SRI SANKARA ARTS & SCIENCE COLLEGE

AUTONOMOUS

DEPARMENT OF COMPUTER SCIENCE

BACHELOR DEGREE COURSES: UNDER THE FACULTY OF SCIENCE (B.Sc)

CHOICE BASED CREDIT SYSTEM.

REGULATIONS

1. ELIGIBILITY FOR ADMISSION:

Candidates for admission to the first year of the Degree of Bachelor of Science courses shall be required to have passed the Higher Secondary Examinations with a computer science background (Academic Stream) conducted by the Government of Tamil Nadu or CBSE pattern shall be permitted to appear and qualify for the B.Sc Degree Examination of the University of Madras affiliated colleges of this University.

2. STRUCTURE OF THE COURSE

The course is organized on semester basis with a total of six semesters. Each student will opt for a comprehensive, interactive course with one of the faculty member. The topic of specialization and course content will be determined by the dept/course advisor.

Core practical **Laboratory:** Independent system shall be provided for the each student. It is recommended that the practical training be organized as an exercise rather than simple demonstration. The student must actually perform the experiments.

3. ELIGIBILITY FOR THE AWARD OF DEGREE

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a Autonomous College for a period of not less than three academic years, passed the examinations of all the Six Semesters prescribed earning **140** credits in Parts-I, II, III, IV, V & VI and fulfilled such conditions as have been prescribed therefore.

The parent university will award degrees to the students evaluated and recommended by autonomous colleges. The degree certificates will be in a common format devised by the university. The name of the college will be mentioned in the degree certificate, if so desired. The declaration of results was decided by the examination committee.

4. DURATION:

Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters and the third academic year the fifth and sixth semesters respectively.

The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester exclusive of the days for the conduct of semester examinations.

In each semester, Papers are administered in 15 teaching weeks and another 5 weeks are utilized for evaluation and grading purposes. Each week has 30 working hours spread over in a 5 day week. Depending upon the content and specialization, a paper may have 1 to 6 credits. Total number of teaching hours in a semester will be 450 hrs. One credit of each theory paper is equal to 15 hrs of lectures or 30 hrs of practical works.

5. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMMES

The candidates shall complete the B.Sc Degree Programmes within 6 years from the date of admission. The term completing the programmes means passing all the prescribed examinations of the programme to become eligible for the degree. No candidate shall be permitted to appear for the examinations after the prescribed period for completing the programme.

6. COURSE OF STUDY

A Bachelor's programme consists of a number of papers. The term Course is used to indicate logical part of a subject matter of the programme. In each of Bacherlor's programmes, there will be a prescription of (i) language –I (Tamil, Sanskrit or other languages), (ii) language – II (English), (iii) a set of compulsory courses (called core subjects), some optional courses (called elective / allied subjects) and projects, (iv) a set of papers recommended by UGC and TANSCHE (Advanced Tamil / Soft skill / Environmental Studies / Value education), (v) Extension activities and (vi) Certificate courses.

The detail of the Study for Bachelor Degree Courses shall consist of the following:

PART – I Language Courses (LC) [Tamil / Other Languages]

PART – II English Language Courses (ELC)

PART – III Core Subjects
Allied Subjects
Projects / Field work

PART – IV

1. (a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two papers (level will be at 6th Standard).
   (b) Those who have studies Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Advanced Tamil comprising of two papers.
   (c) Others who do not come under a + b can choose non-major elective comprising of two papers.

2. Skill Based Subjects - Soft Skills

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed papers on Soft Skills. For three years UG degree Programme, a candidate must undergo a minimum of 4 papers (4 x 2 = 8 credits). Papers will be finalized in due course.

3. Environmental Studies

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed paper on Environmental studies. For three years UG degree Programme, a candidate must undergo environmental studies during third semester of second year (2 credits). Syllabus is common to all UG courses.

4. Value Education

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed paper on value education. For three years UG degree Programme, a candidate must undergo value education during fourth semester of second year (1 credit). Paper will be finalized in due course.

PART – V Extension Activities

A candidate shall be awarded a maximum of 1 Credits for Compulsory Extension Service. All the Students shall have to enroll for NSS /NCC/ NSO (Sports & Games) Rotract / Youth Red cross or

any other service organizations in the college and shall have to put in Compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the college before 31st March in a year. If a student LACKS 40 HOURS ATTENDANCE in the First year,
he/she shall have to compensate the same during the subsequent years. Students those who complete minimum attendance of 40 hours in One year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in Two Years will ONE CREDIT. Literacy and population Education Field Work shall be compulsory components in the above extension service activities. The working hours should not overlaps the normal teaching hours.

Student advisor

All teachers of the department shall function as student advisors. There will be more or less an equal number of students assigned to each student advisor of a department. The student advisor will help the students in choosing core and elective papers of study. The student advisor shall be responsible for registration of papers (subjects) by his students. The student advisor will offer all possible student support services

7. CREDITS

The term credit is used to describe the quantum of syllabus for various programmes in terms of periods of study. It indicates differential weightage given according to the contents duration of the courses in the curriculum design. The minimum credit requirement for a three year Bacherlor's programme shall be **140** credits. Each subject (course) is designed variously under lectures / tutorials / laboratory work / seminar / project work etc., to meet effective teaching and learning needs and credits are assigned suitably.

One credit for each lecture / tutorial / project work period per week shall be alloted. One credit for two laboratory hours per week shall be alloted. In practical, each credit should cover minimum of six experiments. Thus normally, in each of the subject, credits will be assigned on the basis of the lectures / tutorials / laboratory work / project work and other forms of learning in a 15 week schedule.

8. SCHEME OF EXAMINATION

There shall be continuous, comprehensive evaluation of students through internal and external examination. At least 2 internal examinations (Sessional Tests) per semester and 1 semester ending examination should be conducted.

Sessional Test I will he held during sixth week for syllabi covered till then. Sessional Test I will be a combination of a variety of tools such as class test, assignment, papr presentation etc., that would be suitable for the paper. This required an element of openness. The students are to be informed in advance about the nature of assessment and the procedures.

However the tests are compulsory. Test I may be for one hour duration. The pattern of question paper will be decided by the respective board of studies.

Sessional Test I will carry 20% of marks of the entire paper.

Sessional Test II will he held during eleventh week for syllabi covered between seventh and eleventh weeks. Sessional Test I will be a combination of a variety of tools such as class test, assignment, paper presentation etc. that would be suitable for the paper. It will also have an element of openness. The students are to be informed in advance about the nature of assessment and the procedures. However the tests are compulsory. Test II may be for one hour duration. The pattern of question paper will be decided by the respective board of studies.

Sessional Test II will carry 20% of marks of the entire paper.

There will be one End Semester examination of 2 - 3 hours duration in each paper. The End semester examination will cover all the syllabi of the paper for 60% of Marks.

A dissertation may be offered in lieu of one / two papers / practicals. It shall be evaluated by two examiners one external and one internal appointed by the Controller of Examination. Wherever there is viva-voce, it shall be conducted by the common Viva Board consisting of the Chairman and internal members of the Board of Examination in the concerned subject, internal guide and one external expert as approved by the Controller of Examinations.

End semester practical examinations shall be held before the theory examinations to benefit the students to undertake examinations of other departments.
Every course offered will have three components associated with the teaching-learning process of the course, namely (i) Lecture - L (ii) Tutorial - T (iii) Practicals - P, (iv) Self study - S where

L stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study / desk work / brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands Practice session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

S stands Self study session consisting participatory discussion by student with the guidance of faculty. This session is not included in the weekly hour plan.

In terms of credits, every one hour session of L amounts to 1 credit per semester, a minimum of two hour session of T or P amounts to 1 credit per semester and no credits alloted to self study hour, over a period of one semester of 15 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components. The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P + S. The credit pattern of the course is indicated as L: T: P: S. For example: a theory course with a L-T-P-S schedule of 4-0-0-2 will be assigned 4 credits, and a lab practical course with a L-T-P-S schedule of 0-0-3-0 will be assigned 3 credits.

For B.Sc. courses Part I, Part II and Part IV subjects will be provided to first to fourth semesters. In fifth and sixth semesters only part III papers provided. Total of 30 hrs was to be maintained constantly for all semesters.

Projects and Field works might be introduced in the sixth semester of any UG course by utilizing two core papers. Each project work / field work might be awarded with twelve credits and twelve hours per week.

Total credits of 140 attained through three years of their study period.

9. Question Paper Pattern

SECTION – A (30 words)

10 OUT OF 12 - 10 X 2 marks = 20 marks

SECTION – B (200 words)

5 out of 7 -5 x 5 marks = 25 marks

SECTION – C (500 words)

3 out of 5 - 3x 10 marks = 30 marks

TOTAL = 75 marks

---

10. SCHEME OF EXAMINATIONS:

SUBJECTS	CREDITS	EXAM HRS	MAX. MARKS		
			Internal	External	TOTAL
PART I Language	4	3	25	75	100
PART II English	4	3	25	75	100
PART III Core Subject	4	3	25	75	100
Core Practical	3	3	40	60	100
Allied Paper	4	3	25	75	100
Allied Practical	3	3	40	60	100
PART IV 1. (a) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two paper (level will be at 6th Standard). (b) Those who have studies Tamil up to XII Std. and taken a Non- Tamil Language under Part-I shall take Advanced Tamil comprising of two papers. (c) Others who do not come under a + b can choose non-major elective comprising of two papers.	2	2	25	75	100
2. Skill based subjects – Soft Skill	2	2	50	50	100
PART V – Extension activities	1				
PART-VI Certificate course	2				
Total credits : 29					

The following procedure be followed for internal Marks

The offer of an Add-on Courses to the students in various disciplines is to enhance their employability. The number of working hours per week for the students for getting the **140** prescribed credits should not exceed 30 hours of class per week and no faculty member should be allocated extra hours beyond the prescribed 16 lecture hours.

The following procedure be followed for Internal Marks

Theory Papers: **Internal Marks 25**

INTERNAL MARKS

Tests (2 out of 3)	= 10
Attendance	= 5
Seminars	= 5
Assignments	= 5
	25 marks

Break-up Details for Attendance

Below 60%	- No marks
60% to 75%	- 3 marks
76% to 90 %	- 4 marks
91% to 100%	- 5 marks

Practical: **Internal Marks 40**

Attendance	5 marks
Practical Test best 2 out of 3	30 marks
Record	5 marks

11. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

i. Candidates shall register their names for the First Semester Examination after the admission in UG Courses.

ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester Subjects.

iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore by the Academic Council from time to time. Provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorised Medical Attendant (AMA), duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the Course of study. Such Candidates shall have to repeat the missed Semester by rejoining after completion of Final

Semester of the course, after paying the fee for the break of study as prescribed by the Academic Council from time to time.

iv. There shall be examinations at the end of each semester, for odd semesters in the month of October / November, for even semesters in April / May. A candidate who does not pass the examination in any paper(s) shall be permitted to appear in such failed courses in the subsequent examinations to be held in October / November or April / May.

v. The results of all the examinations will be published through the college Website.

12. PASSING MINIMUM

A candidate shall be declared to have passed:

a) There shall be no Passing Minimum for Internal.

b) For External Examination, Passing Minimum shall be of 40 % (Forty Percentage) of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-voce.

c) In the aggregate (External + Internal) the passing minimum shall be of 40%. d) He/She shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed / as per the scheme of examinations by earning **140** CREDITS in Parts-I, II, III, IV & V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 Credit to qualify for the Degree. He/She shall also complete two certificate courses to qualify for the Degree.

13. CLASSIFICATION OF SUCCESSFUL CANDIDATES

PART- I TAMIL / OTHER LANGUAGES

TAMIL/OTHER LANGUAGES: Successful candidates passing the Examinations for the Language and securing the marks (1) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD Class.

PART – II ENGLISH

ENGLISH: Successful candidates passing the examinations for English and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be

declared to have passed the examination in the FIRST and SECOND Class, respectively. All other successful candidates shall be declared to have passed the examination in the THIRD class.

PART – III consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT with three papers: Successful candidates passing the examinations for Core papers together and securing the marks (i) 60 percent and above (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core papers together shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examinations in the THIRD Class.

PART – IV consisting of sub items 1 (a), (b) & (c), 2, 3 and 4
Successful Candidate earning of 2 credits for each paper SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

PART – V EXTENTION ACTIVITIES
Successful Candidate earning of 1 credit for extension activities SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

14. RANKING

Candidates who pass all the examinations prescribed for the Course in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking / Distinction.
Provided in the case of Candidates who pass all the examinations prescribed for the Course with a break in the First Appearance due to the reasons as furnished in the Regulations 8(iii) category are only eligible for Classification.

15. APPEARANCE FOR IMPROVEMENT

Candidates who have passed in a theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 12 semesters counting from his/her first semester of his / her admission. If candidate improve his marks, then his improved marks will be taken into consideration for the award of Classification only. Such improved marks will not be counted for the award of Prizes / Medals, Rank and Distinction. If the candidate does not show improvement in the marks, his previous marks will be taken into

consideration**.** No candidate will be allowed to improve marks in the Practical, Project, Viva-voce, and Field work.

16. CONDONATION

Students must have 75% of attendance in each paper for appearing the examination. Students who have 74% to 70% of attendance shall apply for condonation in the prescribed form with the prescribed fee Rs. 200/-. Students who have 69% to 60% of attendance shall apply for condonation in prescribed form with the prescribed fee along with the Medical Certificate. Students who have below 60% of attendance are not eligible to appear for the examination. They shall re-do the semester(s) after completion of the programme.

17. RETOTALING

Candidates are permitted to apply for retotaling within 10 days from the date of publication of results. The student should submit request for retotaling in the prescribed format and pay a fee of Rs.100/-.

18. PHOTOCOPY OF ANSWER SCRIPT

Candidates are permitted to apply for obtaining a photocopy of answer paper within 20 days from the date of publication of results. The student should submit request for photocopy of answer script in the prescribed format.

19. REVALUATION

Candidates are permitted to apply for revaluation after obtaining a photocopy of answer paper within 30 days from the date of publication of results. The student should submit request for revaluation in the prescribed format and pay a fee of Rs.500/- per paper.

20. MALPRACTICE

Any malpractice by the students debars them from subsequent appearance based on the decision of the examination committee. In all cases of malpractice their conduct certificates will indicate malpractice.

21. EVALUATION AND GRADING SYSTEM

The performance of a student in each paper is evaluated in terms of percentage of marks with a provision for conversion to grade points (GP). Evaluation for each paper shall be done by a continuous internal assessment by the concerned paper teacher as well as by an end semester examination and will be consolidated at the end of the course.

The term grading system indicates a Ten Point Scale of evaluation of the performances of students in terms of marks obtained in the Internal and External Examination, grade points and letter grade.

Once the marks of the Internal and end-semester examinations for each of the papers are available, they will be added. The marks thus obtained will then be graded as per details provided in Table.

The sum of total performance in each semester will be rated by **Grade Point Average (GPA)** while the continuous performance from the second semester onwards will be marked by **Cumulative Grade Point Average (CGPA).** These two are calculated by the following formulae.

$$GPA = \frac{\text{Sum of [Credits acquired x Grade points]}}{\text{Sum of Credits acquired}}$$

For the calculation of Grade Point Average (GPA), Gi is the grade point awarded; Ci is the credit units earned for the ith paper.

$$CGPA = \frac{\sum_{i=1}^{n} C_i GP_i}{\sum_{i=1}^{n} C_i}$$

where 'Ci' is the Credit earned for the paper i in any semester ; 'Gi' is the Grade Point obtained by the student for the paper i and 'n' is the number of papers **passed** in that or **CGPA** = GPA of all the papers starting from the first semester to the current semester.

Note: The GPA and CGPA shall be calculated separately for the following five parts:

Part I: Language Course; Part II: English Language Course and Part III: Core Cs, Allied Cs, Part IV: NME, SBC, ES, VE, Part V: Extension activities.

Marks	Grade Point	CGPA	Letter Point	Classification of Final Result
96 and above	10	9.51 and above	S^+	First Class with Exemplary
91 – 95	9.5	9.01 – 9.50	S	
86 – 90	9.0	8.51 – 9.00	D^{++}	First Class with Distinction
81 – 85	8.5	8.01 – 8.50	D^+	
76 – 80	8.0	7.51 – 8.00	D	
71 – 75	7.5	7.01 – 7.50	A^{++}	First Class
66 – 70	7.0	6.51 – 7.00	A^+	
61 – 65	6.5	6.01 – 6.50	A	
56 – 60	6.0	5.51 – 6.00	B^+	Second Class
51 – 55	5.5	5.01 – 5.50	B	
46 – 50	5.0	4.51 – 5.00	C^+	Third Class
40 – 45	4.5	4.00 – 4.50	C	
Below 40	0	Below 4.00	F	Fail

The grade card / mark sheet issued at the end of the semester to each student will contain the following:

a. the marks obtained for each paper registered in the semester

b. the credits earned for each paper registered for that semester

c. the performance in each paper by the letter grade point obtained

d. the Grade Point Average (GPA) of all the papers registered for that semester and

e. from the second semester onwards, the Cumulative Grade Point Average (CGPA) of all the papers and

f. the class and grade of the student in the final CGPA

22. TRANSITORY PROVISION

Candidates who have undergone the course of study prior to the academic year 2015-2016 will be permitted to appear for the examinations under those Regulations for a period of TWO years i.e. upto and inclusive of April - May 2017 Examinations. Thereafter, they will be permitted to appear for the examination only under the Regulations then in force.

23. INSTANT EXAMINATION

Candidates who have passed all the theory papers upto 5th semester and failed in only one paper pertaining to the 6th semester can apply for Instant Examination. Application form with a demand draft for Rs.300/-, drawn in favour of "The Principal, Sri Sankara Arts and Science College, Enathur" should be submitted on or before 10 days after the publication of results. The results are published within 15 days after the date of examinations.

APPENDIX – C

B.Sc. DEGREE COURSE COMPUTER SCIENCE

FIRST SEMESTER

SUBJECTS	CREDITS	EXAM HRS	MAX. MARKS		
			External	Internal	TOTAL
PART I LANG.PAPER I	3	3	75	25	100
PART II ENGLISH PAPER I	3	3	75	25	100
PART III Programming in C	4	3	75	25	100
PART III Practical – I : Programming in C .	4	3	60	40	100
Allied – Paper – I Mathematics – I	5	3	75	25	100
PART IV 1.(a) Not studied Tamil upto xii std., - shall take tamil compromising of two courses (level VI std.,) (b) Studied Tamil upto xii std. – taken Non-Tamil under Part – I shall take advance Tamil comprising of two courses. 9c) Others who do not comes under a & b can choose non-major elective comprising of two courses. 2. Skill based subject (Elective) (Soft Skills)	2 3	3 3	75 60	25 40	100 100

SECOND SEMESTER

SUBJECTS	CREDITS	EXAM HRS	MAX. MARKS		
			External	Internal	TOTAL
PART I LANG.PAPER-I I	3	3	75	25	100
PART II ENGLISH PAPER -I I	3	3	75	25	100
PART III Digital Electronics and Microprocessor	4	3	75	25	100
PART III Practical II - Digital Electronics & Microprocessors Lab	4	3	60	40	100
Allied – Paper – II Mathematics - II	5	3	75	25	100
PART IV 1.(a) Not studied Tamil upto xii std., - shall take tamil compromising of two courses (level VI std.,) (b) Studied Tamil upto xii std. – taken Non-Tamil under Part – I shall take advance Tamil comprising of two courses. 9c) Others who do not comes under a & b can choose non-major elective comprising of two courses. 2. Skill based subject (Elective) (Soft Skills)	2 3	3 3	75 60	25 40	100 100

THIRD SEMESTER

Course Component	SUBJECTS	Credits	Exam Hrs.	MAX.MARKS		
				Ext. Marks	Int. Marks	Total
PART I	LANG. PAPER III	3	3	75	25	100
PART II	ENGLISH PAPER III	3	3	75	25	100
PART III	Paper – V - Programming in C++ and Data Structures	4	3	75	25	100
PART III	Paper – VI Practical – III : Data Structures using C++	4	3	60	40	100
Allied –II Paper – I		5	3	75	25	100
PART IV 2. Soft Skill – III		3	3	60	40	100
3. Environmental Studies				Examination will be held in IV Semester		

FOURTH SEMESTER

	SUBJECTS	Credits	Exam Hrs.	MAX.MARKS		
				Ext. Marks	Int. Marks	Total
PART I	LANG.PAPER-IV	3	3	75	25	100
PART II	ENGLISH PAPER -IV	3	3	75	25	100
PART III -	Paper – VII Programming in JAVA	4	3	75	25	100
PART III –	Paper - VIII - Practical – IV Java Programming Lab	4	3	60	40	100
Allied–II Paper – II		5	3	75	25	100
PART IV 2.Soft Skill–IV		3	3	60	40	100
3. Environmental Studies		2	3	75	25	100

FIFTH SEMESTER

	SUBJECTS	Credits	Exam Hrs.	MAX.MARKS		
				Ext. Marks	Int. Marks	Total
Part III	Paper - IX Operating systems	4	3	75	25	100
Part III	Paper - X - Database Management Systems	4	3	75	25	100
Part III	Paper - XI - Computer Architecture and Organization	4	3	75	25	100
Part III	Paper - XII Practical – V : RDBMS LAB	4	3	60	40	100
	Elective - I	5	3	75	25	100
PART -IV 4. Value Education		2				

SIXTH SEMESTER

	SUBJECTS	Credits	Exam Hrs.	MAX.MARKS		
				Ext. Marks	Int. Marks	Total
Part III	Paper - XIII - Data Communication and Networking	4	3	75	25	100
Part III	Paper - XIV - Web Technology	5	3	75	25	100
Part III	Paper - XV - Practical – VI Web Applications LAB	4	3	60	40	100
	Elective - II	5	3	75	25	100
	Elective - III	5	3	75	25	100
PART- V Extension Activities		1				

Elective – I

Visual Programming / RDBMS with ORACLE / Unix Programming

Elective - II

Data Mining / Software Testing / Object Oriented Analysis and Design

Elective - III

Client Server Computing /Computer Graphics/ Software Engineering

One of the following allied shall be chosen for Allied – II

(a) Physics (b) Statistical Methods and their applications

B.Sc. DEGREE COURSE IN COMPUTER SCIENCE

SYLLABUS

Title of the Course/ Paper	Programming in C		
Part - III	I Year & First Semester	Credit: 4	

Objective of the course This course introduces the basic concepts of programming in C

Unit 1: C fundamentals Character set - Identifier and keywords - data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.

Unit-2: Data input output functions - Simple C programs - Flow of control - if, if-else, while, do-while , for loop, Nested control structures - Switch, break and continue, go to statements - Comma operator.

Unit 3: Functions –Definition - proto-types - Passing arguments - Recursions. Storage Classes - Automatic, External, Static, Register Variables – Multi-file programs.

Unit-4: Arrays - Defining and Processing - Passing arrays to functions – Multi-dimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures – Unions - Bit wise operations.

Unit-5 : Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files : Creating , Processing ,Opening and Closing a data file.

1. Recommended Texts

i. E.Balaguruswamy, 1995,Programming in ANSI C, TMH Publishing Company Ltd.

ii. Kanetkar Y., 1999,Let us C, BPB Pub., New Delhi.

iii. H. Schildt, C,2004, The Complete Reference, 4th Edition, TMH

2. Reference Books

i.B.W. Kernighan and D.M.Ritchie, 1988,The C Programming Language, 2nd Edition, PHI.

ii. Gottfried,B.S, 1996,Programming with C, Second Edition, TMH Pub. Co. Ltd., New Delhi .

Title of the Course/ Paper	Practical – I Programming in C		
Part - III	I Year & First Semester	Credit: 4	

Objective of the course This course train the students to solve the problems using C language

I Summation of Series :

1. Sin(x), 2. Cos(x), 3. Exp(x) (Comparison with built in functions)

II String Manipulation :

1. Counting the no. of vowels, consonants, words, white spaces in a line of text and array of lines
2. Reverse a string & check for palindrome.
3. Substring detection, count and removal
4. Finding and replacing substrings

III Recursion :

1. ${}^{n}P_{r}$, ${}^{n}C_{r}$
2. GCD of two numbers
3. Fibonacci sequence
4. Maximum & Minimum
5. Towers of Hanoi.

IV Matrix Manipulation :

1.Addition & Subtraction

2.Multiplication

3.Transpose, and trace of a matrix

4.Determinant of a Matri

V Sorting and Searching :

1. Insertion Sort
2. Bubble Sort
3. Linear Search
4. Binary Search

Title of the Course/ Paper	Digital Electronics & Microprocessors		
Part - III	I Year & Second Semester	Credit: 4	

Objective of the course This course introduces the concepts of fundamentals of Digital Electronics and Microprocessor

Unit 1: Binary Systems & Code conversion,Boolean Algebra & Logic Gates – Truth Tables – Universal Gates – Simplification of Boolean functions: SOP, POS methods – K-map (upto 5 variables) – Mc-Clausky tabulation Methods - Combinational Logic: Adders & Subtractors – Multiplexer – Demultiplexer - Encoder – Decoder.

Unit-2: Sequential Logic: RS, Clocked RS, D, JK, Master Slave JK, T Flip-Flops – Shift Registers – Types of Shift Registers – Counters: Ripple Counter – Synchronous Counters – Up-Down Counter.

Unit 3: Introduction to Microprocessors, Microcomputers, and Assembly Language – Microprocessor Architecture and Its Operations – Memory – I/O Devices – 8085 MPU – Introduction to 8085 Instructions – Data Transfer Operations – Addressing Modes - Arithmetic, Logic and Branch Operations – Writing Assembly Language Programs .

Unit-4: Time Delay Programs: Time Delay Using One Register – Using a Register Pair – Using a Loop within Loop Technique – Counter Design with Time Delay – Stack and Subroutines – BCD to Binary Conversion and Vice-versa – BCD to HEX Conversion and Vice-versa – Binary to ASCII Conversion and Vice-versa – BCD Addition and Subtraction .

Unit-5 : 8085 Interrupt – Vectored Interrupts – Interfacing I/O Devices: Basic Interfacing Concepts – Interfacing Input Devices- Memory-Mapped I/O.

1. **Recommended Texts**

i. M. Morris Mano,2005, Digital Logic and Computer Design, Prentice-Hall of India Pvt. Ltd.

ii. Ramesh S. Gaonkar,1999,Microprocessor Architecture, Programming, and Applications with the 8085, 5th Edition,Penram International Publishing (India) Pvt. Ltd.

iii. V. Vijayendran,2004,Digital Electronic and Microprocessor S. Viswanathan (Printers & Publishers) Pvt. Ltd.

2. Reference Books

i. D. P. Leach and A. P. Malvino,2002,Digital Principles and Applications,5th Edition, Tata McGraw, Hill Publishing Co. Ltd.

ii. V. Vijayendran,2004,Digital Fundamentals,S. Viswanathan (Printers & Publishers) Pvt. Ltd.

iii. V. Vijayendran ,2004, Fundamentals of Microprocessor – 8085, S. Viswanathan (Printers & Publishers) Pvt. Ltd.

iv. N. K. Srinath,2005, 8085 Microprocessor Programming and Interfacing,Prentice-Hall of India Pvt. Ltd.

Title of the Course/ Paper	Practical II - Digital Electronics & Microprocessors Lab		
Core	I Year & Second Semester	Credit: 4	
Objective of the course	This course gives training on the experiments of Digital Electronics and Microprocessor 8085.		

DIGITAL ELECTRONICS:

1. Verification of Truth Table for AND, OR, NOT, NAND, NOR and EX-OR gates.
2. Realisation of NOT, AND, OR, EX-OR gates with only NAND and only NOR gates.
3. Karnaugh Map Reduction and Logic Circuit Implementation.
4. Verification of DeMorgan's Law.
5. Implementation of Half-Adder and Half-Subtractor.
6. Implementation of Full-Adder and Full-Subtractor.
7. Four Bit Binary Adder
8. Four Bit Binary Subtractor using 1's and 2's Complement.

MICROPROCESSOR:

1. 8 Bit Addition and Subtraction.

2. 16 Bit Addition.
3. BCD Addition .
4. BCD Subtraction.
5. 8 Bit Multiplication.
6. BCD Multiplication.
7. 8 Bit Division.
8. Searching for an Element in an Array.
9. Sorting in Ascending and Descending Orders.
10. Finding Largest and Smallest Elements from an Array.
11. Reversing Array Elements.
12. Block Move.

Title of the Course/	Paper –V PROGRAMMING IN C++ AND DATA STRUCTURES		
Core	II Year & Third Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of programming in C++ and Data Structures		

Unit 1: Introduction to C++; Principles of Object Oriented Programming: - software evolution - basic concepts and benefits of OOP's - - application of OOP's - Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++; Pointers - Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - Inline Functions - Friend and Virtual Functions

Unit-2: Classes and Objects; Constructors and Destructors; and Operator Overloading and Type Conversions - Type of Constructors - Function overloading. Inheritance : Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance. Pointers, Virtual Functions and Polymorphism; Managing Console I/O operations.

Unit 3: Working with Files: Classes for File Stream Operations - Opening and Closing a File - End-of-File Deduction - File Pointers - Updating a File - Error Handling during File Operations -

Command-line Arguments. Data Structures: Definition of a Data structure - primitive and composite Data Types, Asymptotic notations, Arrays, Operations on Arrays, Order lists.

Unit-4: Stacks - Applications of Stack - Infix to Postfix Conversion, Recursion, Maze Problems - Queues - Operations on Queues, Queue Applications, Circular Queue. Singly Linked List - Operations, Application - Representation of a Polynomial, Polynomial Addition; Doubly Linked List - Operations, Applications

Unit-5 : Trees and Graphs: Binary Trees - Conversion of Forest to Binary Tree, Operations - Tree Traversals; Graph - Definition, Types of Graphs, Hashing Tables and Hashing Functions, Traversal - Shortest Path; Dijkstra's Algorithm.

1. Recommended Texts

i. E. Balagurusamy,1995,Object Oriented Programming with C++, Tata McGraw-Hill Publishing Company Ltd.
ii. E.Horowitz and S.Shani,1999,Fundamentals of Data Structures in C++ , Galgotia Pub.
iii. H.Schildt, C++,1998,The Complete Reference-1998-TMH Edition, 1998

2.Reference Books

i. Robert Lafore, Object Oriented Programming in Microsoft C++, Galgotia publication.
ii. R. Kruse C.L. Tondo and B. Leung ,1997, Data Structures and Program design in C, PHI.
iii. Cangsam,Auguenstein,Tenenbaum,Data Structures using C & C++,PHI
iv. D.Samantha,2005, Classic Data Structures, PHI,New Delhi.

Title of the Course/	Paper VI PRACTICAL – III DATA STRUCTURES USING C++		
Core	II Year & Third Semester	Credit: 4	
Objective of the course	This course deals with practical implementation of Data Structure using C++.		

1. Implement PUSH, POP operations of stack using Arrays.
2. Implement PUSH, POP operations of stack using Pointers.
3. Implement add, delete operations of a queue using Arrays.
4. Implement add, delete operations of a queue using Pointers.

5. Conversion of infix to postfix using stack operations

6. Postfix Expression Evaluation.

7. Addition of two polynomials using Arrays and Pointers.

8. Creation, insertion, and deletion in doubly linked list.

9. Binary tree traversals (in-order, pre-order, and post-order) using linked list.

10.Depth First Search and Breadth first Search for Graphs using Recursion.

Title of the Course/	Paper –VII - PROGRAMMING IN JAVA		
Core	II Year & Fourth Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of programming in JAVA		

Unit 1: Introduction to Java-Features of Java-Basic Concepts of Object Oriented Programming-Java Tokens-Java Statements-Constants-Variables-Data Types- Type Casting-Operators-Expressions-Control Statements: Branching and Looping Statements.

Unit-2: Classes, Objects and Methods-Constructors-Methods Overloading-Inheritance-Overriding Methods-Finalizer and Abstract Methods-Visibility Control –Arrays, Strings and Vectors-String Buffer Class-Wrapper Classes.

Unit 3: Interfaces-Packages-Creating Packages-Accessing a Package-Multithreaded Programming-Creating Threads-Stopping and Blocking a Thread-Life Cycle of a Thread-Using Thread Methods-Thread Priority-Synchronization-Implementing the Runnable Interface .

Unit-4: Managing Errors and Exceptions-Syntax of Exception Handling Code-Using Finally Statement-Throwing Our Own Exceptions-Applet Programming-Applet Life Cycle-Graphics Programming-Managing Input/Output Files: Concept of Streams-Stream Classes-Byte Stream Classes-Character Stream Classes – Using Streams-Using the File Class-Creation of Files-Random Access Files-Other Stream Classes.

Unit-5: : Network basics –socket programming – proxy servers – TCP/IP – Net Address – URL – Datagrams -Java Utility Classes-Introducing the AWT: Working with Windows, Graphics and Text- AWT Classes- Working with Frames-Working with Graphics-Working with Color-Working with Fonts-Using AWT Controls, Layout Managers and Menus.

1. Recommended Texts

i. E. Balagurusamy,2004,Programming with JAVA, 2nd Edition,Tata McGraw-Hill Publishing Co.Ltd.

ii. Herbert Schildt,2005,The Complete Reference Java™ 2, 5th Edition,Tata McGraw-Hill Publishing Co. Ltd.

iii. Y. Daniel Liang ,2003, An Introduction to JAVA Programming, Prentice-Hall of India Pvt. Ltd.

2. Reference Books

i. Cay S. Horstmann and Gary Cornell,2005, Core Java™2 Volume I-Fundamentals, 7th Edition- Pearson Education.

ii. Ken Arnold, James Gosling and David Holmes,2003, The Java™ Programming Language, 3rd Edition, Pearson Education.

iii. Deitel, Paul, and Harvey Deitel. *Java how to program*. Prentice Hall Press, 2011.

Title of the Course/	Paper -VIII PRACTICAL – IV: JAVA PROGRAMMING LAB		
Core	II Year & Fourth Semester	Credit: 4	
Objective of the course	This course gives the practical training in JAVA programming		

APPLICATIONS:

1. Substring Removal from a String. Use String Buffer Class.
2. Determining the Perimeter and Area of a Triangle. Use Stream Class.
3. Determining the Order of Numbers Generated randomly using Random Class.
4. Usage of Calendar Class and Manipulation.
5. Implementation of Point Class for Image Manipulation.
6. String Manipulation Using Char Array.

7. Database Creation for Storing E-mail Addresses and Manipulation.
8. Usage of Vector Classes.
9. Interfaces and Packages
10. Implementing Thread based Applications and Exception Handling.
11. Application using Synchronization such as Thread based, Class based and Synchronized Statements.
12. Textfiles (copy, display, counting characters, words and lines)
13. Data file creating and processing for electricity billing.
14. Data file creating and processing for telephone billing

APPLETS:

15. Working with Frames and Various Controls.
16. Working with Dialog Box and Menus.
17. Working with Colors and Fonts.
18. Drawing various shapes using Graphical statements.
19. Working with panel and all types of Layout.
20. Design a simple calculator with minimal of 10 operations
21. Usage of buttons, labels, text components in suitable application
22. Usage of Radio buttons, check box ,choice list in suitable application.

Title of the Course/	Paper –IX - OPERATING SYSTEMS		
Core	III Year & Fifth Semester	Credit: 4	
Objective of the course	This course introduces the functions of operating systems.		

Unit 1: Introduction: Views –Goals –Types of system – OS Structure –Components – Services - System Structures – Layered Approach -Virtual Machines - System Design and Implementation. Process Management: Process - Process Scheduling – Cooperating Process –Threads - Interprocess Communication. CPU Scheduling : CPU Schedulers – Scheduling criteria – Scheduling Algorithms

Unit-2:– Process Synchronization: Critical-Section problem - Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Critical Region – Monitors. Deadlock : Characterization – Methods for handling Deadlocks – Prevention, Avoidance, and Detection of Deadlock - Recovery from deadlock.

Unit 3: Memory Management : Address Binding – Dynamic Loading and Linking – Overlays – Logical and Physical Address Space - Contiguous Allocation – Internal & External Fragmentation . Non Contiguous Allocation:Paging and Segmentation schemes –Implementation – Hardware Protection – Sharing - Fragmentation.

Unit-4: Virtual Memory **:** Demand Paging – Page Replacement - Page Replacement Algorithms – Thrashing. – File System: Concepts – Access methods – Directory Structure –Protection Consistency Semantics – File System Structures – Allocation methods – Free Space Management-File System –implementation – examples – case study UNIX, Linux, windows 2000

Unit-5 : I/O Systems: Overview - I/O Hardware – Application I/O Interface – Kernel I/O subsystem – Transforming I/O Requests to Hardware Operations – Performance. Secondary Storage Structures : Protection – Goals- Domain Access matrix – The security problem – Authentication – Threats – Threat Monitoring – Encryption..

1. **Recommended Texts**

i. Silberschatz A., Galvin P.B., Gange,. 2002 , Operating System Principles ,Sixth Edition, John Wiley & Sons.

ii. A.S. Godbole – Operating Systems – Tata McGraw Hill – 1999.

iii. H.M. Deitel ,1990, An Introduction to Operating System,- Second Edition,Addison Wesley.

Reference book

i. Stallings, William. Operating Systems: Internals and Design Principles| Edition: 8. Pearson, 2014.

ii. Dhamdhere, Dhananjay M. Operating Systems: A Concept-based Approach, 2E. Tata McGraw-Hill Education, 2006.

iii. Tanenbaum, Andrew S., and Herbert Bos. Modern operating systems. Prentice Hall Press, 2014.

Title of the Course/	Paper - X - DATABASE MANAGEMENT SYSTEMS		
Core	III Year & Fifth Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of database management systems		

Unit 1: Advantages and Components of a Database Management Systems – Feasibility Study – Class Diagrams – Data Types – Events – Normal Forms – Integrity – Converting Class Diagrams to Normalized Tables – Data Dictionary- DBMS Models-The Hierarchical model-Network model-Relational model.

Unit-2: Query Basics – Computation Using Queries – Subtotals and GROUP BY Command – Queries with Multiple Tables – Subqueries – Joins – DDL & DML – Testing Queries

Unit 3: Effective Design of Forms and Reports – Form Layout – Creating Forms – Graphical Objects – Reports – Procedural Languages – Data on Forms – Programs to Retrieve and Save Data – Error Handling.

Unit-4: Power of Application Structure – User Interface Features – Transaction – Forms Events – Custom Reports – Distributing Application – Table Operations – Data Storage Methods – Storing Data Columns – Data Clustering and Partitioning.

Unit-5 : Database Administration – Development Stages – Application Types – Backup and Recovery – Security and Privacy – Distributed Databases – Client/Server Databases – Web as a Client/Server System – Objects – Object Oriented Databases – Integrated Applications.

Recommended Texts

i. G. V. Post – Database Management Systems Designing and Building Business Application – McGraw Hill International edition – 1999.

ii. Raghu Ramakrishnan – Database Management Systems – WCB/McGraw Hill – 1998.

iii. C.J. Date – An Introduction to Database Systems – 7th Edition – Addison Wesley - 2000

Reference Books

i. Abraham silberschatz,H.FKorth And S.Sudarshan- Database System Concepts McGraw HillPublication.

Ii Ullman, Jeffrey D. *Principles of database systems*. Galgotia publications, 1984.
Abiteboul, Serge, Richard Hull, and Victor Vianu. *Foundations of databases: the logical level*. Addison-Wesley Longman Publishing Co., Inc., 1995.

Title of the Course/	Paper - XI - Computer Architecture and Organization		
Core	III Year & Fifth Semester	Credit: 4	
Objective of the course	This course introduces the architecture of various computers and its organization.		

Unit 1: Computer Evolution: Pentium and Power PC Evolution. Computer System: Components – Function – Interconnection Structures – Bus Interconnection – Basics of PCI Bus. Memory: Characteristics – Hierarchy – Cache Memory – Principles – Cache Design – Locality of Reference.

Unit-2: Main Memory: Static RAM – Dynamic RAM – Types of ROM – Memory Chip Organization – Types of DRAM. External Memory: Magnetic Disk – Basics of RAID – Optical Memory – Magnetic Tapes

Unit 3: **:** Input/Output: External Devices – I/O Module – Programmed I/O – Interrupt Driven I/O – DMA – I/O Channels & Processors. Computer Arithmetic: ALU – Integer Representation and Arithmetic – Floating Point Representation and Arithmetic. Instruction Set: Characteristics – Operand Types – Operation Types – Addressing Modes – Instruction Formats – Pentium and Power PC Operands, Operations, Addressing Modes (Simple Examples).

Unit-4: CPU: Organization of Processors and Registers – Instruction Cycle – Instruction Pipelining – Pentium Processor. RISC: Characteristics – Large Register File – Register Optimization – Architecture – RISC Vs CISC Characteristics – Pipelining.

Unit-5: Control Unit: Micro-Operations – Control of Processors – Hardwired Implementation - Micro Programmed Control Concepts – Microinstruction Sequencing – General Microinstruction Execution.

Recommended Texts

i. W. Stallings ,2003,Computer Organization and Architecture, 6th Edition- PHI,New Delhi.
ii. C. Hamacher, Z. Vranesic, S.Zaky, 2002, Computer Organization,5th Edition,Mcgraw Hill.
iii. M. Morris Mano, Computer System Architecture, Prentice Hall of India, III Edition

Reference Books

i.Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India, IV Edition
ii. Computer Architecture: A Quantitative Approach, David Patterson and John L. Hennessy
iii Advanced Computer Architecture ,Kai Hwang, TMH

Title of the Course/	Paper -XII - PRACTICAL – V: RDBMS LAB		
Core	III Year & Fifth Semester	Credit: 4	
Objective of the course	This course train the students to implement the database applications		

i. Payroll
ii. Mark sheet Processing
iii. Savings bank account for banking
iv. Inventory System
v. Invoice system
vi. Library information system
vii. Student information system
viii. Income tax processing system
ix. Electricity bill preparation system
x. Telephone directory maintenance.

ELECTIVE – I

Title of the Course/ Paper	VISUAL PROGRAMMING		
Elective	III Year & Fifth Semester	Credit: 5	
Objective of the course	To inculcate knowledge on Visual Basic concepts and Programming.		

Unit 1: Customizing a Form - Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers.

Unit-2: Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures.

Unit 3: Lists - Arrays - Sorting and Searching - Records - Control Arrays - Combo Boxes - Grid Control - Projects with Multiple forms - DoEvents and Sub Main - Error Trapping.

Unit-4: VB Objects - Dialog Boxes - Common Controls - Menus - MDI Forms - Testing, Debugging and Optimization - Working with Graphics.

Unit-5 : Monitoring Mouse activity - File Handling - File System Controls - File System Objects - COM/OLE - automation - DLL Servers - OLE Drag and Drop.

Recommended Texts

i. Gary Cornell - Visual Basic 6 from the Ground up - Tata McGraw Hill - 1999.

ii. Noel Jerke - Visual Basic 6 (The Complete Reference) - Tata McGraw Hill – 1999

iii. Steven, Holzner. "Visual Basic 6.0 Programming Black Book." (2007).

ELECTIVE I

Title of the Course/ Paper	RDBMS AND ORACLE	
Elective	III Year & Fifth Semester	Credit: 5
Objective of the course	To inculcate knowledge on RDBMS concepts and Programming with Oracle.	

Unit 1: Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams - Denormalization – Another Example of Normalization.

Unit-2: Oracle9*i*: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Errors & Help – Alternate Text Editors - SQL *Plus Worksheet - *i*SQL *Plus.\Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.

Unit 3: Working with Table: Data Management and Retrieval: DML – adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records – retrieving Data from Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions –Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations.

Unit-4: PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQ L in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

Unit-5 : PL/SQL Composite Data Types: Records – Tables – Varrays. Named Blocks: Procedures – Functions – Packages –Triggers –Data Dictionary Views.

Recommended Texts

1. DATABASE SYSTEMS USING ORACLE – Nilesh Shah, 2nd edition, PHI.
2. DATABASE MANAGEMNET SYSTEMS – Arun Majumdar & Pritimoy Bhattacharya, 2007, TMH
3. DATABASE MANAGEMENT SYSTEMS – Gerald V. Post, 3rd edition, TMH.

Reference Books

1. Feuerstein, Steven, and Bill Pribyl. *Oracle Pl/SQL Programming*. " O'Reilly Media, Inc.", 2005.
2. Sumathi, Sai, and S. Esakkirajan. *Fundamentals of relational database management systems*. Vol. 47. Springer, 2007.

ELECTIVE I

Title of the Course/ Paper	UNIX PROGRAMMING		
Elective	III Year & Fifth Semester	Credit: 5	
Objective of the course	This course introduces fundamentals & programming of Unix basic concepts		

Unit 1: INTRODUCTION: File and common commands - Shell - More about files - Directories- Unix system - Basics of file Directories and filenames - Permissions - modes - Directory hierarchy - Devices - the grep family - Other filters - the stream editor sed - the awk pattern scanning and processing language - files and good filters.

Unit-2: CONCEPTS OF SHELL: Command line structure - Metacharacters - Creating new commands - Command arguments and parameters - program output as arguments - Shell variables - More on I/O redirection - loop in shell programs - Bundle - Setting shell attributes, Shift command line parameters - Exiting a command or the shell, evaluating arguments - Executing command without invoking a new process - Trapping exit codes -- Conditional expressions.

Unit 3: SHELL PROGRAMMING: Customizing the cal command, Functions of command, While and Until loops - Traps - Catching interrupts - Replacing a file - Overwrite - Zap - Pick command - News command - Get and Put tracking file changes.

Unit-4: FEATURES IN UNIX: Standard input and output - Program arguments - file access - A screen at a time printer - On bugs and debugging - Examples - Zap - pick - Interactive file comparison program - Accessing the environment - Unix system calls - Low level I/O, File system Directories and modes, Processors, Signal and Interrupts.

Unit-5 : PROGRAM DEVELOPMENT AND DOCUMENT PREPARATION:
Program development - Four function calculator - Variables and error recovery - Arbitrary variable names, Built in functions, Compilation into a machine, Control flow and relational operators, Functions and procedures - Performance evaluation - Ms macro package - Troff level - Tbl and eqn preprocessors - Manual page - Other document preparation

Recommended Texts

1. Brian W. Kernighan, Rob Pike - The UNIX Programming Environment - Prentice Hall of India(1984).
2. I. Steven Earhart - The UNIX System for MSDOS Users - Galgotia book source P. Ltd. (1990).
3. Stefen Prata - Advanced UNIX - A Programmer Guide.

Reference Book:

1. Raymond, Eric S. *The art of Unix programming*. Addison-Wesley Professional, 2003.
2. Kochan, Stephen G., and Patrick Wood. *UNIX shell programming*. Sams Publishing, 2003.
3. Arthur, Lowell Jay. *UNIX shell programming*. John Wiley & Sons, Inc., 1986.

Title of the Course/	Paper-XIII DATA COMMUNICATION AND NETWORKING		
Core	III Year & Sixth Semester	Credit: 4	
Objective of the course	This course introduces the details about basic concepts of data communication and networking.		

Unit 1: Introduction to Data Communication, Network, Protocols & standards and standards organizations - Line Configuration - Topology - Transmission mode - Classification of Network - OSI Model - Layers of OSI Model.

Unit-2: Signals: Analog and Digital – Aperiodic – periodic Signals - Parallel and Serial Transmission - DTE/DCE/such as EIA-449, EIA-530, EIA-202 and x.21 interface - Interface standards - Modems - Guided Media - Unguided Media - Performance - Types of Error - Error Detection - Error Corrections

Unit 3: **:** Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone system - Project 802 - Ethernet - Token Bus - Token Ring - FDDI - IEEE 802.6 - SMDS - Circuit Switching - Packet Switching - Message switching - Connection Oriented and Connectionless services.

Unit-4: History of Analog and Digital Network - Access to ISDN - ISDN Layers - Broadband ISDN - X.25 Layers - Packet Layer Protocol - ATM - ATM Topology - ATM Protocol.

Unit-5 : Repeaters - Bridges - Routers - Gateway - Routing algorithms - TCP/IP Network, Transport and Application Layers of TCP/IP - World Wide Web.

Recommended Texts

i.Behrouz and Forouzan,2001,Introduction to Data Communication and Networking, 2nd Edition,TMH.

ii.Jean Walrand 1998,Communication Networks,Second Edition, WCB/McGraw Hill.

iii.Tanenbaum, Andrew S. *Structured computer organization*. Pearson, 2006.

Reference Books

i. Moussavi, Massoud. *Data Communication and Networking: A Practical Approach*. Cengage Learning, 2011.
ii. Tomasi, Wayne. *Introduction to Data communications and Networking*. Prentice-Hall, Inc., 2004.
iii. Stallings, William. *Data and computer communications*. Pearson/Prentice Hall, 2007.

Title of the Course/	Paper –XIV WEB TECHNOLOGY		
Core	III Year & Sixth Semester	Credit: 4	
Objective of the course	This course introduces the concepts of ASP, VB Script , Java Script.		

Unit 1: Introduction to` VBScript - Adding VBScript Code to an HTML Page - VB Script Basics - VBScript Data Types - VBScript Variables - VBScript Constants - VBScript Operators – mathematical- comparison-logical - Using Conditional Statements - Looping Through Code - VBScript Procedures – type casting variables - math functions –date functions – string functions – other functions - VBScript Coding Conventions - Dictionary Object in VBScript - Err Object

Unit-2: Introduction to Javascript – Advantages of Javascript – Javascript syntax - Data type – Variable - Array – Operator & Expression – Looping – control structures - Constructor Function – user defined function Dialog Box .

Unit 3: Javascript document object model – Introduction – Object in HTML – Event Handling – Window object – Document object – Browser object – Form object – Navigator object – Screen object – Build in object – User defined object – Cookies.

Unit-4: ASP.NET Language Structure – Page Structure – Page event , Properties & Compiler Directives . HTML server controls – Anchor, Tables, Forms, Files . Basic Web server Controls – Lable, Text box, Button, Image Links, Check & radio Button, Hyperlink, Data List Web Server Controls – Check box list. Radio button list, Drop down list, List box, Data grid, Repeater.

Unit-5: Request and Response Objects, Cookies, Working with Data – OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced issues – email, Application issues, working with IIS and page Directives, error handling. Security – Authentication, IP Address, Secure by SSL & Client Certificates

Recommended Texts

i.I.Bayross, 2000, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI, BPB Publications.

ii. A.Russell Jones, Mastering Active Server Pages 3, BPB Publications.

iii. Hathleen Kalata, Internet Programming with VBScript and JavaScript, Thomson Learning

T.A. Powell, 2002,Complete Reference HTML , TMH.

Reference Books

i. Hathleen Kalata, Internet Programming with VBScript and JavaScript, Thomson Learning

Mike McGrath, XML Harness the Power of XML in easy steps, Dreamtech Publications

ii. T.A. Powell, 2002,Complete Reference HTML , TMH.

iii. J.Jaworski, 1999, Mastering Javascript, BPB Publications.

i. Powell, Thomas; Schneider, Fritz, JavaScript: The Complete Reference, 2nd edition 2004, TMH

Title of the Course	Paper - XV PRACTICAL – VI -WEB APPLICATIONS LAB		
Core	III Year & Sixth Semester	Credit: 5	
Objective of the course	This course gives training in web design and applications.		

VB SCRIPT & JAVASCRIPT

1. Write a program outputs the squares, roots, cubes and complements of integers between 1 and 100.

2.Create a calculator.

3. Write a script to Sort numbers and strings

4. Create a program to generate a hit counter

5. Create a program to verify whether email address provided by user is valid or invalid.

6. Write a program to scroll the text on status bar.

7. The form consists of two multiple choice list and one single choice list

a. the first multiple choice list display the major dishes available.

b. the second Multiple choice list display the stocks available.

c. The single choice list display the miscellaneous (Milkshakes, soft drinks, softy available etc.)

8. Write a sript to create a digital clock.
9. Create a web page using two image file which switch black and white one another as the mouse pointer moves over the image. Use the On Mouse over and On Mouse event, onDblclick handler
10. Build a WWW page with an image and 3 buttons., Pick three favorite graphics, Label the buttons and make each one swap in the graphic you have chosen
11. Create a frameset that has two frames, side by side.
    1. Make the left-hand frame contain a form with 3 radio buttons
    2. The buttons should be for three search engines:
        a. Yahoo (http://www.yahoo.com)
        b. Altavista (http://www.altavista.com)
        c. Infoseek (http://www.infoseek.com)

3.When the user clicks on of the option buttons, the frame on the right hand side should be loaded with the right search engine.

12.Write a program to implement Employee database with all validation

ASP

1.Create a login form, to expire, if the user does not type the password within 100 seconds
2.Create an employee database and manipulate the records using command object in ASP
3. Develop an application to illustrate the usage of Request and Response Objects in ASP.
4. Write an ASP program using Request Object to give the exact list of headers sent by the browser to the Web server.
5. Create an Active Server Page to display the records one by one from a student database. The student database should contain roll no, name, marks & total.
7. Design an ASP application that describes books in the Online Bookshop.(Use AD Rotator Component, Content Rotator Component, Content Linking Component)
8. Create a document and add a link to it. When the user moves the mouse over the link it should load the linked document on its own (User is not required to click on the link).
9. Create a document, which opens a new window without a toolbar, address bar, or a status bar

that unloads itself after one minute.

10. Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.

ELECTIVE II

Title of the Course/ Paper	DATA MINING		
Elective	III Year & Sixth Semester	Credit: 5	
Objective of the course	This course introduces the fundamental concepts of Data Mining.		

Unit-1: Introduction: Data mining – Functionalities – Classification –Introduction to Data Warehousing – Data Preprocessing : Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data reduction

Unit-2: Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architectures of Data mining Systems. Concept Description,Characterization and Comparison: Concept Description, Data Generalization and summarization, Mining Class Comparison

Unit-3: Mining Association Rules: Basics Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.

Unit-4: Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification.Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy.

Unit-5: Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods Density Based Methods – GRID Based Method – Model based Clustering Method- Web mining- introduction- web content mining – web structure mining-web usage mining.

RECOMMENDED TEXT

i. J.Han and M. Kamber,2001,Data Mining Concepts and Techniques,Harcourt India Pvt. Ltd – New Delhi.

ii. M.H.Dunham,2003,Datamining: Introductory and Advanced topics, Pearson Education,Delhi.

iii Paulraj Ponnaiah,2001,Data warehousing fundamentals,Wiley publishers.

REFERENCE BOOKS

i. K.P. Soman , Shyam Diwakar, V.Ajay ,2006, Insight into Data Mining Theory and Practice, Prentice Hall of India Pvt. Ltd – New Delhi.

ii. Hand, David J., Heikki Mannila, and Padhraic Smyth. *Principles of data mining*. MIT press, 2001.

WEBSITE, E-LEARNING RESOURCES

i http:// www.academicpress.com ii. http://www.mkp.com

Title of the Course/ Paper	SOFTWARE TESTING		
Elective	III Year & Sixth Semester	Credit: 5	
Objective of the course	This course introduces the basic concepts of software testing		

Unit 1: Introduction: Purpose – Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.

Unit-2: Flow/Graphs and Path Testing – Achievable paths – Path instrumentation – Application – Transaction Flow Testing Techniques

Unit 3: Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing .

Unit-4: Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases .

Unit-5 : Logic Based Testing – Decision Tables – Transition Testing – States, State Graph, State Testing.

Recommended Texts

1. B. Beizer , 2003, Software Testing Techniques, II Edn., DreamTech India, New Delhi.

2. K.V.KK. Prasad , 2005, Software Testing Tools, DreamTech. India, New Delhi.

3. R.Rajani, and P.P.Oak, 2004, Software Testing, Tata Mcgraw Hill, New Delhi

Reference Books

1. I. Burnstein, 2003, Practical Software Testing, Springer International Edn.

2. E. Kit, 1995, Software Testing in the Real World: Improving the Process, Pearson Education, Delhi.

3. Mathur, Aditya P. "Foundations of software testing." *Copymat Services* (2006).

ELECTIVE II

Title of the Course/ Paper	OBJECT ORIENTED ANALYSIS AND DESIGN		
Elective	III Year & Sixth Semester	Credit: 5	
Objective of the course	This course introduces to UML, object oriented analysis and design of any application		

Unit 1: System Development - Object Basics - Development Life Cycle - Methodologies - Patterns - Frameworks - Unified Approach - UML.

Unit-2: Use-Case Models - Object Analysis - Object relations - Attributes - Methods - Class and Object responsibilities - Case Studies.

Unit 3: Design Processes - Design Axioms - Class Design - Object Storage - Object Interoperability - Case Studies.

Unit-4: User Interface Design - View layer Classes - Micro-Level Processes - View Layer Interface - Case Studies.

Unit-5 : Quality Assurance Tests - Testing Strategies - Object orientation on testing - Test Cases - test Plans - Continuous testing - Debugging Principles - System Usability - Measuring User Satisfaction - Case Studies.

Recommended Texts

1. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition - 1999.
2. Grady Booch- Object Oriented Analysis and design –Addison Wesley.

3.Mala, D. Jeya. *Object Oriented Analysis and Design Using UML*. Tata McGraw-Hill Education, 2013.

Reference Book:

1. Ramnath, Sarnath, and Brahma Dathan. *Object-oriented analysis and design*. Springer Science & Business Media, 2010.
2. Kahate, Atul. *Object Oriented Analysis & Design*. Tata McGraw-Hill Education, 2004.

ELECTIVE III

Title of the Course/ Paper	CLIENT / SERVER COMPUTING		
Elective	III Year & Sixth Semester	Credit: 5	
Objective of the course	This Subject deals with the C/S Computing, GUI.		

Unit 1: Introduction to Client/Server Computing – What is Client/Server Computing – Benefits of Client/Server Computing – Evolution of C/S Computing – Hardware Trends – Software Trends- Evolution of Operating Systems – N/w Trends – Business Considerations.

Unit-2: Overview of C/S Applications: Components of C/S Applications – Classes of C/S Applications – Categories of C/S Applications . Understanding C/S Computing : Dispelling the Myths – Obstacies – Upfront & Hidden – Open Systems & Standards – Standards – Setting Organizations – Factors of Success.

Unit 3: The Client Hardware & Software : Client Component – Client Operating Systems – What is GUI – Database Access – Client Software Products : GUI Environments – Converting 3270/5250 Screens – Database Tools – Client Requirements : GUI Design Standards – Open GUI Standards – Interface Independence – Testing Interfaces .

Unit-4: The Server : Categories of Servers – Features of Server Machines – Classes of Server Machines – Server Environment : N/W Management Environment – N/W Computing Environment – Extensions – Network Operating System – Loadable Module.

Unit-5 : Server Operating System : OS/2 2.0 – Windows New Technology – Unix Based OS – Server Requirements : Platform Independence – Transaction Processing – Connectivity – Intelligent Database – Stored Procedure – Triggers – Load Leveling – Optimizer – Testing and Diagnostic Tools – Backup & Recovery Mechanisms.

1. Recommended Texts

1.Patrick Smith & Steave Guengerich, "Client/Server Computing". PHI

2. Dawna Travis Devire, "Client/Server Computing". TMH

Reference Book:

1.Elbert, Bruce R. Client/server computing: architecture, applications, and distributed systems management. Artech House Publishers, 1994.
2.Smith, Patrick. Client/server computing. Sams, 1994.
3.Subhash, Chandra Yadav. Introduction To Client Sever Computing. New Age International, 2009.

ELECTIVE III

Title of the Course/ Paper	COMPUTER GRAPHICS		
Elective	III Year & Sixth Semester	Credit: 5	
Objective of the course	This course introduces the fundamental concepts of Graphics.		

Unit 1: INTRODUCTION TO COMPUTER GRAPHICS : Brief Survey of Computer Graphics – Graphics Systems: Video Display Devices – Types – Raster-Scan Systems and Random-Scan Systems – Input Devices – Hard-Copy Devices – Graphics Software.

Unit-2: OUTPUT PRIMITIVES AND THEIR ATTRIBUTES Line-Drawing (DDA and Bresenham's) Algorithms – Circle-Generating (Midpoint) Algorithm – Ellipse-Generating (Midpoint) Algorithms- Area-Filling (Boundary-Fill and Flood-Fill) Algorithms - Line Attributes - Color and Grayscale Levels – Character Attributes – Inquiry Functions.

Unit 3: TWO-DIMENSIONAL TRANSFORMATIONS AND VIEWING : Basic Transformations - Matrix Representations and Homogeneous Coordinates – Composite Transformations - Other Transformations – Window-to- Viewport Coordinate Transformation – Clipping Algorithms: Cohen-Sutherland Line Clipping and Sutherland- Hodgeman Polygon Clipping – Basic Modeling Concepts - Interactive Input Methods: Logical Classification of Input Devices – Interactive Picture-Construction Techniques.

Unit-4: THREE-DIMENSIONAL CONCEPTS: Three-Dimensional Display Methods: Parallel and Perspective Projections – Depth Cueing - Visible Line and Surface Identification – Polygon Surfaces: Polygon Tables, Plane Equations and Polygon Meshes - Three-Dimensional Transformations: Basic, Other and Composite Transformations.

Unit-5 : THREE-DIMENSIONAL VIEWING : Viewing Pipeline and Coordinates – Transformation from World to Viewing Coordinates – Projection Transformations - Matrices - View Volumes -Hidden Surface and Hidden Line Elimination Methods: Back-Face Detection ,

Depth-Buffer and A-Buffer Methods –Wireframe Methods- Light Sources – RGB,CMY and HLS Color Models – Computer Animation: Design of its Sequences and Languages- Key Frame systems – General animation functions - morphing.

1. Recommended Texts

i. D. Hearn and M.P. Baker,2005,Computer Graphics, 2nd Edition, Pearson Education, Prentice Hall, 19th Reprint.

ii. W.M. Newman and R.F. Sproull ,1997, Principles of Interactive Computer Graphics, 2nD Edition,Tata McGraw-Hill Publishing Co. Ltd.

iii D.P. Mukherjee ,1999,Fundamentals of Computer Graphics and Multimedia , 1st Edition,Prentice-Hall of India Pvt. Ltd.

2.Reference Books

i. S. Harrington,1987, Computer Graphics , 2nd Edition , McGraw-Hill Book Co.

ii. N. Krishnamurthy ,2002, Introduction to Computer Graphics, 1st Edition, Tat McGraw-Hill Publishing Co. Ltd.

iii D.F.Rogers ,2001,Procedural Elements for Computer Graphics, 2nd Edition, Tata McGrawHill Publishing Co. Ltd.

iv. Z. Xiang and R.A. Plastock,2002, Computer Graphics, Schaum's Outline Series, Tata McGraw-Hill Publishing Co.

ELECTIVE III

Title of the Course/ Paper	SOFTWARE ENGINEERING		
Core	III Year & Sixth Semester	Credit: 5	
Objective of the course	This course introduces the details about the concepts of life cycle of software		

Unit 1: Introduction to Software Engineering Some definition – Some size factors – Quality and productivity factors – Managerial issue. Planning a Software Project: Defining the problem – Developing a solution strategy – planning the development process – planning an organization structure – other planning activities.

Unit-2: Software Cost Estimation: Software – Cost factors – Software cost estimation techniques – specification techniques – level estimation – estimating software maintenance costs. The software requirements specification – formal specification techniques - languages and processors for requirements specification.

Unit 3: Software Design: Fundamental Design concepts – Modules and modularizing Criteria – Design Notations – Design Techniques – Detailed Design Consideration – Real time and distributed system design – Test plan – Mile stones walk through and inspection.

Unit-4: Implementation issues : Structured Coding techniques – coding style – standards and guidelines – documentation guidelines – type checking – scooping rules – concurrency mechanisms.

Unit-5 : Quality assurance – walk through and inspection - Static analysis – symbolic exception – Unit testing and Debugging – System testing – Formal verification: Enhancing maintainability during development – Managerial aspects of software maintenance – Configuration management – source code metrics – other maintenance tools and techniques.

1. Recommended Texts

i. Richard E.Fairly - Software Engineering Concepts - Tata McGraw-Hill book Company.

ii. Rajib Mall ,2004,Fundamentals of Software Engineering,2nd Edition, PHI.

iii. R.S.Pressman, 1997, Software Engineering – 1997 - Fourth Ed., McGraw Hill.

2. Reference Books

i Kotonya, Gerald, and Ian Sommerville. *Requirements engineering: processes and techniques*. Wiley Publishing, 1998.

iii. Leach, Ronald J. *Introduction to software engineering*. CRC Press, 2016.

B.Sc. DEGREE COURSE IN COMPUTER SCIENCE

CHANGES IN THE SYLLABUS

I Year & Second Semester
Title of the Course/ Paper : Digital Electronics & Microprocessors

Mc-Clausky tabulation Methods - K-Map upto 5 Variables

II Year & Third Semester
Title of the Course/ Paper : Programming In C++ And Data Structure

Introduction to C++: Principles of Object Oriented Programming: - software evolution - basic concepts and benefits of OOP's - application of OOP's

III Year & Fifth Semester
Title of the Course/ Paper: Operating Systems

File System –implementation – examples – case study UNIX, Linux, windows 2000

III Year & Fifth Semester
Title of the Course/ Paper: Database Management Systems

DBMS Models-The Hierarchical model-Network model-Relational model

III Year & Sixth Semester
Title of the Course/ Paper : Data Communication And Networking

Signals: Analog and Digital – Aperiodic – periodic Signals

ELECTIVE II

III Year & Sixth Semester
Title of the Course/ Paper: DATA MINING

Web mining- introduction- web content mining – web structure mining-web usage mining.

ELECTIVE III

III Year & Sixth Semester
Title of the Course/ Paper: COMPUTER GRAPHICS

Key Frame systems – General animation functions - morphing.