1) **Title of the Course : B. Sc. Computer Science**

F.Y.B.Sc. Computer Science Syllabus
(To be implemented from Academic Year 2013-14)

2) Preamble:
B. Sc. Computer Science is a systematically designed three year course that prepares the student for a career in Software Industry. The syllabus of computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) forms the required basics for pursuing higher studies in Computer Science. The Syllabus also develops requisite professional skills and problem solving abilities for pursuing a career in Software Industry.

3) Introduction:
At **first year of under-graduation** basic foundation of two important skills required for software development is laid. A course in programming and a course in database fundamentals forms the preliminary skill set for solving computational problems. Simultaneously two practical courses are designed to supplement the theoretical training. The second practical course also includes a preliminary preparation for website designing in the form of HTML programming.
Alongwith Computer Science two theory and one practical course each in Statistics, Mathematics and Electronics help in building a strong foundation.
At **second year under-graduation**: The programming skills are further strengthened by a course in Data structures and Object oriented programming. The advanced topics in Databases and preliminary software engineering form the second course. Two practical courses alongside help in hands-on training. Students also undertake a mini project using software engineering principles to solve a real world problem.
Simultaneously two theory and one practical course each in Mathematics and Electronics help in strengthening problem solving abilities.
At **third year under-graduation:** Six theory papers in each semester and practical courses cover the entire spectrum of topics necessary to build knowledge base and requisite skill set. Third practical course also includes project work which gives students hands on experience in solving a real world problem.
Objectives:
- To develop problem solving abilities using a computer
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To imbibe quality software development practices. To create awareness about process and product standards
- To train students in professional skills related to Software Industry.
- To prepare necessary knowledge base for research and development in Computer Science
- To help students build-up a successful career in Computer Science

4) Eligibility:
Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune.Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:
First Year B. Sc. Computer Science
Subject : Computer Science

Pattern of Examination: Annual

Theory courses	(CS-101): Annual	(CS-102): Annual
Practical Course	(CS-103): Annual	(CS-104): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of **20**	External marks out of **80**	Total marks out of **100**
Computer Science Paper I (CS-101)	Problem Solving Using Computers and 'C' Programming	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Paper II CS-102)	File Organization and Fundamental of Databases	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Practical Paper I (CS-103)	Computer Science Practical Paper I	25 Practical slots of 4 lectures each	08	32	40 *
Computer Science Practical Paper II (CS-104)	Computer Science Practical Paper II	25 Practical slots of 4 lectures each	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:
1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practical)+ Grade(practical) = 300 marks +Grade
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on continuous assessment of lab work.
4. In case of Computer Science Practical Paper II, marks out of 100 will be converted to grades

Marks	Grade
75 and above	O

65 and above	A
55 and above	B
50 and above	C
45 and above	D
40 and above	E
Below 40 (indicates Failure)	F

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3 ,4 and 5	4 out of 5/6– short answer type questions; answerable in 8 – 10 lines ; mix of theory and problems

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain).There shall be 20 questions.
Practical: Continuous assessment of Lab work and mini project.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 3 hours duration for each practical course. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Computer Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-211:Data Structures using 'C'	CS-221:Object Oriented Concepts using C++
2	Computer Science Paper II	CS-212: Relational Database Management System	CS-222:Software Engineering
3	Computer Science Paper III	CS-223:Data structures Practicals and C++ Practicals	
4	Computer Science Paper IV	CS-224:Database Practicals & Mini Project using Software Engineering techniques	

5	Mathematics Paper I	MT-211:Mathematics Paper I-Sem I	MT-221:Mathematics Paper I-Sem II
6	Mathematics Paper II	MT-212:Mathematics Paper II-Sem I	MT-222:Mathematics Paper II-Sem II
7	Mathematics Paper III	MT-223:Practical Course in Mathematics	
8	Electronics Paper I	EL-211:Electronics Paper I-Sem I	EL-221:Electronics Paper I-Sem II
9	Electronics Paper II	EL-212:Electronics Paper II-Sem I	EL-222:Electronics Paper II-Sem II
10	Electronics Paper III	EL-223:Practical Course in Electronics	
11	English	EN-211:Technical English-Sem I	EN-221:Technical English – Sem II

Pattern of examination: Semester

Theory courses   (Sem I: CS-211 and CS212): Semester
(Sem II: CS-221 and CS-222): Semester
Practical Course   (CS-223 and CS-224): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
Theory Paper I (CS- 211)	Data Structures using 'C'	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (CS 212)	Relational Database Management System	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper I (CS 221)	Object Oriented Concepts using C++	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (CS 222)	Software Engineering	Four lectures/Week (Total 48 per	04	16	20 *

		Semester)			
Practical paper I (CS 223) (First & Second Semester)	Data structures Practicals and C++ Practicals	Practicals of 4 lectures each 25 practicals / year)	08	32	40 **
Practical paper II (CS 223) (First & Second Semester)	Database Practicals & Mini Project using Software Engineering techniques	Practicals of 4 lectures each 25 practicals / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:
1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals)+Grade(practical) = 300 marks+Grade
3. Internal marks for theory papers given on the basis of Continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 questions, each of 1 marks	10 marks
Question 2 3	Sub-questions carrying 5 marks (2 out of 3)	10 marks each
Question 4	Sub-questions carrying marks depending on their complexity with options	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: Continuous assessment of practical performance

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. Electronic Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-331:System Programming	CS-341:Operating System
2	Computer Science Paper II	CS-332:Theoretical Computer Science	CS-342:Compiler Construction
3	Computer Science Paper III	CS-333:Computer Networks-I	CS-343:Computer Networks-II
4	Computer Science Paper IV	CS-334: Internet Programming- I	CS-344:Internet Programming- II
5	Computer Science Paper V	CS-335:Programming in Java-I	CS-345:Programming in Java-II
6	Computer Science Paper VI	CS-336:Object Oriented Software Engineering	CS-346:Computer Graphics
7	Computer Science Paper VII	CS-347:Practicals Based on CS-331 and CS341 – Sem I & Sem II	
8	Computer Science Paper VIII	CS-348:Practicals Based on CS-335 and CS-344 – Sem I & Sem II and Computer Graphics using Java	
9	Computer Science Paper IX	CS-349:Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	

Subject : Computer Science

Pattern of examination: Semester
Theory courses:
    (Sem III: CS-331-CS-336): Semester   (Sem IV: CS-341-CS-346): Semester
Practical Course:
    (CS-347-CS-349): Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
CS-331	System Programming	48	4	16	20*

CS-332	Theoretical Computer Science	48	4	16	20*
CS-333	Computer Networks-I	48	4	16	20*
CS-334	Internet Programming- I	48	4	16	20*
CS-335	Programming in Java-I	48	4	16	20*
CS-336	Object Oriented Software Engineering	48	4	16	20*
SEM IV					
CS-341	Operating System	48	4	16	20*
CS-342	Compiler Construction	48	4	16	20*
CS-343	Computer Networks-II	48	4	16	20*
CS-344	Internet Programming- I	48	4	16	20*
CS-345	Programming in Java-I	48	4	16	20*
CS-346	Computer Graphics	48	4	16	20*
Practical Papers					
CS 347 (Semester III & IV)	Practicals Based on CS-331 and CS-341 – Sem I & Sem II	25 practicals/ year	08	32	40 **
CS 348 (Semester III & IV)	CS-348:Practicals Based on CS-335 and Cs-344 – Sem I & Sem II and Computer Graphics using Java	25 practicals/ year	08	32	40 **

CS 349 (Semester III & IV)	CS-349:Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	25 practicals/ year	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50
** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100
Notes:
1. Total marks: Theory for each semester (50 × 6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers given on the basis of continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 questions, each of 1 marks	10 marks
Question 2 and 3	Sub-questions carrying 5 marks (2 out of 3)	10 marks each
Question 4	Sub-questions carrying marks depending on their complexity with options	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.
Practicals: one internal assessment test + practical journals + attendance + activity.

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:
i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester.

(Algorithm to derive a Primary Key for a relation)
7.3 Concept of Decomposition
7.4 Desirable Properties of Decomposition (Lossless join &
    Dependency preservation)
7.5 Concept of Normalization
7.6 Normal forms (only definitions) 1NF, 2NF, 3NF, BCNF
7.7 Examples on Normalization

References

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     ISBN:9780071289597,Tata McGraw-Hill Education
2.   Database Management Systems ,Raghu Ramakrishnan,ISBN:9780071254342,
     Mcgraw-hill higher Education
3.   Database Management Systems,Raghu Ramakrishnan and Johannes Gehrke,
     McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631
4. Database Systems, Shamkant B. Navathe, Ramez Elmasri, ISBN:9780132144988,
    PEARSON HIGHER EDUCATION
5. Beginning Databases with PostgreSQL: From Novice to Professional, Richard Stones,
    Neil Matthew, ISBN:9781590594780, Apress
6. PostgreSQL, Korry Douglas, ISBN:9780672327568, Sams
7. Practical PostgreSQL (B/CD),John Worsley, Joshua Drake, ISBN:9788173663925
     Shroff/O'reilly
8. Practical Postgresql , By Joshua D. Drake, John C Worsley **(O'Reilly publications)**
9**.** "An introduction to Database systems", Bipin C Desai, Galgotia Publications

Important to Note: It is absolutely necessary and essential that all the practicals for Paper III and Paper IV be conducted on Open Source Operating System like Linux. All the practicals related to C needs to be conducted using GCC compiler.

Paper III – Computer Science Practical Paper I

Title : Basic 'C' Programming and Database Handling practicals

Objective :-
i) Design and implement a 'C' programs for simple problems
ii) Understand appropriate use of data types and array structures
iii) Understand use of appropriate control structures

Syllabus
1. Initial 3 practical slots (12 lectures) should be used for teaching basic operating systems commands and use of editors

2. Last 2 slots (8 lectures) are to be used for revision
3. Remaining 80 lectures are to be utilised for the following 20 Assignments

No	Topic	Lectures
Computer Science : Paper III : Basic 'C' Programming and Database Handling practicals#		
1	Assignment to demonstrate use of data types, simple operators (expressions)	4
2	Assignment to demonstrate decision making statements (if and if-else, nested structures)	4
3	Assignment to demonstrate decision making statements (switch case)	4
4	Assignment to demonstrate use of simple loops	4
5	Assignment to demonstrate use of nested loops	4
6	Assignment to demonstrate menu driven programs.	4
7	Assignment to demonstrate writing C programs in modular way (use of user defined functions)	4
8	Assignment to demonstrate recursive functions.	4
9	Assignment to demonstrate use of arrays (1-d arrays) and functions	4
10	Assignment to demonstrate use of multidimensional array(2-d arrays) and functions	4
11	Assignment to create simple tables , with only the primary key constraint (as a table level constraint & as a field level constraint) (include all data types)	4
12	Assignment to create more than one table, with referential integrity constraint, PK constraint.	4
13	Assignment to create one or more tables with following constraints, in addition to the first two constraints (PK & FK) a. Check constraint b. Unique constraint c. Not null constraint	4
14	Assignment to drop a table from the database, to alter the schema of a table in the Database.	4
15	Assignment to insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)	4

16	Assignment to query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by <> having <> order by <>]	4
17	Assignment to query table, using set operations (union, intersect)	4
18	Assignments to query tables using nested queries	4
19	Assignment to query tables , using nested queries (use of 'Except', exists, not exists clauses	4
20	Assignment related to small case studies (Each case study will involve creating tables with specified constraints, inserting records to it & writing queries for extracting records from these tables)	4

Paper IV – Computer Science Practical Paper II[#]

Title : HTML5 programming and Advanced 'C' Programming practicals

Objective :-
  i)   Understanding basic HTML designing
  ii) Writing C programs using complex data structures such as pointers,
       structures etc.

Syllabus
1. Initial 3 practical slots (8 lectures) should be used for teaching basic internet
usage including use of browsers
2. Last 2 slots (8 lectures) are to be used for revision
3. Remaining 80 lectures are to be utilised for the following 20 Assignments

Computer Science : Paper IV : HTML 5 programming and Advanced 'C' Programming practicals		
No	Topic	Lectures
1	Creating simple HTML pages (use of different tags for changing fonts, foreground and background colors etc.))	4
2	HTML programming (use of lists, tables)	4
3	HTML programming using frames	4
4	HTML programming using hyperlinks	4
5	HTML programming (Creation of forms)	4

6	HTML programming – Case Study 1	4
7	HTML programming – Case Study 1	4
8	HTML programming – Case Study 1	4
9	Assignment to demonstrate use of pointers	4
10	Assignment to demonstrate concept of strings (string & pointers)	4
11	Assignment to demonstrate array of strings.	4
12	Assignment to demonstrate use of bitwise operators.	4
13	Assignment to demonstrate structures (using array and functions)	4
14	Assignment to demonstrate structures and unions	4
15	Assignment to demonstrate command line arguments and preprocessor directives	4
16	Assignment to demonstrate file handling (text files)	4
17	Assignment to demonstrate file handling (binary files and random access to files)	4
18	C Programming – Case study 1	4
19	C Programming – Case study 2	4
20	C programming – Case Study 3	4

#The Lab Hand Book will define in detail the contents and provide fuidelines for each practical Assignment.

MTC 103: Mathematics Practicals

(Practicals based on the applications of articles in MTC 101 and MTC 102)

List of Practicals:

TERM I
1. Logic
2. Lattices
3. Boolean Algebra .
4. Counting Principles.
5. Recurrence Relations
6. Miscellaneous.
7. Relations and functions.
8. Binary Operations
9. Groups
10. Divisibility in Integers I
11. Divisibility in Integers II.
12. Miscellaneous.

TERM II
13. Graphs and Operations on Graphs.
14. Connected Graphs.
15. Eulerian and Hamiltonian Graphs.
16. Trees
17. Directed Graphs.
18. Miscellaneous.
19. Continuity and Differentiability.
20. Mean value theorems and L'Hospital rule.
21. Successive Differentiation.
22.Taylor's and Maclaurin's Theorems.
23. Matrices and System of Linear Equations.
24. Miscellaneous.

Modalities For Conducting The Practical and The Practical Examination

1) There will be one 3 hour practical session for each batch of 15 students per week.

2) A question bank consisting of 100 problems in all for the whole year, distributed in four Sections: 50 questions for each term (25 questions on MT 101 and 25 on MT 102) will be the course work for this paper. Question Bank will be prepared by the individual subject teacher and the problems included should be changed every year, based on the list of practicals given above. The question bank of each year should be preserved by the subject teachers, which can be reviewed by the L.I.C. members visiting college.

3) The College will conduct the Practical Examination at least 15 days before the commencement of the Main Theory Examination. The practical examination will consist of written examination of 72 marks and oral examination of 08 marks.

4) There will be no external examiner; the practical exam will be of the duration of 3 hours.

5) The subject teacher will set a question paper based on pattern as follows:

        Q1.   (a) Any 1 out of 2 worth 8 marks on MTC101 (first term).
                  (b) Any 1 out of 2 worth 8 marks on MTC 102(First term).
        Q2*. Any 5 out of 7 each of 4 marks on MTC 101.
        Q3*. Any 5 out of 7 each of 4 marks on MTC 102.
        Q4.   (a) Any 1 out of 2 of 10 marks on MTC 101(second term).
                  (b) Any 1 out of 2 worth 10 marks on MTC 102(second term).

(*In Q2 and Q3, there will be 3 questions from first term and 4 questions from the second term or vice-versa.)

6)   Each student will maintain a journal to be provided by the college.

  7) The internal 20 marks will be given on the basis of journal prepared by student and the cumulative performance of student at practicals.

8) It is recommended that concept may be illustrated using computer software and graphing calculators wherever possible.

  8) The subject teachers must include computer practicals based on use of free mathematical software's like Sclib, Maxima, mu-pad, etc. for solving problems in the miscellaneous practical mentioned above.

10) **Special Instruction:** Before starting each practical necessary introduction, basic definitions, intuitive inspiring ideas and prerequisites must be discussed**.**

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Paper III

ELC-103: Practical Course

1. The practical course consists of 20 experiments.
2. Any two of the following activities with proper documentation will be considered as equivalent of 4 experiments weightage in term work.
   i. Preparatory experiments
   ii. Hobby projects
   iii. Internet browsing
   iv. industrial visit / live work experience
   v. PCB Making
   vi. Market Survey of Electronic Systems
   vii. Circuit Simulations and CAD tools
   These will be evaluated in an oral examination for 20% marks at internal and term end examination.

3. All the students are required to complete a minimum of 16 experiments

(four from each group) from the following list.

Group A Any Four

1. Study of forward and Reverse biased characteristics of PN Junction Diode
2. Study of breakdown characteristics and voltage regulation action of Zener diode
3. Study of output characteristics of Bipolar Junction Transistor in CE mode
4. Study of output and transfer characteristics JFET/MOSFET
5. Study of I-V characteristics of UJT and Demonstration of UJT based relaxation oscillator .
6. Study of solar cell.

Group B Any four

1. Verification of network theorems: KCL / KVL, Thevenin, Norton.
2. Verification of network theorems: Maximum Power Transfer, Superposition theorem.
3. Design, build and test Low pass and High pass RC filters.
4. Study of low voltage Half-wave, Full-wave and Bridge rectifier circuits.
5. Study of amplification action of BJT.
6. Study of potential divider biasing of BJT and its use in DC motor driving.
7. Build and test Inverting and non inverting amplifier using OPAMP.
8. Build and test adder and subtractor circuits using OPAMP.
9. Study of clipping and clamping circuits.

Group C Any Four

* Minimum Two experiments may be carriedout with CMOS ICs

1. Basic Logic gates using Diodes and transistors
2. Interconversions and realizations of logic expressions using ICs
3. Study of RS, JK and D flip flops using NAND gates
4. Study of Up/Down Counter
5. Study of decade counter IC circuit configurations
6. Study of 4-bit Shift register IC

Group D Any Four

1. Build and Test 4 bit parity checker/ generator using X-OR gate IC
2. Build and Test Half Adder, Full Adder and Subtractor using basic gate
3. Build and Test 2:1 Multiplexer and 1:2 Demultiplexer using gates
4. Build and Test 3X4 matrix Keyboard Encoder
5. Build and Test a Debounce switch using NAND or NOR gate IC
6. Build and Test Diode matrix ROM
7. Study of Four bit Universal Adder/Subtractor / ALU

Preparatory Experiments

1. Identification of Components / Tools

- Minimum 10 different types of components must be given
- Identification based on visual inspection / data sheets be carried out

2. Use of Multimeters (Analog and Digital)

- Measurement of AC/DC voltage and Current – on different ranges
- Measurement of R & C
- Testing of Diodes & Transistors
- Measurement of h_{fe}
- Use of Multimeter in measurement of Variation of Resistance of LDR.
- Thermister

3. Study of Signal Generator/CRO

- Understand how to use Signal Generator/CRO
- Study of front panel controls
- Measurement of amplitude and frequency of Sine/Square waveform
- Measurement of Phase with the help of RC circuit
- Demonstration of Lissajous figures
- Demonstrate the use of Component testing facility

Hobby Project Examples

Build and Test gadgets like

- Water level Indicator
- Photo relay / smoke detector
- Burglar Alarm
- Fan regulator
- Logic Probe
- Experiments with some software's like PSPICE / LTSPICE

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6	**Large Sample Tests**	
	6.1 H_0: $\mu = \mu_0$ Vs H_1: $\mu \neq \mu_0$, $\mu < \mu_0$, $\mu > \mu_0$ (One sided and two sided tests)	
	6.2 H_0: $\mu_1 = \mu_2$ Vs H_1: $\mu_1 \neq \mu_2$, $\mu_1 < \mu_2$, $\mu_1 > \mu_2$ (One sided and two sided tests)	
	6.3 H_0: $P = P_0$ Vs H_1: $P \neq P_0$, $P < P_0$, $P > P_0$ (One sided and two sided tests)	
	6.4 H_0: $P_1 = P_2$ Vs H_1: $P_1 \neq P_2$, $P_1 < P_2$, $P_1 > P_2$ (One sided and two sided tests)	
	6.5 Numerical problems related to real life situations.	7
7	**Tests based on t-distribution**	
	7.1 H_0: $\mu = \mu_0$ Vs H_1: $\mu \neq \mu_0$, $\mu < \mu_0$, $\mu > \mu_0$ (One sided and two sided tests)	
	7.2 H_0: $\mu_1 = \mu_2$ Vs H_1: $\mu_1 \neq \mu_2$, $\mu_1 < \mu_2$, $\mu_1 > \mu_2$ (One sided and two sided tests)	
	7.3 Paired t-test.	
	7.4 Test of significance of correlation coefficient for bivariate raw data.	
	7.5 Test of significance of regression coefficients for bivariate raw data.	
	7.6 Numerical problems related to real life situations.	8
8	**Test based on Chi-square distribution**	
	8.1 Chi square test for goodness of fit	
	8.2 Test for independence of attributes (m X n contingency table)	
	8.3 Test for significance of variation for a population.	
	8.4 Numerical problems related to real life situations.	3
9	**Non parametric tests**	
	9.1 Run test	
	9.2 Sign test.	
	9.3 Kolmogrov - Smirnov test	
	9.4 Mann – Whitney test	
	9.5 Numerical problems related to real life situations.	6
10	**Simulation**	
	10.1 Introduction to Simulation, merits and demerits and pitfall.	
	10.2 Pseudo-random number generator ,requisites of a good random number generator, Testing these requirements by using various test of hypothesis using Run test, goodness of fit test, Sign test etc.	
	10.3 Model Sampling from uniform and exponential distribution.	
	10.4 Model sampling from Normal distribution using Box-Muller transformation.	
	10.5 Numerical problems related to real life situations.	7

Detailed Syllabus for Statistics Paper III (Practical)

A) Practicals to be done manually using scientific calculator

1	Measures of Central Tendency and Dispersion.
2	Problems on simple probability, conditional probability, Baye's theorem and independence of events.
3	Measures of skewness and kurtosis

4	Correlation and Linear Regression Analysis. (for bivariate raw data)
5	Fitting of second degree and exponential type models. (for bivariate raw data)
6	Multiple and Partial Correlation and Regression Analysis. (for trivariate data) + Using spreadsheet with use of readymade function.
7	Time Series (Moving Average and Fitting of AR(1) and AR(2) models).
8	Fitting of Binomial and Poisson distributions.
9	Fitting of Normal Distribution.
10	Model Sampling from Simple Continuous Distributions
11	Large Sample Tests.
12	Tests based upon t distribution.
13	Tests based upon chi square distribution.
14	Non parametric tests.

B) Practicals to be done using any spreadsheet (like MS-Excel in MS-Windows or Open-Office in Linux etc.)

1	Diagrammatic Representation and Descriptive Statistics for raw data
2	For a bivariate raw data, fitting various models and finding the "best fit". (3 problems to be solved in a slot)
3	Fitting of Geometric Distribution and Normal Distribution
4	Using random numbers, drawing of a sample form exponential distribution, normal distribution (Box Muller Transformation) etc.

C) Project –

Project is compulsory which is equivalent to 2 practicals.
Project will carry 5 marks as part of internal evaluation.
One project should be given to one practical batch of students.
The formal project report should be prepared by each student and it must be attached in Statistics journal.

10) Recommended books

Author Name	Year of Publication	Title	Publisher
Medhi J.	1992	Statistical Methods (An Introductory Text)	New Age International
Freund J.E.	2005	Modern Elementary Statistics	Pearson Publication
Trivedi K.S.	2001	Probability, Statistics, Design of Experiments and Queuing Theory with Applications of Computer Science	Prentice Hall of India, New Delhi

CS-223 : Data structures Practicals and C++ Practicals

(semester 1)

Objective:-
1. Design and implement Data structures and related algorithms
2. Understand several ways of solving the same problem.

No	Topic	Lectures
	S.Y.B.Sc.(Computer Science) : Paper III : Data Structures using C Assignments	
1	Sorting Algorithms – Bubble sort, Insertion	4
2	Recursive Sorting Algorithms – Quick sort , Merge Sort	4
3	Searching Method-Linear search, Binary search	4
4	Static/Dynamic stack implementation, infix to postfix, infix to prefix and evaluation of Postfix.	8
5	Static and Dynamic Queue Implementation – Linear Queue, Circular queue	8
6	Dynamic implementation of Singly Linked List, Doubly Linked List and Circular Linked List.	8
7	Polynomial addition (Using Linked list).	4
8	Binary Search Tree Traversal: Create, add, delete, and display nodes.	8
9	Adjacency matrix to adjacency list conversion, in degree, out degree	4
10	Graph: DFS, BFS.	4

Title: Database Assignments and Mini Project using Software Engineering techniques

Objective:-
- o Understanding the use of cursors, triggers, views and stored procedures
- o Understanding the steps of system analysis and design
- o Understanding Data requirements for a specific problem domain
- o Designing Data base as per the Data requirements
- o Designing queries as per the functional requirements

No	Topic	Lectures
1	Simple Queries	4
2	Nested Queries, using aggregate functions	4
3	Queries using Views	8
4	Queries using loops and conditional statements	8
5	Stored Function	12
6	Exception Handling	4
7	Cursors and Triggers	12

Paper III : Mathematics practical (MTC:223)

(Semester – I)

1. **Using scilab**

 i. Revision of scilab with some basic commands

  e.g. size,length,eye,ones,rand,zeros etc.

 ii. Use of ' deff ' command for one and two variables functions.

 iii. Draw 2-D and 3-D graph for some standard functions.

 e.g. x^2 , sin (x), exp(x), x^3+y^3 etc .

2. **Using scilab**

 i. basic operations on matrices .

  e.g. addition , subtraction, multiplication ,square etc.

 ii. solution for system of linear equation .

3. **Scilab programming** :

 i. Regula-Falsi Metho.

 ii. Newton-Raphson Method.

4 . **Using scilab** .

 i. Eigen values and Eigen vectors.

 ii. Diagonalization.

5. **Scilab programming** :

 i. Newton's forward interpolation formula.

 ii. Newton's backward interpolation formula.

6. **Scilab programming** :

 i. Lagranges interpolation for unequal interval.

 ii. Newton's divided difference formula.

7. **Scilab programming** :

 i. Numerical Integration by Trapezoidal method.

 ii. Numerical Integration by Simpson's (1/3)rd ule.

 iii. Numerical Integration by Simpson's (3/8)th rule.

8. **Scilab programming** :

 i. Euler's Method

 ii. Runge-Kutta Method

9. **Written practical** : Coding Theory and cryptology.

Semester II

10. **C -programming**

i. Sorting a set of points with respect to a line.

ii. Sorting a set of points with respect to a rectangle.

11. **C- programming**

i. Find a pair of points with least mutual mutual distance from the given set

ii. Find a pair of points with fartest mutual distance from the given set

12. **Written practical :** Solution of L. P. P. by simplex method

Verification by TORA

13**. Written practical** : 2 -D ransformations

14. Written practical : Transportation and assignment problem

Verification by TORA

15. Written practical : 3 -D ransformations.

16. **C - programming**

i. Generation of uniformly n- points on standard Circle

ii. Generation of uniformly n- points on standard Ellipse

17. **C -programming**

i. Sorting a set of points with respect to a polygon

ii. Sorting a set of points with respect to a rectangular block

18. **Written practical** : Be'ziers curve

Instructions:

1. The annual examination is of 80 marks and 20 marks are based on internal evaluation (journal, attendance ,vivo-voce etc).

2. The annual examination of 80 marks having 3 hours duration and has two parts

i. Question paper solving   ii. Computer Session

3. The maximum marks for the question paper is 30 and is of 1 hr duration.

there will be 5 questions ; each of 10 marks and student has two solve any three questions .

4. Computer session is of 2 hrs duration . It consist of two questions with first on C' programming of 20 marks .and second on scilab of 30 marks with internal options .

5. The slips for the questions on c-programming and problems solving by scilab should be prepared and can be use in annual examination at least for 3 years.

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S. Y .B. Sc. (Computer Science) Electronics
Paper- III: Practical Course (ELC-203)

Objectives:

1. To use basic concepts for building various applications in electronics.
2. To understand design procedures of different electronic circuits as per requirement.
3. To build experimental setup and test the circuits.
4. To develop skills of analyzing test results of given experiments.

- Total Practical to be conducted 20.

- 16 experiments compulsory: At least four practical from each of the A B C D groups.

- One activity equivalent to 2 experiments by the student.

    a. Continuation of F. Y. activity.

    b. Electronics project

    c. Documentation type experiments

    d. Presentation/Seminar on Electronics /advanced topic/research topics.

- One activity equivalent to 2 experiments to be arranged by the teacher – Arrange atleast two practical demonstrations / Workshops /Industrial visit which will enhance quality and skills of the student.

- Examination will be conducted on 16 experiments as well as on activities.

Practical Examination –

A) Internal Marks 20: 16 marks for experiments and 04 marks for activities

B) Annual examination: 80 Marks **in Two sessions of 3 Hrs each as usual practice.**

Session I- 40 marks: Practical work 32 marks , Oral based on the student's own activities 8 marks

Session II -40 marks: Practical work 32 marks, Oral based on common activities arranged by teachers 8 marks

32 Marks can be divided as -Circuit diagram / flowchart and algorithm	10
Connection / program	05
Demonstration and working explanation	10
Results	05
Result analysis / conclusion / comments	02

Group A: List of Practicals (Digital System Hardware): Any Four

1. Build and test code converter using logic gates – binary to gray , gray to binary .
2. Build and test Decimal to BCD encoder using logic gates.
3. Build and test 3 bit synchronous counter using JK flip flops.
4. Build and test 4 bit sequence generator for counting sequence 0,2,4, 6, 8, 1, 3, 5, 7, 9, 0
5. Study of read and write action of RAM (using IC 2112/4 or equivalent).
6. Serial communication using RS 232 and ZigBee

Group B: List of Practicals (Analog Systems): Any Four

1. LM-35 based temperature sensing system/Optocoupler /opto-isolator based system.
2. Low Pass Filter and High Pass Filter using IC-741 Op Amp.
3. Build and test DAC using R-2R Ladder network.
4. Flash ADC using discrete components.
5. Build and test LDR based light control system.
6. Study of Linear Variable Differential Transformer.
7. Build and test Instrumentation Amplifier.

Group C :List of Practicals (Microcontroller): Any Four

1. Arithmetic, logical & code conversion problems using assembly/C programming
2. Interfacing the thumbwheel & seven segment display.
3. Traffic light controller using microcontroller.
4. Interfacing LCD to Microcontroller.
5. Waveform generation using DAC Interface.
6. Event counters using opto- coupler using seven segment display / LCD.
7. Speed Controller of stepper motor using microcontroller.

Group D: List of Practicals (Principles of Communication): Any Four

List of Practicals (Principles of Communication): Any Four

1. Build and test Amplitude Modulator and Demodulator.
2. Build and test Time Division Multiplexing circuit.
3. Build and test Frequency Shift Keying.
4. Build and test Delta Modulation circuit using IC.
5. Build and test Pulse Amplitude Modulation.
6. Study of radiation pattern of antenna.
7. Build and test Hamming Code generator and detector circuit.

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A Course in Environmental Awareness
Syllabus

SECTION-I

Sr. No.	Topic	Sub-topics	No. of periods
1.	Nature & Scope of Environmental Studies	Definition scope, importance, Multi disciplinary nature, Need for public awareness	2
2	Natural Resources	Renewable & non-renewable Natural resources & associated problems of forest, water, mineral, energy, land & food - case studies, conservation of resources	7
3	Eco system	Types, characteristics, structure & function	6
4	Biodiversity & its conservation	Definition, Genetic, species & eco system diversity, Biogeographical classification of India. Biodiversity at global, national & local levels, conservation of biodiversity	5

SECTION II

Sr. No.	Topic	Sub-topics	No. of periods
5.	Environmental Pollution	Definition course, effects & control measures of air, water, soil marine noise, thermal nuclear. Role of an individual in prevention of pollution -case studies, Disaster management	7
6.	Social Issues & the environment	Urban problems, Resettlement problems, climatic change, global warming acid rain, ozone layer depletion, nuclear accidents, Air act, Environment Protection Act, water, forest wild life act, public awareness	5
7.	Human Population & environment	Population – explosion, Family Welfare Programme, Environment & Human Health, Human Rights, Value Education, HIV/AIDS, Role of I.T. in Environment & human health - case studies	4
8.	Fieldwork	Visit to a local area- urban, rural, industrial, agricultural, study of simple eco system-pond, river, hill etc	4

Aim:
To understand the process of designing and implementing System programs and operating system components.

Objective :-
1. Design and implement System programs with minimal features to understand their complexity.
2. Design and implement simulations of operating system level procedures.

Syllabus

Sr. No	Topic	Lectures
1	Line Editor	8 lectures
2	SMAC0 simulator	8 lectures
3	Assembler	12 Lectures
4	Macro processor	12 lectures
5	DFA driver	8 lectures
6	Development Utilities	8 lectures
7	Toy shell	8 Lectures
8	CPU Scheduler	12 lectures
9	Deadlock detection	8 lectures
10	Page Replacement Algorithms	12 lectures
11	File Allocation methods	12 Lectures

Examination

Internal Marks : Activity + Labbook(10+10)

External Marks : two programs(35each) oral(5) Activity(5)

Aim:

To understand the process of designing and implementing Core and Advanced Java programs.

Objective :-

1. Implement core Java programs to solve simple problems
2. Implement Client and Server end Java programs

Syllabus

Sr. No	Topic	Lectures
Core and Advanced Java		
1	Simple Java programs	8 Lectures
2	Arrays and Packages	8 Lectures
3	Inheritance and Interfaces	8 Lectures
4	Exception Handling	8 Lectures
5	File Handling	8 Lectures
6	GUI designing & Event Handling	8 Lectures
7	Database Programming	8 Lectures
8	Multithreading	4 Lectures
9	Collection	8 Lectures
10	Servlets	8 Lectures
11	JSP	8 Lectures
12	Socket Programming	4 Lectures
Computer Graphics		
1	Simple Graphics program using OpenGL	4 Lectures
2	Using graphics primitives to display graphics	4 Lectures
3	Window to viewport transformations and other transformations	4 Lectures
4	Using simple Keyboard and Mouse interaction	4 Lectures
5	Graphics Mini project	16 Lectures

Examination

Internal Marks : Activity(CG) + Seminar(Enhanced java+ listening) (10+10)

External Marks : two programs(30each) oral(5) Activity(5)+ Labbook(10)

SAVITRIBAI PHULE PUNE UNIVERSITY
Proposed Draft of
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER :Lab Course III – Programming in PHP & Project
Code No. : CS-349

Aim:
To understand the process of designing and implementing Web applications, using PHP.

Objective :-
1. Implement Simple PHP programs to solve simple problems

Syllabus

Sr. No	Topic	Lectures
PHP		
1	String manipulation	8 Lectures
2	Arrays	8 Lectures
3	Inheritance	8 Lectures
4	File Handling	8 Lectures
5	Form designing	8 Lectures
6	Database Connectivity	8 Lectures
7	Sessions and cookies	8 Lectures
8	Java script with AJAX	8 Lectures
Networking		
1	Setting a LAN Environment	4 Lectures
2	Configuring the Server	4 Lectures
3	Use of Service Primitives	4 Lectures
4	Use of Networking Tools	12 Lectures
Project		
1	Choose Project topic and Prepare problem description	
2	Study of Existing System	
3	Identifying users and functionalities of proposed system	
4	Preparing the Design of the proposed system- Data Design Screen and Report Designs	
5	Implementation	

Examination

Internal Marks: Project (20) Continuous Evaluation.

External Marks: One programs (30) (large program on PHP + small program PHP), networking(10)
– Internal, Lab book(10), Project(30) -20 Marks External + 10 Marks Internal for Project Demo
    before Final Practical Exam