications

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	L	T	P	C
MCA – II Semester	4	1	0	3

15DHS10-DISCRETE MATHEMATICS

Course Outcomes:

After Completion of the course the student will be able to

1. Apply Predicative logics and Rules of inference for various statements (and Theorems)
2. Solve problems involving Hasse diagrams, Lattice relations and Boolean Algebra
3. Analyze data by using Permutations and Combinations, Binomial and Multinomial Theorems
4. Use Recurrence relations for various functions and Generating functions
5. Construct various types of graphs such as DFS and BFS for the given data

UNIT I

MATHEMATICAL LOGIC AND PREDICATES: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT II

SET THEORY AND BOOLEAN ALGEBRA: Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function Comports of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application. Introduction to Boolean Algebra- Sub Algebra , Direct product and homomorphism .
-
UNIT III

Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

UNIT IV

RECURRENCE RELATION: Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics roots solution of In homogeneous Recurrence Relation.

UNIT V

GRAPH THEORY: Representation of Graph, Directed Graph , DFS, BFS, Spanning Trees, planar Graphs. Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

2015-16

TEXT BOOKS:
1. Trembly J.P. & Manohar .P, Discrete Mathematical Structures with applications to computer science TMH
2. Ralph. P.Grimaldi. Discrete and Combinatorial Mathematics- An Applied Introduction-5th Edition –Pearson Education
3. DrD.S.Chandrasekharaiaha ,Mathematical Foundations of computer science Prism books Pvt Ltd.

REFERENCES:
1. BernandKolman, Roberty C. Busby, Sharn Cutter, Discrete Mathematical Structures, Ross, Pearson Education/PHI.
2. Garry Haggard and others, Discrete Mathematics for Computer science, Thomson
3. Mallik and Sen, Discrete Mathematical Structures, Thomson
4. J.L. Mott, A. Kandel, T.P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians Prentice Hall, 1986 .
5. NarsinghDeo, 'Graph Theory' PHI Publishers.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2	3	2										
CO3		2										
CO4				3	1							
CO5		2										

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	L	T	P	C
MCA – II Semester	4	1	0	4

15DMC11 - OBJECT ORIENTED PROGRAMMING USING JAVA

Course Outcomes:

After Completion of the course the student will be able to

1. Understand OOPS Concepts and basics of Java Programming
2. Write reusable functions/utilities
3. Develop program that read and write data to a file, client server programs and packages.
4. Develop applications using Exception Handling and threads
5. Develop a GUI Application using Applets, Swings.

UNIT I

Java Basics - History of Java, Java buzzwords, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow-block scope, conditional statements, loops, break and continue statements, simple java program, arrays, input and output, formatting output, Review of OOP concepts, encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class, Enumerations.

UNIT II

Inheritance – Inheritance concept, benefits of inheritance ,Super classes and Sub classes, Member access rules, Inheritance hierarchies, super uses, preventing inheritance: final classes and methods, casting, polymorphism- dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

UNIT III

Files – streams- byte streams, character streams, text Input/output, binary input/output, random access file operations, File management using File class, Using java.io.

Networking in Java – Introduction, Manipulating URLs, Ex. Client/Server Interaction with Stream Socket Connections, Connectionless Client/Server Interaction with Datagram's, Using java.net.

Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

UNIT IV

Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions.

Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities,thread groups, daemon threads.

UNIT V
Applets– Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet - Four methods of an applet, Developing applets and testing, passing parameters to applets, applet security issues. The AWT class hierarchy, MVC architecture.

Swings: Introduction to Swing, Swing vs. AWT **-**Hierarchy for Swing components, Containers – Top-level containers – JFrame, JApplet, JWindow, JDialog, Light weight containers – JPanel, A simple swing application, Overview of several swing components-Jbutton, JToggleButton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList, JComboBox, JMenu, Layout management - Layout manager types – border, grid, flow, box.

Event Handling- Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Examples: handling a button click, handling mouse and keyboard events, Adapter classes.

TEXT BOOKS:
1. Herbert Schildt, Java: the complete reference, 7th editon, TMH.
2. P.J.Deitel and H.M.Deitel, Java for Programmers, Pearson education
3. P.J.Deitel and H.M.Deitel , Java: How to Program , 8th edition, PHI.

REFERENCES:
1. Cay S.Horstmann and Gary Cornell, Core Java, Volume 1-Fundamentals, eighth edition, Pearson eduction.
2. D.S.Malik, Java Programming, Cengage Learning.
3. B.Eswara Reddy, T.V.Suresh Kumar, P.Raghavan, Object Oriented Programming with Java, Pearson-Sanguine.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2				3								
CO3		2	2	3				3				
CO4				3								
CO5		1		3								

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	L	T	P	C
MCA – II Semester	4	1	0	4

15DMC12–DATA STRUCTURES & ALGORITHMS

Course Outcomes:

After Completion of the course the student will be able to

1. Use linear data structures to develop real world problems using linked lists, Queues and Stacks
2. Understand the Trees Concept and to traverse the Binary tree
3. Apply the algorithm design techniques for Balanced Trees and various sorting methods.
4. Develop and apply different Graph traversal methods.
5. Analyze algorithms based on asymptotic notation

UNIT I
LINEAR DA TA STRUCTURES

Introduction - Abstract Data Types (ADT) – Arrays and its representation –Structures – Stack – Queue– Circular Queue - Applications of stack – Infix to postfix conversion – evaluation of expression –Applications of Queue - Linked Lists – Doubly Linked lists – Applications of linked list – Polynomial Addition

UNIT II
TREE STRUCTURES

Need for non-linear structures – Trees and its representation – Binary Tree – expression trees – Binary tree traversals – left child right sibling data structures for general trees – applications of trees – Huffman Algorithm - Binary search tree.

UNIT III
BALANCED SEARCH TREES, SORTING AND INDEXING

AVL trees –B-Trees - Sorting – Bubble sort - Quick Sort - Insertion Sort – Heap sort – Hashing: Hashing functions - Collision Resolution Techniques - Separate chaining - Open addressing – Multiple hashing.

UNIT IV
GRAPHS

Definitions – Representation of graph - Graph Traversals - Depth- first traversal – breadth-first traversal - applications of graphs - Topological sort – shortest-path algorithms – minimum spanning tree – Prim's and Kruskal's algorithms – biconnectivity – Euler circuits.

UNIT V
ALGORITHM DESIGN AND ANALYSIS

Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Binary Search Greedy Algorithms – Knapsack Problem – Dynamic Programming – Warshall's Algorithm for Finding Transitive Closure – Backtracking – Sum of Subset Problem – Branch and Bound – Travelling Salesman Problem.

TEXT BOOKS:
1. M. A. Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education Asia, 2013.
2. Tanaenbaum A.S.,Langram Y . Augestei n M.J " Data Structures using C" Pearson Education , 2004
3. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education 2003.

REFERENCES:
1. E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", University Press, 2007.
2. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, University Press, 2007.
3. ReemaThareja, "Data Structures using C", Oxford Press, 2012.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		3										
CO2	3											
CO3		2										
CO4				1								
CO5		2										

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	L	T	P	C
MCA – II Semester	4	1	0	4

15DMC13 - OPERATING SYSTEMS

Course Outcomes:

After Completion of the course the student will be able to

1. Understand how the OS manages all the processes and handles the different OS operations.
2. Master various process management concepts including scheduling, synchronization and deadlocks.
3. Understand the importance of memory management using different techniques.
4. Understand the various allocation methods in disk scheduling and distributed file systems.
5. Compare different Operating System

UNIT I
INTRODUCTION

Introduction -Types of operating systems-operating systems structures-Systems components operating systems services-System calls-Systems programs-Processes-process concept- process scheduling-operation on processes- co-operating processes-Inter process communications-CPU Scheduling - Scheduling criteria-Scheduling algorithms - Multiple-processor Scheduling

UNIT II
PROCESS SYNCHRONIZATION

Process Synchronization –Critical Section problem – Semaphores-Classical problems of Synchronization-critical regions-Monitors-Deadlock Characterization-Deadlock handling-Deadlock Prevention-Deadlock avoidance-Deadlock Detection-Deadlock Recovery –Threads-Multithreading Models

UNIT III
MEMORY MANAGEMENT

Memory Management – Swapping - Contiguous Memory allocation – Paging - Segmentation - Virtual Memory-Demand paging-Page Replacement-Thrashing

UNIT IV
DISK SCHEDULING AND DISTRIBUTED FILE SYSTEMS

Disk Structures-Disk Scheduling-File Systems Inter face-File concepts-Access methods-Directory Structures-File System Implementation-File Systems structures-Directory Implementation-Allocation Methods-Free Space management-Distributed File systems-Naming and Transparency-Remote File Accesses- Stateful Versus Stateless Service-File replication

UNIT V
CASE STUDIES

Linux System-design Principles- process management-File Systems-Windows Vista-Systems

Structures-Process management-memory management-Android OS-Virtual machine OS.

TEXT BOOKS:
1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Sixth Edition, Wiley India Pvt Ltd, 2003.
2. Charles Gowley, Operating Systems – A Design – Oriented Approach, TMG 1998.
3. Pramod Chandra, P.Bhatt, "An Introduction to Operating System concepts and practice", Prentice Hall Indiam 3rd Edition, 2010.

REFERENCES:
1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education, 2004.
2. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
3. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2004.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2	3			2								
CO3	2			2								
CO4	2				2							
CO5				1					2			

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	L	T	P	C
MCA – II Semester	4	1	0	3

15DME14 -OPERATIONS RESEARCH

Outcomes:
After completion of the course, the student will be able to:
1. Analyze a variety of industrial scenarios and choose appropriate model to solve the problems.
2. Find alternate solutions to help the management to make effective decisions.
3. Find the sequence in which a job is to be carried out on 'n' machines.
4. Use Dynamic program approach for solving complex problems involving multi stage problems and the replacement technique for replacing the deteriorated items at the right time.
5. Implement the principles of inventory and make effective decisions in materials management.

UNIT I
Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research, Linear Programming Problem – Formulation, Graphical solution, Simplex Method, big-M method, two-phase method, degeneracy and unbound solutions. Duality in LP, Comparison of solutions of the dual and its primal, Dual simple method.

UNIT II
Transportation Problem: Formulation, Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method, Optimality test by MODI method.
Assignment model: Formulation, Hungarian method for optimal solution, Solving unbalanced problem, Traveling salesman problem as assignment problem.

UNIT III
Job shop scheduling: various criteria and rules, Processing 2 jobs through 'm' machines. Sequencing models, Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines.

UNIT IV
Replacement Models: Replacement of Items that Deteriorate not considering time value of money & considering time value of money. Replacement of items that fail suddenly individual replacement policy, group replacement policy.
Dynamic programming: Characteristics of dynamic programming, Dynamic programming approach for Priority Management employment smoothening, capital budgeting, cargo loading and Reliability problems.

UNIT V
Game Theory: Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game, Solution of games with saddle points,

dominance principle, Rectangular games without saddle point – mixed strategy for 2 X 2 games.

Inventory models: Inventory costs, Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate uniform and production rate finite with shortages & no shortages. Selective inventory control & types of inventory systems.

TEXT BOOKS:
1. A.M. Natarajan, P. Balasubramani& A. Tamilarasi, Operations Research, Pearson Education, 2005.
2. S.D. Sharma, Operations Research, 13th Edition, KedarnathRamnath Publications, 2002.
3. H.A. Taha, Introduction Operations Research, 8th Edition Prentice Hall India Publications, 2006

REFERENCES:
1. P. K. Gupta & D. S. Hira, Operations Research, S. Chand & company, 2007.
2. J K Sharma, Operations Research – Theory & Applications, 3rd Edition, Macmillan India Ltd, 2007.
3. Vohra, Optimization Techniques for management , Tata McGraw Hill, 2006.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3										
CO3		2										
CO4				3								
CO5									2			

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	L	T	P	C
MCA – II Semester	4	1	0	4

15DMC15 - DATABASE MANAGEMENT SYSTEMS

Outcomes:
After Completion of the course the student will be able to
1. Understand the basic concepts of the database and data models.
2. Transform and information model into Relational database Schema
3. Formulate SQL Queries and Advanced SQL Queries
4. Demonstrate and understanding of normalization theory and apply such knowledge to the normalization of a database
5. Understand the concepts in concurrency control and recovery system.

UNIT I
Database Systems: Data vs Information-Introducing the Database and the DBMS-Why database Design is Important-Files and File Systems-Problems with File System Data Management-Database Systems. Data Models: Data Modeling and Data Models-The importance of Data Models-Data Model Basic Building Blocks-Business Rules-The Evolution of Data Models-Degree of Data abstraction.

UNIT II
Entity Relationship Modeling: The Entity Relationship Model (ERM)-Developing an ER Diagram--The Extended Entity Relationship Model
The Relational Database Model: A Logical View of Data-Keys-Integrity Rules-Relational Set Operators-The Data Dictionary and the System Catalog-Relationships within the Relational Database- Indexes- Codd's Relational Database Rules.

UNIT III
Structured Query Language (SQL): Introduction to SQL-Data Definition Commands-Data Manipulation Commands-Advanced SELECT Queries-Virtual Tables: Creating a View-Joining Database Tables.
Advanced SQL: Relational Set Operators-SQL Join Operators- sub queries and Correlated Queries – SQL Functions-Oracle Sequences-Updatable Views-Procedural SQL-Embedded SQL.

UNIT IV
Normalization of Database Tables: Database Tables and Normalization-The Need for Normalization-The Normalization Process- Improving the Design-Surrogate Key Considerations-Higher-Level Normal Forms-Normalization and Database Design Denormalization.

UNIT V
Transaction Management and Concurrency Control: What is a Transaction?-Transaction State-Implementation of atomicity and durability-Concurrency Control-Serializability-Concurrency Control with Locking Methods, Time Stamping Methods and Optimistic Methods
Recovery System: Recovery and Atomicity-Log-Based Recovery-Recovery with Concurrent Transactions-Buffer Management-Failure with loss of nonvolatile storage-Advance Recovery Techniques-Remote Backup Systems.

TEXT BOOKS :
1. Peter Rob, A.Ananda Rao and Carlos Coronel, Database Management
Systems,Cengage Learning.
2. Elmasri, Navate, Fundamentals of Database Systems, Pearson Education.
3. M. L. Gillenson, Fundamentals of Database Management Systems, Wiley Student
Edition.
REFERENCES:
1. C. J. Date ,Introduction to Database Systems, Pearson Education.
2. S. Shah and V. Shah, Oracle for Professionals, The X Team, SPD.
3. Raghurama Krishnan, Johannes Gehrke, Database Management Systems,
TATAMcGraw Hill 3rd Edition.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3										
CO3		2										
CO4				3								
CO5									2			

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	L	T	P	C
MCA – II Semester	0	0	3	2

15DMC16 - DBMS LAB

List of Sample Problems/Experiments

1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
5. i) Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
   ii) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.
8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.
11. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
12. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

TEXT BOOKS :
1. Peter Rob, A.Ananda Rao and Carlos Coronel, Database Management Systems, Cengage Learning.
2. Benjamin Rosenzweig, Elena Silvestrova, ORACLE   PL/SQL by example. Pearson Education 3rd Edition
3. Dr.P.S. Deshpande, SQL & PL/SQL for Oracle 10g, Black Book

REFERENCES:
1. Rick F.VanderLans, Introduction to SQL, Pearson Education.
2. Steven Feuerstein, Oracle PL/SQL Programming, SPD.
3. N.Gehani, The Database Book, Universities Press.

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		L	T	P	C
MCA − II Semester		0	0	3	2

15DMC17−DATA STRUCTURES LAB

1. Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminant $b^2 - 4ac$ is negative; display a message stating that there are no real solutions.

2. The Fibonacci sequence is defined by the following rule. The fist two values in the sequence are 1 and 1. Every subsequent value is the run of the two values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value in the Fibonacci sequence.

3. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.

4. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.

5. Write a Java program for sorting a given list of names in ascending order.

6. Write a Java program to multiply two given matrices.

7. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (use StringTokenizer class)

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

9. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

10. Write a Java program that displays the number of characters, lines and words in a text file.

11. Write a Java program for creating multiple threads
    a) Using Thread class
    b) Using Runnable interface

12. Write a Java program that illustrates how run time polymorphism is achieved.

13. Write a java program that illustrates the following
    a) Creation of simple package.
    b) Accessing a package.
    c) Implementing interfaces.
14. Write a java program that illustrates the following
    a) Handling predefined exceptions
    b) Handling user defined exceptions

15. Write a Java program that uses functions to perform the following operations :
    a) Inserting a sub-string in to the given main string from a given position.
    b) Deleting n characters from a given position in a given string.

16. Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.

17. a) Develop an applet in Java that displays a simple message.
   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

18. Write a Java program for handling mouse events.

19. Write a Java program for handling key events.

20. Write a Java program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle, and the result produced by the server is the area of the circle. (Use java.net)

21. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
   a) Linear search   b) Binary search

22. Write java programs to implement the following using arrays and linked lists
   a. List ADT

23. Write Java programs to implement the following using an array.
   a) Stack ADT
   b) Queue ADT

24. Write a java program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).

25. Write a java program that determines whether parenthetic symbols ( ), { } and <> are nested correctly in a string of characters(use stack ADT).

26. Write a java program that uses both stack and queue to test whether the given string is a palindrome.

27. Write Java programs to implement the following using a singly linked list.
   a) Stack ADT
   b) Queue ADT

28. Write Java programs to implement the deque (double ended queue) ADT using
a) Array
   b) Singly linked list
   c) Doubly linked list.

29. Write a java program to implement priority queue ADT.

30. Write a Java program to perform the following operations:
   a) Insert an element into a binary search tree.
   b) Delete an element from a binary search tree.
   c) Search for a key element in a binary search tree.

31. Write a Java program to implement all the functions of a dictionary (ADT) using

Hashing.

32. Write a Java program to implement circular queue ADT using an array.

33. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in
    a) Preorder
    b) Inorder and
    c) Postorder.

34. Write Java programs for the implementation of bfs and dfs for a given graph.

35. Write Java programs for implementing the following sorting methods:
    a) Bubble sort   d) Quick sort   g) Radix sort
    b) Selection sort   e) Merge sort   h) Binary tree sort
    c) Insertion sort   f) Heap sort

36. Write a Java program to perform the following operations
    a) Insertion into a B-tree
    b) Deletion from a B-tree

37. Write a Java program to perform the following operations
    a) Insertion into an AVL-tree
    b) Deletion from an AVL-tree

38. Write a Java program for implementing KMP pattern matching algorithm.

39. Write a java program that displays node values in a level order traversal (traverse the tree one level at a time, starting at the root node) for a binary tree.

40. Write a java program that uses recursive functions

    a. To create a binary search tree.
    b. To count the number of leaf nodes.
    c. To copy the above binary search tree.

41. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.

Suggested Books for lab:

1. Data Structures, Algorithms and Applications in Java, 2nd Edition, S.Sahani, Universities Press
2. Data Structures and Java Collections Frame Work, W.J.Collins, McGraw Hill.
3. Java How to Program, 5th Edition, Dietel&Dietel, Pearson Education

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	L	T	P	C
MCA – III Semester	4	1	0	4

15DMC18 - LINUX PROGRAMMING

Course Outcomes:
After Completion of the course the student will be able to
   1. Understand Linux operating system environment along with other OS
   2. Work with Linux utility commands
   3. Work with administrative Linux utility commands
   4. Implement interactive bash shell programming
   5. Work with advanced control elements in bash shell script.

UNIT I
Introduction to Linux , History of Linux, Linux Advantages, Difference between Linux and Unix operating systems, Common things between Linux & Unix , Differences between Linux and windows , Kernel Structure.

UNIT II
Linux Utilities: General Purpose utilities : Cal, date, echo, printf, bc, script, passwd, who, uname, tty, stty . File System: Filename, Parent-child Relationship, Home Directory, pwd , cd, mkdir, rmdir, Absolute pathnames , Relative pathnames, ls .

File handling utilities: cat, cp, rm, mv, more, file, wc, od, cmpcomm, diff, compressing and Archiving files ,gzip&gunzip, tar , zip & unzip .

Security by file permissions : File ownership , File permissions , changing File permissions , chmod , directory permissions , Changing File ownership.

UNIT III
Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, actions, functions, using system commands in awk.

UNIT IV
Working with the Bourne again shell(bash): Introduction, shell responsibilities, pipes and input Redirection, output redirection, here documents, running a shell script

UNIT V
The shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

TEXT BOOKS:
1. Unix Concepts and Applications, 4thEdition, SumitabhaDas,TMH,2006.
2. Beginning Linux Programming, 4thEdition, N.Matthew, R.Stones, Wrox, Wiley India Edition, rp-2008.
3. Unix Network Programming, W.R.Stevens, PHI.
4. UnixandShellprogramming,B.A.ForouzanandR.F.Gilberg,CengageLearning.

REFERENCES:
1. Linux System Programming, Robert Love, O'Reilly, SPD,rp-2007.
2. Unix for programmers and users, 3rdEdition, GrahamGlass, KingAbles, Pearson Education, 2003.
3. Advanced Programming in the Unix environment, 2ndEdition, W.R.Stevens, Pearson Education.
4. System Programming with C and Unix, A.Hoover, Pearson.
5. Unix System Programming, Communication, Concurrency and Threads, K.A.Robbins and S.Robbins, Pearson Education.
6. Unix shel lProgramming, S.G.Kochan and P.Wood,3rdedition, Pearson Education.
7. Shell Scripting, S.Parker, Wiley India Pvt. Ltd.
8. C Programming Language, Kernighan and Ritchie, PHI

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3										
CO3		3			2							
CO4				2								
CO5					2							

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	L	T	P	C
MCA – III Semester	4	1	0	4

15DMC19 - COMPUTER NETWORKS

Course Outcomes:

After Completion of the course the student will be able to

1. Defining, using and implementing computer network and types of transmission Media.
2. Understand the Error Detection and Correction codes and MAC Sub Layer.
3. Understand Routing Algorithms and Congestion Control algorithms in network layer
4. Understand the features of Connection-oriented and Connectionless Transport protocols
5. Understand the features of application layer and Cryptographic Algorithms

UNIT I

Introduction to Computer Network: Data Communication – Line Configuration, Transmission Modes, Topology, Categories of Network: LAN, MAN, WAN, OSI Layer, TCP/IP Layer

Physical Layer: Guided transmission media – Twisted Pair, coaxial cable, fiber optics

UNIT II

The Data Link layer: Design issues, Error detection and correction, Sliding window protocols, Data link layer in HDLC.

The Medium Access Sub Layer : Channel allocation methods, TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision free protocols

UNIT III

Network Layer: Routing Algorithms, Shortest path, Flooding, Flow based, Distance vector, Link state. Congestion control algorithms-General principals of congestion control, Congestion prevention polices, choke packets and Load shedding.

UNIT IV

The Transport Protocol: The Transport Service, Elements of transport protocol , A simple Transport Protocol , Internet Transport Protocols UDP, Internet Transport Protocols TCP, Performance Issues.

UNIT V

Application Layer: DNS-(Domain Name System), Electronic Mail, SMTP, MIME, World Wide Web-HTTP, SNMP.

Network Security: Cryptographic Algorithms, Symmetric _key Algorithms, Public–Key Algorithms, Digital Signatures, Firewalls-Filter based Firewalls, Proxy based firewalls, limitations.

TEXT BOOKS:
1. Andrew S Tanenbaum, Computer Networks -- 4th Edition. Pearson Education
2. Behrouz A. Forouzan , Data Communications and Networking. Third Edition TMH.

REFERENCES:
1. Michael A.Gallo, William M .Hancock, Computer Communications and Networking Technologies –   - Thomson Publication
2. S.Keshav An Engineering Approach to Computer Networks-,2ndEdition,Pearson Education.
3. W.A.Shay, Understanding communications and Networks,3rd Edition, Cengage Learning.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2			2									
CO3		3										
CO4	3											
CO5		3			2							

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	L	T	P	C
MCA – III Semester	4	1	0	4

15DMC20 – SOFTWARE ENGINEERING

Course Outcomes:

After Completion of the course the student will be able to

1. Know the models involve in Software Engineering
2. Apply the design concepts in system.
3. Found the bugs in code
4. Manage the metrics in software projects.
5. Identity the configuration techniques in Software engineering.

UNIT I
INTRODUCTION
Software Engineering paradigms – Waterfall Life cycle model – Spiral Model – Prototype Model –fourth Generation Techniques – Planning – Software Project Scheduling, – Risk analysis and management – Requirements and Specification – Case Study for Project Plan and SRS

UNIT II
SOFTWARE DESIGN
Abstraction – Modularity – Software Architecture – Cohesion – Coupling – Various Design Concepts and notations – Real time and Distributed System Design – Documentation – Dataflow Oriented design – Jackson System development – Designing for reuse – Programming standards – Case Study for Design of any Application Project.

UNIT III
SOFTWARE TESTING AND MAINTENANCE
Software Testing Fundamentals – Software testing strategies – Black Box Testing – White BoxTesting – System Testing – Object Orientation Testing – State based Testing - Testing Tools – Test Case Management – Software Maintenance Organization – Maintenance Report – Types of Maintenance – Case Study for Testing Techniques

UNIT IV
SOFTWARE METRICS
Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Cost Estimation - Reliability – Software Quality Assurance – Standards – Case Study for COCOMO model

UNIT V
SCM & WEB ENGINEERING
Need for SCM – Version Control – SCM process – Software Configuration Items – Taxonomy – CASE Repository – Features –Web Engineering

TEXT BOOKS:

1. Roger, S., Pressman, Software Engineering, A Practitioner's Approach, Six Edition, McGraw-Hill, International Edition, 2005.

2. James F Peters, Software Engineering, John Wiley
3. Ian Sommerville, Software Engineering, Pearson Education, 6th Edition.

REFERENCES:

1. Waman S Jawadekar, Software Engineering, Tata McGraw Hill, 2004.
2. Carlo Ghezzi, Mehdi Jazayeri, Dino Manrioli, Fundamentals of Software Engineering, PHI,2001
3. Pankaj Jalote, An Integrated approach to Software Engineering, Narosa.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3	2									
CO3							2					
CO4			2									
CO5	3	3										

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	L	T	P	C
MCA – III Semester	4	1	0	4

15DMC21 – DATAWAREHOUSING AND MINING

Course Outcomes:

After Completion of the course the student will be able to

1. Store voluminous data for online processing
2. Preprocess the data for mining applications
3. Apply the association rules for mining the data
4. Deploy appropriate techniques for classification
5. Cluster the high dimensional data for better organization of the data.

UNIT I
DATAWAREHOUSE

Data Warehousing - Operational Database Systems vs. Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.

UNIT II
DATAMINING & DATA PREPROCESSING

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing –Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III
ASSOCIATION RULE MINING

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT IV
CLASSIFICATION & PREDICTION

Classification vs. Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT V
CLUSTERING

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods –Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

TEXT BOOKS:

1. Jiaweihan and Micheline Kamber   Data Mining, Concepts and Tecniques, .Harcourt India.
2. M H Dunham, Data Mining Introductory and advanced topics, Pearson Education.
3. Arun K Pujari, Data Mining Techniques, University Press.

REFERENCES:

1. Sam Anahory Dennis Murray, Data Warehousing in the Real World, Pearson Education, Asia.
2. Paulraj Ponnaiah, Data Warehousing Fundamentals, Wiley Student edition.
3. Alex Berson and Stephen J. Smith, Data Warehousing , Data Mining and OLAP, Tata McGraw-Hill Edition,2004
4. Ralph Kimball, Data Warehouse Life Cycle Tool Kit, Wiley Student Edition.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1			3									
CO2		3										
CO3					2							
CO4				3								
CO5	3											

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	L	T	P	C
MCA – III Semester	4	1	0	4

15DMC22 - PRINCIPLES OF PROGRAMMING LANGUAGES

Course Outcomes:
After Completion of the course, the students will be able to
1. Use of preliminary concepts in programming environment.
2. Analyze semantic issues associated with function implementations, including parser tree grammars and semantics
3. Use different data types and type checking conversions in programming language.
4. Inscribe Expression and Statements for various programming languages and use exception handling.
5. Introduce modularity using subprograms

UNIT I

Preliminary Concepts: Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming , Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments.

UNIT II

Syntax and Semantics: general Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotational semantics and axiomatic semantics for common programming language features.

UNIT III

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization.

UNIT IV

Expressions and Statements: Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands. Exception handling : Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.

UNIT V
Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

TEXT BOOKS:
1. Concepts of Programming Languages Robert .W. Sebesta 8/e, Pearson Education,2008.
2. Programming Language Design Concepts, D. A. Watt, Wiley dreamtech,rp-2007.

REFERENCES:
1. Programming Languages, 2nd Edition, A.B. Tucker, R.E. Noonan, TMH.
2. Programming Languages, K. C.Louden, 2nd Edition, Thomson,2003.
3. LISP, Patric Henry Winston and Paul Horn, Pearson Education.
4. Programming in Prolog, W.F. Clocksin,&C.S.Mellish, 5th Edition, Springer.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2	3											
CO3				3		1						
CO4		3		2								
CO5					2							

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	L	T	P	C
MCA – III Semester	4	1	0	4

15DMC23 – ORGANIZATIONAL STRUCTURE AND PERSONNEL MANAGEMENT
Course Outcomes:
After Completion of the course, the students will be able to
1. To able to get analytical skills in Business
2. To get confident level and gaining technology levels in business
3. To get human behaviors and mental skills in marketing management
4. Gaining a knowledge about man power and its development.
5. To get human behavior and its knowledge using technique.

UNIT I
Introduction to Management**:** Concepts of Management and organization – nature, importance and functions and theories of management, systems approach to management, leadership styles, social responsibilities of management.
Introduction to Organization**:** Designing Organizational structures: Basic concepts related to Organization – Departmentation and Decentralization, types and evaluation of mechanistic and structures of organization and suitability.

UNIT II
Decision Process Approach**:** Parts of organization system, development of corporate strategy, dynamics of decision, role of system. Types models: mathematical planning models, deterministic and probabilistic models.

UNIT III
Personnel Management**:** Evolution, objectives, personnel policies. Personnel management vs HRM, position of the personnel department in the organization, Role of personnel manager as line manager and staff manager.

UNIT IV
Man Power Planning: Need-strategies and limitations, manpower inventory, manpower forecasting, job description, recruitment, job specification and selection, interviewing techniques, transfers and promotion policies.
Training and Development: Objectives and policies planning, organizing the training department, training manager and his job, on and off the job training techniques, career planning, objectives of performance appraisal.

UNIT V
Understanding Human Behavior**:** Personality – Johari Window – Transactional Analysis. Perception: Perceptual process, Development of Attitudes and Values, Understanding Group Dynamics, Team Effectiveness, Strategies to deal with conflicts and stress.
Contemporary Strategies: Total Quality Management (TQM), six sigma, people capability maturity model (PCMM) levels, performance management, business process outsourcing (BPO), business process re-engineering, bench marking and balanced score card.

TEXT BOOKS:

1. Organisational Behaviour, Robbins:Pearson,2008.
2. Management and Organizational Behavior, P.Subbarao HPH, 2009.

REFERENCES:

1. Industrial Business Management, Martand T Telsang, S.Chand.
2. Human resources Management, DrL.M.Prasad, S.Chand.
3. Dynamic personnel Administration, Rudrabasavaraj MN, Himalaya.
4. Personnel Management, Mamoria & Gankar, HPH, 2009.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1												3
CO2			3						3			3
CO3											3	
CO4						3						
CO5								3				3

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	L	T	P	C
MCA – III Semester	0	0	3	2

15DMC24 - LINUX PROGRAMMING LAB

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

4. Write a shell script that receives any number of file names as arguments checks if every   argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
6. Write a shell script to list all of the directory files in a directory.
7. Write a shell script to find factorial of a given integer.
8. Write an awk script to count the number of lines in a file that do not contain vowels.

9. Write an awk script to find the number of characters, words and lines in a file.
10. write a non-recursive shell script which accepts any number of arguments and prints them in the reverse order (For example, if the script is named rags, then executing rags A B C should produce C B A on the standard output).
11. .Write a shell script that accepts two file names as arguments, checks if the permissions for these files are identical and if the permissions are identical, output common permissions and otherwise output each file name followed by its permissions.
12. Write a shell script that takes a valid directory name as an argument and recursively descend all the subdirectories, finds the maximum length of any file in that hierarchy and writes this maximum value to the standard output.

13. Write a shell script which accepts valid log- in names as arguments and prints their corresponding home directories, if no arguments are specified, print a suitable error message.
14. Create a script file called file-properties that reads a file name entered and outputs it properties.
15. Write a shell script that accept one or more filenames as argument and convert all of them to uppercase, provided they exist in current directory.

16. Write a shell script that accepts as filename as argument and display its creation time if file exist and if it does not send output error message.

17. Write a shell script to display the calendar for current month with current date replaced by * or ** depending on whether the date has one digit or two digits.

18. Write a shell script to find smallest of three numbers that are read from keyboard.

19. Write a shell script using expr command to read in a string and display a suitable message if it does not have at least 10 characters.

20. Write a shell script to compute the sum of number passed to it as argument on command line and display the result.

21. Write a shell script that compute gross salary of an employee, accordingly to rule given below.
      i.   If basic salary is < 15000 then HRA=10% of basic 7 DA=90% of basic.
      ii. If basic salary is >=15000 then HRA=500 of basic & DA=98% of basic.

22. Write a shell script that delete all lines containing a specific word in one or more file supplied as argument to it.

23. Write a shell script that gets executed displays the message either "Good Morning" or "Good Afternoon" or "Good Evening" depending upon time at which the user logs in.

24. Write a shell script that accept a list of filenames as its argument, count and report occurrence of each word that is present in the first argument file on other argument files.

25. Write a shell script that determine the period for which a specified user is working on system.

26. Write a shell script that reports the logging in of a specified user within one minute after he/she log in. The script automatically terminate if specified user does not log in during a specified period of time.

27. Write a shell script that accepts two integers as its argument and compute the value of first number raised to the power of second number.

28. Write a shell script that accept the file name, starting and ending line number as an argument and display all the lines between the given line number.

29. Write an awk script that accepts date argument in the form of mm-dd-yy and displays it in the form if day, month, and year. The script should check the validity of the argument and in the case of error, display a suitable message.

30. Write an awk script to compute gross salary of an employee accordingly to rule given below.

If basic salary is < 10000 then HRA=15% of basic & DA=45% of basic.

If basic salary is >=10000 then HRA=20% of basic & DA=50% of basic.

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	L	T	P	C
MCA – III Semester	0	0	3	2

15DMC25–DATAWAREHOUSING AND MINING LAB
List of Sample Problems/Experiments:

i)Data Warehousing and Data Mining:

Task 1: Credit Risk Assessment
Description:
The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.
1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:
Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset (original) Excel spreadsheet version of the German credit data. In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer !)

A few notes on the German dataset
• DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
• owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
• foreign_worker. There are millions of these in Germany (many from Turrkey). It is very hard to get German citizenship if you were not born of German parents.
• There are 20 attributes used in judging a loan applicant. The goal is the classify the applicant into one of two categories, good or bad.

Subtasks : (Turn in your answers to the following tasks)
1.List all the categorical (or nominal) attributes and the real-valued attributes seperately.

2.What attributes do you think might be crucial in making the credit assessement ? Come up with some simple rules in plain English using your selected attributes.

3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.

4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly ? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy ?

5. Is testing on the training set as you did above a good idea ? Why orWhynot ?

6. One approach for solving the problem encountered in the previous question is using cross-validation ? Describe what is cross-validation briefly. Train a Decistion Tree again using cross-validation and report your results. Does your accuracy increase/decrease ? Why ?

7. Check to see if the data shows a bias against "foreign workers" (attribute 20),or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss.

8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)

9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifcations equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?

10.Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees ? How does the complexity of a Decision Tree relate to the bias of the model ?

11.You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the

Decision Tree you obtain ? Also, report your accuracy using the pruned model. Does your accuracy increase ? (10 marks)

12. (Extra Credit): How can you convert a Decision Trees into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules.PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one ! Can you predict what attribute that might be in this dataset ?OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR.

Task Resources:
- Mentor lecture on Decision Trees
- Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
- Decision Trees (Source: Tan, MSU)
- Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)
- Weka resources:
  - Introduction to Weka (html version) (download ppt version)
  - Download Weka
  - Weka Tutorial
  - ARFF format
  - Using Weka from command line

Task 2: Hospital Management System

Data Warehouse consists Dimension Table and Fact Table.
REMEMBER The following

Dimension
      The dimension object (Dimension):
            _ Name
            _ Attributes (Levels) , with one primary key
            _ Hierarchies
      One time dimension is must.
      About Levels and Hierarchies

Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.
For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:

        H1: YearL>QuarterL>MonthL>WeekL>DayL
        H2: YearL>WeekL>DayL

The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth.

About Unique Key Constraints
When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level)

Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are ' NO UNITS', UNIT PRICE.

Assume the Relational database (SOURCE)
table schemas as follows
TIME (day, month, year),
PATIENT (patient_name, Age, Address, etc.,)
MEDICINE (Medicine_Brand_name, Drug_name, Supplier, no_units, Uinit_Price, etc.,)
SUPPLIER :(Supplier_name, Medicine_Brand_name, Address, etc.,)

If each Dimension has 6 levels,   decide the levels and hierarchies, Assume the level names suitably. Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

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		L	T	P	C
MCA – IV Semester		4	1	0	4

15DMC26 – WEB TECHNOLOGIES

Course Outcomes:
After Completion of the course the student will be able to
1. Understand and Develop a Static Web Documents
2. Develop a Web Document with validation using Java Script
3. Understand the functionality of XML and XML Parsers
4. Develop server side programs using Servlet.
5. Develop a dynamic web Documents using JSP

UNIT I
HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets

UNIT II
Introduction to Java Scripts: JavaScript Overview, Declarations, Internal and External JavaScript, Functions

Objects in Java Script: Math Object, Date Object, String Object, Array Object

UNIT III
XML: XML Overview - Document type definition, XML Schemas, Document Object model, Presenting XML using CSS

UNIT IV
Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses

UNIT V
Introduction to JSP : The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

JSP Application Development: JSP Scriptlet – JSP Declarations - JSP Expressions – JSP Comments –JSP Directives – JSP Operators – JSP Implicit Objects - Control Flow Statements - Loop Statements - JSP Form Processing

TEXT BOOKS :

1. Dietel and Nieto, Internet and World Wide Web – How to program Pearson Education Asia. (Chapters: 3, 4, 8, 9, 10, 11, 12 – 18)
2. Hans Bergstan, Java Server Pages. (Chapters: 1 – 9)

REFERENCES:
1. Wang, An Introduction to web Design and Programming –Thomson
2. Knuckles, Web Applications Technologies Concepts- John Wiley
3. Sebesta, Programming world wide web- Pearson
4. Bai/Ekedaw , Web Warrior Guide to Web Programmming-Thomas
5. Jon Duckett , Beginning Web Programming- WROX.
6. Pekowsky, Java Server Pages, Pearson.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3										
CO2					2							
CO3	3											
CO4					3							
CO5					2							

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	L	T	P	C
MCA – IV Semester	4	1	0	4

15DMC27 – MULTIMEDIA AND APPLICATION DEVELOPMENT

Course Outcomes:
After Completion of the course the student will be able to
1. Understand core multimedia technologies and standards
2. Develop the application using Flash and Action Script
3. Develop application using reusability concepts with exception handling
4. Apply the Lossless and Lossy Compression Techniques.
5. Compress audio and videos using MPEG

UNIT I
Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video. Fundamental concepts in video and digital audio.

UNIT II
Action Script I: Action Script Features, Object-Oriented Action Script, Data types and Type Checking, Classes, Authoring an Action Script Class

UNIT III
Action Script II: Inheritance, Authoring an Action Script 2.0 Subclass, Interfaces, Packages, Exceptions

UNIT IV
Multimedia data compression: Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding

UNIT V
Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications : Quality of Multimedia Data Transmission, Multimedia over IP.

TEXT BOOKS:
1. Ze-Nian Li and Mark S. Drew , Fundamentals of MultiMedia, PHI/Pearson Education
2. Colin Moock, Essentials Action Script 2.0, SPD O,REILLY.

REFERENCES:
1. Nigel chapman and jenny chapman, Digital Multimedia, Wiley-Dreamtech
2. Unleashed Macromedia Flash MX Professional 2004, Pearson.
3. Steve Heath, Elsevier, Multimedia and communications Technology, (Focal Press)
4. Steinmetz, Nahrstedt, Multimedia Applications, Springer.
5. Weixel , Multimedia Basics Thomson
6. David Hilman , Multimedia Technology and Applications, Galgotia

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3			3							
CO3				3	2							
CO4					2							
CO5		3										

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	L	T	P	C
MCA – IV Semester	4	1	0	4

15DMC28 – PROFESSIONAL ETHICS

Course Outcomes:

After Completion of the course the student will be able to

1. Identify the multiple ethical interests at stake in a real world situation
2. Analyze and manage about intellectual property rights.
3. Analysis the various issues involved in hacking
4. Demonstrate the knowledge of work environment
5. Gain the knowledge of social networking and digital management.

UNIT I
COMPUTER ETHICS INTRODUCTION AND COMPUTER HACKING
A general Introduction – Computer ethics: an overview – Identifying an ethical issue – Ethics and law– Ethical theories - Professional Code of conduct – An ethical dilemma – A framework for ethical decision making - Computer hacking – Introduction – definition of hacking – Destructive programs –hacker ethics - Professional constraints – BCS code of conduct – To hack or not to hack? – Ethical positions on hacking

UNIT II
ASPECTS OF COMPUTER CRIME AND INTELLECTUAL PROPERTY RIGHTS
Aspects of computer crime - Introduction - What is computer crime – computer security measures –Professional duties and obligations - Intellectual Property Rights – The nature of Intellectual property– Intellectual Property – Patents, Trademarks, Trade Secrets, Software Issues, Copyright - The extent and nature of software piracy – Ethical and professional issues – free software and open source code

UNIT III
REGULATING INTERNET CONTENT, TECHNOLOGY AND SAFETY
Introduction – In defence of freedom expression – censorship – laws upholding free speech – Free speech and the Internet - Ethical and professional issues - Internet technologies and privacy –Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk

UNIT IV
COMPUTER TECHNOLOGIES ACCESSIBILITY ISSUES
Introduction – Principle of equal access – Obstacles to access for individuals – professional responsibility - Empowering computers in the workplace – Introduction – computers and employment – computers and the quality of work – computerized monitoring in the work place – telecommuting –social, legal and professional issues - Use of Software, Computers and Internet-based Tools -Liability for Software errors - Documentation Authentication and Control – Software engineering code of ethics and practices – IEEE-CS – ACM Joint task force

UNIT V
SOFTWARE DEVELOPMENT AND SOCIAL NETWORKING
Software Development – strategies for engineering quality standards – Quality management standards – Social Networking – Company owned social network web site – the use of social networks in the hiring process – Social Networking ethical issues – Cyber bullying – cyber stalking –Online virtual world – Crime in virtual world - digital rights management - Online defamation – Piracy –Fraud.

TEXT BOOKS:
1. Penny Duquenoy, Simon Jones and Barry G Blundell, "Ethical , legal and professional issues in computing", Middlesex University Press, 2008
2. George Reynolds, "Ethics in Information Technology", Cengage Learning, 2011

REFERENCES:
1. Caroline Whitback," Ethics in Engineering Practice and Research ", Cambridge University Press,2011
2. Richard Spinello, "Case Studies in Information and Computer Ethics", Prentice Hall,1997.
3. John Weckert and Douglas Adeney, Computer and Information Ethics, Greenwood Press, 1997.
4. Sara Baase, "A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet",3rd Edition,Prentice Hall, 2008

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3							2				
CO2	3											
CO3	3	2					2	3				
CO4		2							2			2
CO5											1	1

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	L	T	P	C
MCA – IV Semester	4	1	0	4

15DMC29 – BIG DATA ANALYTICS

Course Outcomes:
After Completion of the course the student will be able to
1. Identify the need for big data analytics for a domain
2. Use Hadoop, Map Reduce Framework
3. Apply big data analytics for a give problem
4. Suggest areas to apply big data to increase business outcome
5. Contextually integrate and correlate large amounts of information automatically to gain faster.

UNIT I
INTRODUCTION TO BIG DATA Analytics – Nuances of big data – Value – Issues – Case for Big data – Big data options Team challenge – Big data sources – Acquisition – Nuts and Bolts of Big data. Features of Big Data - Security, Compliance, auditing and protection - Evolution of Big data – Best Practices for Big data Analytics - Big data characteristics - Volume, Veracity, Velocity, Variety – Data Appliance and Integration tools – Greenplum – Informatica

UNIT II
DATA ANALYSIS Evolution of analytic scalability – Convergence – parallel processing systems – Cloud computing – grid computing – map reduce – enterprise analytic sand box – analytic data sets – Analytic methods – analytic tools – Cognos – Microstrategy - Pentaho. Analysis approaches – Statistical significance – business approaches – Analytic innovation – Traditional approaches – Iterative

UNIT III
STREAM COMPUTING Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window - Realtime Analytics Platform(RTAP) applications IBM Infosphere – Big data at rest – Infosphere streams – Data stage – Statistical analysis – Intelligent scheduler – Infosphere Streams

UNIT IV
PREDICTIVE ANALYTICS AND VISUALIZATION Predictive Analytics – Supervised – Unsupervised learning – Neural networks – Kohonen models – Normal – Deviations from normal patterns – Normal behaviours – Expert options – Variable entry - Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications:

UNIT V
FRAMEWORKS AND APPLICATIONS IBM for Big Data – Map Reduce Framework - Hadoop – Hive - – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Hbase – Impala – Analyzing big data with twitter – Big data for Ecommerce – Big data for blogs.

TEXT BOOKS :
1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2012
2. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier, 2007

REFERENCES:
1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012. 47
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley and SAS Business Series, 2012.
4. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill, 2011.
5. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch , James Giles, David Corrigan, "Harness the Power of Big data – The big data platform", McGraw Hill, 2012.
6. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 9. Pete Warden, Big Data Glossary, O'Reilly, 2011. 10. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier,

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3										
CO2					2							
CO3			3	3								
CO4			3		2	2						
CO5					3							

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	L	T	P	C
MCA – IV Semester	4	1	0	3

15DMC30 – E-COMMERCE
(CHOICE BASED COURSE-I)

Course Outcomes :

After Completion of the course the student will be able to

1. Understand about E-commerce and its applications
2. Be aware of ethical, social and security issues in Internet
3. Deploy E-payment system in real time situations.
4. Use Internal Information System and Supply chain management
5. Do online marketing in Internet.

UNIT I

Electronic Commerce: Electronic Commerce Framework; Electronic Commerce and Media Convergence; The Anatomy of E-Commerce Applications; Electronic Commerce Consumer Applications; Electronic Commerce Organization Applications – The Network Infrastructure for Electronic Commerce: Market Forces Influencing the I-Way; Components of the I-Way; Network Access Equipment; The Last Mile: Local Roads and Access Ramps; Global Information Distribution Networks; Public Policy Issues Shaping the I-Way.

UNIT II

The Internet as a Network Infrastructure : The Internet Terminology; Chronological History of the Internet; NSFNET : Architecture and Components; Globalization of the Academic Internet; Internet Governance : The Internet Society – An Overview of Internet Applications – Electronic Commerce and World Wide Web : Architectural Framework for Electronic Commerce; World Wide Web (WWW) as the Architecture; Web Background : Hypertext Publishing; Technology behind the Web; Security and the Web – Consumer-Oriented Electronic Commerce : Consumer-Oriented Applications; Mercantile Process Models; Mercantile Models from the Consumer's Perspective; Mercantile Models from the Merchant's Perspective.

UNIT III

Electronic Payment Systems : Types of Electronic Payment Systems; Smart Cards and Electronic Payment Systems; Credit Card-Based Electronic Payment Systems; Risk and Electronic Payment Systems; Designing Electronic Payment Systems – Inter organizational Commerce and EDI : Electronic Data Interchange; EDI Applications in Business; EDI : Legal, Security, and Privacy Issues; EDI and Electronic Commerce – EDI Implementation, MIME, and Value-Added Networks : Standardization and EDI; EDI Software Implementation; EDI Envelope for Message Transport; Value-Added Networks (VANs); Internet-Based EDI.

UNIT IV

Intra organizational Electronic Commerce : Internal Information System; Macro forces and Internal Commerce; Work-Flow Automation and Coordination; Customization and Internal Commerce; Supply Chain Management (SCM) – The Corporate Digital Library : Dimensions of Internal Electronic Commerce Systems; Making a Business Case for a Document Library;

Types of Digital Documents; Issues behind Document Infrastructure; Corporate Data Warehouses.

UNIT V

Advertising and Marketing on the Internet : The New Age of Information - Based Marketing; Advertising on the Internet; Charting the On-Line Marketing Process; Market Research – Consumer Search and Resource Discovery : Search and Resource Discovery Paradigms; Information Search and Retrieval; Electronic Commerce Catalogs or Directories; Information Filtering; Consumer-Data Interface : Emerging Tools – On-Demand Education and Digital Copyrights : Computer-Based Education and Training; Technological Components of Education On-Demand; Digital Copyrights and Electronic Commerce.

TEXT BOOKS:
1. Ravi Kalakota and Andrew B.Whinston, Frontiers of Electronic Commerce, Pearson Education.
2. Henry Chan, Raymond Lee, Tharan Dillan and E.Chany, E-Commerce, Wiley, 2003

REFERENCES:
1. Daniel Minoli and Emma Minoli, Web Commerce Technology, Tata McGraw Hill, 1999.
2. Marilyn Greenstein and Todd M Feinman, Electronic Commerce, Tata McGraw Hill Edition.
3. Craig Patridge, Gigabit Networking, Addison-Wesley, 1994.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2							2	2				
CO3		3	2									
CO4												2
CO5						3						

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	L	T	P	C
MCA – IV Semester	4	1	0	3

15DMC31 – NETWORK SECURITY AND CRYPTOGRAPHY
(CHOICE BASED COURSE-I)

Outcomes:
After Completion of the course the student will be able to
1. Understand different types of attacks
2. Apply encryption and decryption techniques and improve security through Hash functions.
3. Deploy public key cryptographic principles and employ various authentication services.
4. Comprehend and apply Email Security services and IP Security.
5. Comprehend and apply Web Security services like SSL, TLS, SNMP, etc,.

UNIT I
Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II
Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

UNIT III
Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

UNIT IV
Email privacy: Pretty Good Privacy (PGP) and S/MIME. IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT V
Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats. Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

TEXT BOOKS:
1 William Stallings, Network Security Essentials (Applications and Standards) by Pearson Education.
2 Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn IdoDubrawsky, Steve W.Manzuik and Ryan Permeh, Hack Proofing your network by wiley Dreamtech

REFERENCES:
1. Eric Maiwald, Fundamentals of Network Security by (Dreamtech press)
2. Radia Perlman and Mike Speciner, Network Security - Private Communication in a Public World by Charlie Kaufman, Pearson/PHI.
3. Stallings, Cryptography and network Security, Third edition, PHI/Pearson

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3						1				
CO3				3								
CO4				3								
CO5				2								

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	L	T	P	C
MCA – IV Semester	4	1	0	3

15DMC32 – ARTIFICIAL INTELLIGENCE
(CHOICE BASED COURSE-I)

Course Outcomes:
After Completion of the course the student will be able to
1. Identify problems that are amenable to solution by AI methods, and with AI methods may be suited to solving a given problem.
2. Formalize the given problem in the language/ framework of different AI methods
3. Understand first order logic.
4. Describe and list the key aspects of planning in Artificial Intelligence.
5. Acquire an Understanding of capabilities and limitations of Expert System.

UNIT I
Introduction: AI-Acting and Thinking humanly, rationally, Searching: Searching for solutions, Uniformed Search Strategies, Informed Search Strategies, Heuristic Functions.

UNIT II
Local Search Algorithms and Optimization Problems: Hill-climbing, Simulated annealing, Local beam, Genetic algorithms, Constraint Satisfaction Problems, Backtracking Search for CSPs. **Adversial Search:** Games, Optimal Decision in Games, Alpha-Beta Pruning, Evaluation Functions, Cutting off search, Games that include an Element of chance, Game programs. Knowledge and reasoning-I: Logical Agents.

UNIT III
Knowledge and reasoning-II: First-Order Logic: Syntax and Semantics, Using First Order Logic, Knowledge Engineering, Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Resolution, Forward and Backward Chaining.

UNIT IV
Planning: Classical planning problem, Language of planning problems, Partial-Order planning, Planning Graphs, Planning with Propositional Logic. **Learning:** Forms of learning, Introduction learning, Learning Decision Tree, Statistical learning methods, learning with complete data, Instance based learning, Neural networks.

UNIT V
Expert Systems: Introduction, Advantages, Languages, Elements, Production Systems, Procedural and Nonprocedural Paradigms, Artificial Neural Systems

Design of Expert Systems: Selecting the Appropriate Problem, Stages in the Development of an Expert System, The Expert System Life Cycle. Detailed life cycle model, Decision trees, backward chaining.

TEXT BOOKS:
1. Russell, Norvig- "Artificical Intelligence-A Modern Approach",2e, 2004, PEA
2. Giarratano, Riley-"Expert Systems-Principles and Programming", 3e,2003, Thomson

REFERENCES:
1. George F Luger – "Artificial Intelligence-Structures and strategies for Complex problem Solving", 4e, 2004, PEA.
2. Rich, Knight, Nair – "Artificial Intelligence", 3e, TMH.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3										
CO2		2										
CO3	2											
CO4	3											
CO5	3											

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	L	T	P	C
MCA – IV Semester	4	1	0	3

15DMC33 – SOFTWARE PROJECT MANAGEMENT
(CHOICE BASED COURSE-II)

Course Outcomes:

After Completion of the course the student will be able to
1. Understand Software development life cycle.
2. Implement various cost controlling techniques in project management.
3. Gain knowledge in software development process and quality models
4. Implement various measurable techniques to achieve quantifying results
5. Implement project plans through managing people, communication and change.

UNIT I
Conventional Software Management
The Waterfall Model, Conventional software Management Performance. Evolution of Software Economics: Software Economics, Pragmatic Software Cost Estimation.

UNIT II
Improving Software Economics
Reducing Software Product Size, Improving software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

UNIT III
Conventional And Modern Software Management
Principles of Conventional Software Engineering, Principles of Modern Software Management, Transitioning to an Iterative Process. Life Cycle Phases: Engineering and Production Stages, Inception. Elaboration, Construction, Transition Phases.

UNIT IV
Flow Of The Process
Software Process Workflows. Inter Trans Workflows. Checkpoints of the Process : Major Mile Stones, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cost and Schedule Estimating. Interaction Planning Process. Pragmatic Planning.

UNIT V
Project Organizations And Responsibilities
Line-of-Business Organizations, Project Organizations, and Evolution of Organizations. Process Automation: Automation Building Blocks, The Project Environment. Life Cycle Expectations Pragmatic Software Metrics, Metrics Automation. Tailoring the process: Process Discriminates, Example.

TEXT BOOKS:
1. Walker Rayce, "Software Project Management", 1998, PEA.
2. Henrey, "Software Project Management"' Pearson.

REFERENCES:
1. Richard H. Thayer: "Software Engineering Project Management", 1997, IEEE Computer Society.
2. Shere K. D. : "" Software Engineering and Management", 1998, PHI.
3. S. A. Kelkar, " Software Project Management: A Concise Study", PHI.
4. Hughes Cotterell, " Software Project Management", 2e, TMH.
5. Kaeron Conway, " Software Project Management from Concept to Development", Dream Tech.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2			3									
CO3	3											
CO4				3	3							
CO5						3						3

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	L	T	P	C
MCA–IV Semester	4	1	0	3

15DMC34 – SCRIPTING LANGUAGES
(CHOICE BASED COURSE-II)

Course Outcomes:

After Completion of the course the student will be able to
1. Understand the Preliminary Concepts of Programming Language & syntax and Semantics methods
2. Understand the Strings, Lists, Functions & methods
3. Create a Software Systems using Python Scripts
4. Apply Exception handling Techniques in Real Programming Environment
5. Develop skills to use Python with Object Oriented Concepts.

UNIT I: Introduction

Python Introduction, History of Python, Python features, Python Installation, Python Environment Variables, Running Python, Simple Programs, Python Identifiers, Reserved words, Lines and Indentation, Multi line statements, Quotation in Python, Comments in Python, Command line arguments, Assigning values to the variables, Multiple assignment, Standard data types, Type Conversion, Operators in Python, Operators Precedence, Decision Making, Looping, Loop Control statement, Mathematical functions- Random number function, Trigonometric functions, Mathematical Constants,

UNIT II : Strings & Lists:

Assigning values in strings, String manipulations, String special operators, String formatting operators, Triple Quotes, Raw String, Unicode String, Build-i n-String methods, Lists-Introduction, Accessing values in list, List manipulations, List Operations, Indexing, slicing & matrices.

Functions & Methods

Built –in Functions and methods, Tuples- introduction, accessing values, Tuple functions, Dictionary- Introduction, Accessing values, Functions, Time tuple functions, Calendar tuple functions, time module functions, calendar module functions, and other module functions, user defined functions, Pass by value & pass by reference, function arguments & its types.

UNIT III: Python Scripts:

Import statements, Locating modules, Namespace, dir(), global(), local(), reload(), Packages in python, I/O function, Opening and closing files, file object attribute, manipulations of the files, Directories in python, File and Directory related methods.

UNIT IV: Exception:

Exception, Handling Exception, example programs, try-finally, Argument of an Exception, Raising an Exception, User-defined exceptions.

UNIT V: OOPs Terminology:

OOPs Concepts -Class, class variable, Data member, Objects, methods, Instance, Function Overloading, Instance variable, Inheritance

TEXT BOOKS:
1. Introduction to Python Programming, PovelSolin, Martin Novak,2012
2. Introduction to Python Programming, Jacob Fredslund, 2007

REFERENCES:
1. An Introduction to Python, John C. Lusth, 2011
2. Introduction to Python, DaveKuhlman, 2008

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2	3											
CO3		3										
CO4						3						
CO5					3							

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	L	T	P	C
MCA – IV Semester	4	1	0	3

15DMC35 – ADVANCED LINUX PROGRAMMING
(CHOICE BASED COURSE-II)

Course Outcomes:

After Completion of the course the student will be able to

1. Work with Linux POSIX APIs for accessing Linux File System
2. Create, Control Processes using fork, vfork and exec System calls and also control asynchronous events occur at runtime using signals.
3. Implement Inter process Communication using pipes, named pipe(FIFO), message queues, shared memory and semaphores.
4. Build Multi Tasking Processes using POSIX Thread APIs
5. Build Connection oriented/ Connectionless Client – Server communication using sockets.

UNIT I
Linux Files: File Concept, File System Structure,Inodes, File types, The standard I/O (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets etc.), formatted I/O, stream errors, kernel support for files, System calls, library functions, file descriptors, low level file access - usage of open, creat, read, write, close, lseek, stat family, umask, dup, dup2, fcntl, file and record locking. file and directory management - chmod, chown, links(soft links & hard links - unlink, link, symlink), mkdir, rmdir, chdir, getcwd, Scanning Directories-opendir, readdir, closedir,rewinddir, seekdir, telldir functions.

UNIT II
Linux Process: Process concept, Kernel support for process, process attributes, process hierarchy, process states, process composition, process control - process creation, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, system.

Linux Signals: Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions.

UNIT III
Inter process Communication : Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes, FIFOs, Introduction to three types of IPC(Linux)-message queues, semaphores and shared memory.
Message Queues: Kernel support for messages, Linux APIs for messages, client/server example.

Semaphores: Kernel support for semaphores, Linux APIs for semaphores, file locking with semaphores.
Shared Memory: Kernel support for shared memory, Linux APIs for shared memory, semaphore and shared memory example.

UNIT IV
Multithreaded Programming: Differences between threads and processes, Thread structure and uses, Threads and Lightweight Processes, POSIX Thread APIs, Creating Threads, Thread Attributes, Thread Synchronization with semaphores and with Mutexes, Example programs.

UNIT V
Sockets: Introduction to Linux Sockets, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs.

TEXT BOOKS :
   1. W.R.Stevens, Advanced Programming in the Unix environment, 2nd Edition, Pearson Education.
   2. N.Matthew, R.Stones,Wrox, Beginning Linux Programming, 4th Edition, Wiley India Edition,rp-2008.

REFERENCES:
   1. Robert Love, Linux System Programming, O'Reilly, SPD, rp-2007.
   2. W.R.Stevens, Unix Network Programming , PHI.
   3. Graham Glass, King Ables, Unix for programmers and users, 3rd Edition, Pearson Education, 2003.
   4. A.Hoover , System Programming with C and Unix,Pearson.
   5. Kumar Saurabh, Unix Programming, 1st Edition, Wiley India pvt Ltd.
   6. B.A.Forouzan and R.F.Gilberg, Unix and Shell programming, Cengage Learning.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1			3									
CO2		3										
CO3		3		2								
CO4		3	2									
CO5		3			3							

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	L	T	P	C
MCA – IV Semester	0	0	3	2

15DMC36 – WEB TECHNOLOGIES LAB

1. Develop static pages (using only HTML) Develop static pages (using only HTML) of an online Book store. The pages should resemble:
   - Home page
   - Registration and user Login
   - User profile page
   - Books catalog
   - Shopping cart
   - Payment By credit card
   - Order confirmation.
2. Create a Dynamic web page using CSS
3. Validate the Registration, user login user profile and payment by credit card pages using JavaScript
4. Create a Dynamic Web Page using html, CSS and JavaScript and display the data in next page
5. Create a XML document which contains 10 user information.
6. Create a XML Document and validate using XML DTD's
7. Create a XML Document and validate using XML Schemas
8. Create a program using Looping and branches in JSP
9. Create a program using JSP Directives
10. Create a dynamic web page using page centric approach using jsp.

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	L	T	P	C
MCA – IV Semester	0	0	3	2

15DMC37 – MULTIMEDIA AND APPLICATION DEVELOPMENT LAB

1. Assigning Actions to an Object, and a Button
2. Creating Loops
3. Generation Random Numbers
4. Creating a Function, Calling a Function
5. Detecting the Player Version
6. Detecting the Operating System
7. Checking the System language
8. Detecting Display Settings
9. Tinting a Movie Clip's Color
10. Controlling a Movie Clip's Color with Sliders
11. Drawing a Circle
12. Drawing a Rectangle
13. Filling a Shape with a Gradient
14. Scripting Masks
15. Converting Angle Measurements
16. Calculating the Distance Between the Two Points
17. Formatting Currency Amount
18. Converting Between Units of Measurement
19. Determining Points Along a Circle
20. Sorting or Reversing an Array
21. Implementing a Custom Sort
22. Creating a Text Field
23. Making a Password Input field

All the above programs are to be done in Flash MX 2004.

Reference:
1. Joey Lott, Action Script Cookbook, SPD-Oreilly.
2. Doug Sahlin, Flash MX Action Script for designers, Dreamtech Wiley.
3. David Vogeleer and Matthew Pizzi , Flash MX Professional 2004 Unleashed, Pearson Education.

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	L	T	P	C
MCA – V Semester	4	1	0	4

15DMC38 - ANDROID APPLICATION DEVELOPMENT

Course Outcomes:
After Completion of the course the student will be able to
   1. Understand how Android applications works and to develop mobile application
   2. Understand the various Android View Controls and Layouts in Android.
   3. Comprehend and apply menus and indicators.
   4. Implement Event Handling procedures to develop interactive Applications.
   5. Develop Applications using Animation Techniques.

UNIT I
Introduction to Android: History of Mobile Software Development, Open Handset Alliance, The Android Platform, Exploring Android SDK, Building First Android application, Android terminologies

UNIT II
Exploring User Interface Screen Elements: Introducing Android Views and Layouts, Displaying Text with TextView, Retrieving Data From Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times From Users

UNIT III
Using Indicators to Display Data to Users: Adjusting Progress with SeekBar, Providing Users with Options and Context Menus,

UNIT IV
Handling User Events, Working with Dialogs, Working with Styles, Working with Themes

UNIT V
Layouts and Animation: Creating User Interfaces in Android, Organizing User Interface, Using Built-in Layout Classes, Using Built-in View Container Classes, Drawing on the Screen, Working with Text, Working with Bitmaps, Working with Shapes

TEXT BOOKS:
1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

REFERENCES:
1. Wei-Meng Lee, Beginning Android Application Development By Wrox Publication
2. Frank Ableson and Charlie Collins and Robi Sen, Unlocking Android Developer's Guide by Manning Publication Co.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2	3											
CO3		2										
CO4			3			2						
CO5					3							

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	L	T	P	C
MCA – V Semester	4	1	0	4

15DMC39 – C# Programming

Course Outcomes:
After Completion of the course the student will be able to
1. Develop fundamental programs in C#
2. Understand the Syntax and use of C# Object Oriented classes
3. Display proficiency in C# by building standalone applications in .NET framework
4. Create distributed data driven applications using .NET framework, C#, SQL Server and ADO.NET
5. Utilize XML in the .NET environment to create web service based applications and components

UNIT I
MS.NET Framework Introduction: Why .Net and what is .Net -Code Execution Process-Keywords, System. Console Class, Data Types, Variables, Constants , Type Casting, Boxing and Unboxing, Scope of Variables, Operators, Control Statements, Enumerations, Command Line Arguments Developing Console Application-Introduction to Object Oriented Features.

UNIT II

Introduction to OOP, Access Modifiers, Principles of OOP, Classes, Objects, Fields, Methods Static Members, Static Classes, Constructors, Destructors, Object Initializer Static Constructors, Method Overloading, Operator Overloading Generics, Properties, Partial Classes Indexer, Inheritance, Sealed Classes, Hiding the Methods, Method Overriding Abstract Classes and Methods, Interfaces, Structures ,Delegates , LINQ.

UNIT III
Windows Forms Applications Development using C#-Getting started with Windows Apps Button, Event Handling, The "Form" class -Label, Textbox, Checkbox, Radio button, Link Label, Picture box -Panel, Group Box, List box, Combo box, Tree View, Numeric Updown, Domain Updown, DateTime Picker, Month Calendar-User Controls and Windows Forms Control Library Creating Graphics with GDI+.

UNIT IV
ADO.NET Architecture - Understanding the Connection Object -Building the Connection String - Understanding the Command Object - Understanding Data Readers . Understanding Data Sets and Data Adapters - DataTable - DataColumn -DataRow -Working with SQL.NET.

UNIT V
XML: Introduction to .NET and XML - Reading and Writing XML - Reading and Writing XML Data Using XmlReader and XmlWriter - Manipulating XML with DOM - XML Data Validation - XML DOM Object Model - Transforming XML Data with XSLT - XML and ADO.NET

TEXT BOOKS:

1. Thuan L. Thai, Hoang Lam .NET Framework Essentials, Third Edition , Publisher: O'Reilly.2003
2. Donis Marshall, Programming Microsoft® Visual C#® 2008: The Language , Microsoft Press,2008.

REFERENCES:

1. Francesco Balena, Programming Microsoft® Visual Basic® .NET (Core Reference) , Microsoft   Press, 2006.
2. Step ,Rebecca M. Riordan, Microsoft® ADO.NET Step by Microsoft Press,2002

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		3										
CO2	3											
CO3			3									
CO4			3									2
CO5			3		3							2

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	L	T	P	C
MCA – V Semester	4	1	0	4

15DMC40 - OBJECT ORIENTED ANALYSIS & DESIGN USING UML

Course Outcomes:
After Completion of the course the student will be able to
1. Understand the basic concepts to identify state and behavior of real world objects of modeling and basic structure modeling
2. Apply modularity design in solving complex problems
3. Construct various UML models using appropriate notation
4. Develop UML Models using advanced concepts of Behavioral modeling
5. Implement architectural modeling for given system

UNIT I
Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture
Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.
Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT II
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams

UNIT III
Basic Behavioral Modeling-I: Interactions, Interaction diagrams.
Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT IV
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT V
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

TEXT BOOKS :
1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education 2nd Edition
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

REFERENCES:
1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt.Ltd.
3. AtulKahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Mark Priestley: Practical Object-Oriented Design with UML,TATAMcGrawHill.
5. Craig Larman, Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Pearson Education.
6. John W. Satzinger, Robert B Jackson and Stephen D Burd, Object-Oriented Analysis and Design with the Unified Process, Cengage Learning.
7. R.C.Lee, and W.M.Tepfenhart, UML and C++, PHI.
8. B.Dathan,S.Ramnath, Object Oriented Analysis,Design and Implementation,
9. Universities Press.
10. K.Barclay,J.Savage,Elsevier, OODesign with UML and Java.
11. Russ Miles and Kim Hamilton, Learning UML 2.0, O'Reilly,SPD

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3										
CO3			3									
CO4					2							
CO5			3		2							

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	L	T	P	C
MCA – V Semester	4	1	0	4

15DMC41 – CLOUD COMPUTING

Outcomes:

After Completion of the course the student will be able to

1. Understand the services and its applications of cloud data.
2. Apply suitable abstraction and virtualization technique in cloud environment.
3. Utilize the Microsoft Database Services in Windows Azure platform.
4. Gain knowledge in Administrating and managing the cloud.
5. Deploy applications for Business and Consumers Services

Unit I
Introduction
Defining cloud computing –Cloud types –Characteristic of computing– Open standards – Measuring the cloud value – Exploring the cloud computing Stack-Connecting to the cloud – Understanding services and applications by type.

Unit II
Understanding Abstraction and Virtualization Using virtualization technique – Load balancing- Understanding hypervisors –Machine imaging- Porting applications – Capacity planning – Baseline and metrics – Network capacity – Scaling – Exploring platform as service.

Unit III
Cloud Computing Web Services Google Web service – Surveying the Google application portfolio – Google toolkit – Amazon web services – Components and services – EC2- Storage systems – Database services- Microsoft cloud services – Windows azure platform – Windows live.

Unit IV
Cloud Infrastructure
Managing the cloud – Administrating the cloud –Management products –Communicating with the cloud – Instant messaging – Collaboration technologies –Social networks – Media and streaming.

Unit V
Cloud Applications and Mobile Cloud Working with mobile devices – Smartphone with the cloud – Mobile web services -Scientific applications – Business and consumer applications.

TEXT BOOKS :
1. Barrie Sosinsky, Cloud Computing Bible, Wiley Publishing, Inc,.2011
2. RajkumarBuyya, Christian Vecchiola and ThamariSelvi S , Mastering in Cloud Computing, McGraw Hill Education (India) Private Limited, 2013

REFERENCES:
1. Michael Miller,Cloud Computing, Pearson Education, New Delhi, 2012
2. Anthony T Velte, Cloud Computing: A practical Approach, Tata McGraw Hill, 2010
3. Fern Halper, Marcia Kaufman, Bloor Robin and Judith Hurwit, Cloud Computing for Dummies, Wiley India, 2009.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		3										
CO3				3	3							
CO4											3	3
CO5						3						3

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	L	T	P	C
MCA – V Semester	4	1	0	3

15DMC42 – HUMAN COMPUTER INTERACTION
(CHOICE BASED COURSE-III)

Outcomes:
After Completion of the course the student will be able to
1. Understand the importance of Graphical user Interface
2. Design, Implement and evaluate effective and usable graphical computer interface
3. Understand the concepts of screen navigation flow and different types of statistical chart.
4. Deploy multimedia window components to design interactive GUI
5. Implement simple graphical user interfaces using software Tools

UNIT I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II
Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business Functions.

UNIT III
Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT IV
Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT V
Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS:
1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia

REFERENCES:
1. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen , Pearson Education.
4. Human –Computer Interaction,D.R.Olsen,Cengage Learning.
5. Human –Computer Interaction,Smith - Atakan,Cengage Learning.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2		2										
CO3	3											
CO4				3								
CO5				2								

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	L	T	P	C
MCA – V Semester	4	1	0	3

15DMC43 – THEORY OF COMPUTATION
(CHOICE BASED COURSE-III)

Course Outcomes:
At the end of the course, the student should be able to:
1. Understand the basic kind of finite automata and their capabilities
2. Master Context free Grammars and Languages.
3. Understand the concept of pushdown automata
4. Comprehend and apply Techniques for Turing Machine construction.
5. Understand the challenges for theoretical computer science and its contribution to other sciences.

UNIT I
FINITE AUTOMATA
Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA's with and without €-moves – Equivalence of finite Automaton and regular expressions – Minimization of DFA- – Pumping Lemma for Regular sets – Problems based on Pumping Lemma.

UNIT II
GRAMMARS
Grammar Introduction– Types of Grammar – Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols – Unit productions – Null productions – Greiback Normal form – Chomsky normal form – Problems related to CNF and GNF.

UNIT III
PUSHDOWN AUTOMATA
Pushdown Automata- Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Equivalence of Pushdown automata and CFL – pumping lemma for CFL – problems based on pumping Lemma.

UNIT IV
TURING MACHINES
Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing machine construction – Multi head and Multi tape Turing Machines – The Halting problem – Partial Solvability – Problems about Turing machine- Chomskian hierarchy of languages.

UNIT V
UNSOLVABLE PROBLEMS AND COMPUTABLE FUNCTIONS
Unsolvable Problems and Computable Functions – Primitive recursive functions – Recursive and recursively enumerable languages – Universal Turing machine. MEASURING AND CLASSIFYING COMPLEXITY: Tractable and Intractable problems- Tractable and possibly intractable problems – P and NP completeness – Polynomial time reductions.

TEXT BOOKS:
1. Hopcroft J.E., Motwani R. and Ullman J.D, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2008. (UNIT 1,2,3)
2. John C Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata McGraw Hill Publishing Company, New Delhi, 2007. (UNIT 4,5)

REFERENCES:
1. Mishra K L P and Chandrasekaran N, "Theory of Computer Science – Automata, Languages and Computation", Third Edition, Prentice Hall of India, 2004.
2. Harry R Lewis and Christos H Papadimitriou, "Elements of the Theory of Computation", Second Edition, Prentice Hall of India, Pearson Education, New Delhi, 2003.
3. Peter Linz, "An Introduction to Formal Language and Automata", Third Edition, Narosa Publishers, New Delhi, 2002.
4. Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education 2009

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2	3											
CO3	2											
CO4				2								
CO5	3											

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	L	T	P	C
MCA – V Semester	4	1	0	3

15DMC44 – GEOGRAPHICAL INFORMATION SYSTEMS
(CHOICE BASED COURSE-III)

Course Outcomes:
After Completion of the course the student will be able to
1. Identify geo social problems and the requisite problems
2. Understand the basic principles of cartography system in GIS
3. Gain the knowledge on analytical skills which involved in GIS problem
4. Understand the database system involved in geographical system
5. Pursue advanced programs in geo informatics.

UNIT I:
Principles of Geographical Information Systems: Theory of GIS supported by extensive practical exercises, Geographic information and spatial data types, Hardware and software; for GIS; Steps of spatial data handling, Database management systems, Spatial referencing, Data quality, Measures of location errors on maps, Satellite based positioning, Spatial data input, Data preparation, Point data transformation, Analytical GIS capabilities; Retrieval and classification Overlay functions Neighborhood operations; Network analysis; error propagation , Data visualization.

UNIT II:
Cartography : Cartography, Introduction to Cartography, Classification of maps, Types of data, Visual variables, Generalization, Symbolization, Map design, Map Layout, Diagrams Map Projection, Topographic mapping, and Production of large-scale maps and photo.

UNIT III:
GIS Analysis, Planning & implementation: Network analysis, Digital terrain modeling & analysis, Grid cell GIS modeling & analysis, GIS plan, Components of GIS plan, Phases: Planning, Analysis, Implementation, Successful Implementation of GIS, Management support, Leadership & vision, Data conversion & maintenance of Hardware & software, User training, Data communication, Software customization, User support, Funding.

UNIT IV:
Maintenance & Management of GIS Database: Centralized GIS database, Distributed GIS database, Master & transaction GIS databases, Data maintenance issues, Financial & legal aspects of GIS: GIS costs, Ongoing costs, Savings, Additional benefits, GIS model for financial justification, Laws for access, pricing, privacy, liability, copyright, practice etc. Pitfalls of GIS: Failures, Outstanding benefits, Experimentation, Undefined goals, Lack of long term planning & management support, Computerizing existing problems, User involvement, Lack of user training and R & D support, Budget overrun / underestimation etc.

UNIT V:
Advanced GIS: Geo-information system and analysis, Raster data base design, GIS Vector based data structure/design, Data base creation for urban area analysis, Urban information system for resources and integrated developing planning, Urban modeling, GIS application case studies, Grid cell Data Processing, Principle of grid cell date processing, Rasterizing point, line and polygons, Selection of grid cell size and effect on data quality.

TEXT BOOKS :
1. G.B. Korte, "*The GIS Handbook*"
2. Chang, Kang, Tsung (2004), "*Programming Arc Objects with VBA CRC Press*", Boka Raton Florida

REFERENCES:
1. Michael N. Demers, "Fundamentals of Geographical Information Systems" - Wiley 4th edition

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		3										
CO2	3											
CO3			3									
CO4	3											
CO5				2	2							

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	L	T	P	C
MCA – V Semester	4	1	0	3

15DMC45 – COMPILER DESIGN
(CHOICE BASED COURSE-IV)

Outcomes:
After Completion of the course the student will be able to
1. Identify and understand different components of a compiler and their functioning
2. Understand and user context free grammar and parse tree construction
3. Identify the syntax analysis phase and identify the similarities and difference among various parsing techniques and grammar transformation techniques
4. Understand the concept of intermediate code generation in compiler
5. Understand the new code optimization technique and improve the performance of a program in terms of speed and space.

UNIT I
Compilers-An Introduction: The Bigger Picture, The Compiler-Front End and Back End, Compiler Implementation.
Lexical analysis : Introduction, The Role of the Lexical Analyzer, Recognition of Tokens, Elements of Lexical Analysis, The Mechanics of Lexical Analyzer Generators, rlex -A Restricted Lexical Analyzer Generator.

UNIT II
Parsing : The Role of the Parser, Context-Free Grammar, Classification of Parsing techniques, Top Down Parsing, Bottom up Parsing, Error Reporting and Recovery in Syntax Analyzer. A Syntax Analyzer for C Language.

UNIT III
Semantic Analysis: Syntax-Directed Definitions, Syntax Directed Translation, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, Semantic Analysis.

UNIT IV
Intermediate Code Generation: Intermediate Languages, Declarations, Intermediate Forms of Source Programs – Abstract Syntax Tree and Three Address Code, Intermediate code generation of basic programming language constructs: Simple Assignment statements, arrays, Pointers and address operators, Conditional statements.

UNIT V
Code Generation: Intermediate code Optimization, Issues in the Design of a Code Generator, Target Program, Dynamic Programming Code-Generation Algorithm, Register Allocation and Assignment, x86 Primer, Run-Time Environment, Code Generation for x 86, Target Code Optimization.

TEXT BOOKS:
1. V. Raghavan, Principles of Compiler Design, Mc Graw Hill Edn (India) Pvt Ltd, 2013.
2. Aho, Ravi Sethi, Monica S Lam, Ullman Compilers - Principles, Techniques and Tools,2nd Edition, Pearson, 2002.
3. Randy Allen, Ken Kennedy, Optimizing Compilers for ModernArchitectures,1E,Elsevier, 2001.

REFERENCES:
1. Dick Grune,Kees van reeuwijk, Henry E. Bal, Cariel J. H.JacobsModern CompilerDesign, springer ,2nd ed 2012.
2. Keith Cooper and Linda Tarczon, Engineering a Compiler, 2nd Edition,Elsevier,2011.
3. Kenneth C Louden, Compiler Construction: Principles and Practice,PWS publishingcompany,1997

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3											
CO2	3											
CO3		2										
CO4	3											
CO5	3											

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	L	T	P	C
MCA – V Semester	4	1	0	3

15DMC46 – SOFTWARE TESTING METHODLOGIES
(CHOICE BASED COURSE-IV)

Course Outcomes:
After completion of this course, the students will be able to
1. Apply software testing knowledge and engineering methodologies
2. Comprehend and apply knowledge in transaction flow and data flow techniques.
3. Understanding and knowledge of contemporary issues in software testing.
4. Apply logic based testing and state graph testing in software methodologies.
5. Have an ability to use software testing methods and modern software testing tools for their testing projects

UNIT I

Introduction:-Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.
Flow graphs and Path testing:-Basics concepts of pathtesting, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT II

Transaction Flow Testing:- Transaction flows, transaction flow testing techniques.
Data flow testing:-Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT III

Domain Testing:-Domains and paths, Nice and ugly domains, domain testing, domain and interface testing, domains and testability.

Paths, Path products and Regular expressions:-path products and path expression, reduction procedure, applications, regular expressions and flow anomaly detection.

UNIT IV

Logic Based Testing:-overview, decision tables, path expressions, kv charts, specifications.
State, State Graphs and Transition testing:-state graphs, good & bad state graphs, state testing, Testability tips.

UNIT V

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools . (Student should be given an exposure to a tool like JMeter or Win-runner).

TEXT BOOKS:

1. Software Testing techniques-Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools– Dr.K.V.K.K.Prasad,Dreamtech.

REFERENCES:

1. The craft of software testing –Brian Marick, Pearson Education.
2. Software Testing, 3rdedition, P.C.Jorgensen, Aurbach Publications(Dist.bySPD).
3. Software Testing in the Real World– EdwardKit, Pearson.
4. Effective methods of Software Testing, Perry, JohnWiley,2ndEdition,1999.
5. Art of Software Testing– Meyers,JohnWiley.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		3										
CO2		3		3								
CO3	3											
CO4		3			2							
CO5					3							

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	L	T	P	C
MCA – V Semester	4	1	0	3

15DMC47 – SEMANTIC WEB
(CHOICE BASED COURSE-IV)

Course Outcomes:
After completion of this course, the students will be able to
1. Analyze the Semantic web architectures .
2. Understand the semantic relationships among these data elements using Resource Description Framework (RDF).
3. Understand and reflect on the principles of Ontology Engineering.
4. Design and implement a web services application that "discovers" the data and/or other web services via the semantic web.
5. Discover the capabilities and limitations of semantic web technology for social networks

UNIT I
Web Intelligence
Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT II
Knowledge Representation for the Semantic Web
Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT-III
Ontology Engineering
Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT-IV
Semantic Web Applications, Services and Technology
Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT-V
Social Network Analysis and semantic web
What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS:
1. Berners Lee, Godel and Turing , "Thinking on the Web", Wiley , 2008.
2. Peter Mika, "Social Networks and the Semantic Web, Springer, 2007.

REFERENCES:
1. J.Davies, R.Studer, P.Warren, Semantic Web Technologies, Trends and Research in Ontology Based Systems,John Wiley & Sons,2006.
2. Liyang Lu Chapman, Semantic Web and Semantic Web Services ,Hall/CRC Publishers,2007.
3. Heiner Stucken Schmidt, Frank Van Harmelen, Information Sharing on the semantic Web,Springer Publications,2006.

COURSE ARTICULATION MATRIX

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		3										
CO2	3											
CO3	3											
CO4		3										
CO5		3	2									

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L	T	P	C

MCA V Semester

0 0 3 2

15DMC48 - ANDROID LAB

1   Create "Hello World" application

2   Create sample application with login module.(Check username and password)On successful login that will display toast(Message)

3   Create sample application using checkbox that will display toast(Message)

4   Create sample application using Radio buttons that will display toast(Message)

5   Create sample application using Option Menu

6   Create sample application using Context Menu

7   Create sample application with login module.(Check username and password) On successful login, go to next screen. And on failing login, alert user using Toast.

8   Create and Login application as above. On successful login , open browser with any URL

9   Create an application using spinner control

10   Working with Dialogs

11   Working with Style

12   Creating a sample application to drawing on the screen

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	L	T	P	C
MCA – V Semester	0	0	3	2

15DMC49 - C# Programming LAB

List of Experiments

1. Write a program to Display hello world on screen
2. Write a program to perform Addition of two numbers
3. Write a program to perform Switch statement and Single dimensional array, Two dimensional array
4. Write a program to Calculate Electricity Bill
5. Write a program to Display employee details using Inheritance
6. Write a program to perform Method over riding
7. Write a program to perform Constructor over loading
8. Write a program to show Interface concept.
9. Write a program to show Exceptions concept.

10. Write a program to perform Operator Overloading Using C#
11. Create a Web Page using XML DOM
12. Design an Student application using Windows Form Controls using c#.Net and ADO.Net.

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MCA – VI Semester   0   0   0   11

15DMC50 – PROJECT WORK

Project Work Phases		
Phase - 1	Review - 0	Abstract Submission & Approval
	Review – 1	Problem Introduction, Literature Survey, Methodology/Algorithms
	Review – 2	System Architecture / design Modules , data schemas
	Review – 3	Testing & Implementation, Execution
Phase - 2	←--------------Pre Submission Seminar---------------→	
Phase - 3	←-------------- External Viva voce ---------------→	