

Values	Program Name	Course Code	Course Name	Year
Environment & Sustainability	SY B.Sc. CS	EVS	Environmental Science	2014-15
Human Values and Professional Ethics	FYBBA	106	Business Demography and Environmental Studies	2013-14
	FYBBA-CA	203	Organizational Behavior	2013-14
	SYBBA	301	Personality Development	2014-15
	SYBBA	302	Business Ethics	2014-15
	SYBBA	303	Human Resource Management and Organizational Behaviour	2014-15
	SYBBA	402	Industrial Relations and Labour Laws	2014-15
	SYBBA-CA	404	Enterprise Resource Planning	2014-15
	SYBBA-CA	405	Human Resource Management	2015-16
	TYBBA	502	Enterperneureship Development	2016-17
	TYBBA	503	Business Law	2016-17
	TYBBA	504	Research Methodology: Tools and Analysis	2016-17
	TYBBA	601	Business Planning and Project Management	2016-17
	TYBBA	602	Event Management	2016-17

University of Pune

**Three Year Degree Course in
B. Sc. Computer Science**

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' Programmin g	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Paper II CS-102)	File Organizatio n and Fundament al 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 Semester)	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 Engineeri ng technique s	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.

(Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)

- iii. In order to pass in practical 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 Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 13) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc. While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 22) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, the Question paper slips will be provided by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers: Papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Computer Science Degree Program shall be three years.

a) All are Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 2 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 2 Practical (Annual)

T.Y.B.Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :**F.Y.B.Sc.Theory paper:**

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc.Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be **English.**

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Introduction to Computers and 'C' Programming	CS-101:Problem Solving Using Computers and 'C' Programming
Paper II: File Organization and Fundamental of Databases	CS 102:File Organization and Fundamental of Databases
Paper III: Computer Science Practical paper I	CS-103: Computer Science Practical paper I
Paper IV: Computer Science Practical paper II	CS-104: Computer Science Practical paper II

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers:M.Sc. Computer Science/M.C.A. or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.

10) Detail Syllabus with Recommended Books:

Title : Problem Solving Using Computers and 'C' Programming

Objective :-

- i) To develop Problem Solving abilities using computers
- ii) To teach basic principles of programming
- iii) To develop skills for writing programs using 'C'

Syllabus**Chapter 1 Problem Solving using Computers****[8]**

- 1.1 Problem-Solving
- 1.2 Writing Simple Algorithms
- 1.3 Algorithms
- 1.4 Flowcharts

Chapter 2 Programming Languages as Tools**[3]**

- 2.1 Machine language R6(1.5,1.6)
- 2.2 Assembly language
- 2.3 High level languages
- 2.4 Compilers and Interpreters

Chapter 3 Introduction to C**[2]**

- 3.1 History R3(2-1), R6(1.1)
- 3.2 Structure of a C program R3(2-2), R6(1.8)
- 3.3 Functions as building blocks R3(4-1,4-2)
- 3.4 Application Areas
- 3.5 C Program development life cycle R6(1.10)
- 3.6 Sample programs

Chapter 4 C Tokens**[12]**

- 4.1 Keywords R6 (Ch 2, 3)
- 4.2 Identifiers
- 4.3 Variables
- 4.4 Constants – character, integer, float, string, escape sequences
- 4.5 Data types – built-in and user defined
- 4.6 Operators and Expressions Operator types (arithmetic, relational, logical, assignment, bitwise, conditional , other operators) , precedence and associativity rules.
- 4.7 Simple programs using printf and scanf

Chapter 5 Input and Output**[3]**

- 5.1 Character input and output R6(4.2 - 4.5)
- 5.2 String input and output
- 5.3 Formatted input and output

Chapter 6 Control Structures**[10]**

- 6.1 Decision making structures If, if-else, switch R3(5-2, 5-3), R6(5.2 - 5.8)
- 6.2 Loop Control structures While, do-while, for R6 (Ch 8)
- 6.3 Nested structures
- 6.4 break and continue

Chapter 7 Functions in C		[8]
7.1 What is a function	R3(4-2, 4-4)	
7.2 Advantages of Functions		
7.3 Standard library functions	R3(5-4)	
7.4 User defined functions :Declaration, definition, function call, parameter passing (by value), return keyword,	R6 (Ch 9)	
7.5 Scope of variables, storage classes		
7.6 Recursion	R3 (6-9)	
Chapter 8 Arrays		[8]
8.1 Array declaration, initialization	R6(Ch 7)	
8.2 Types – one, two and multidimensional	“	
8.3 Passing arrays to functions	R3(8-3), R6(9.17)	
Chapter 9 Pointers		[6]
9.1 Pointer declaration, initialization	R6(11.1 - 11.14)	
9.2 Dereferencing pointers		
9.3 Pointer arithmetic		
9.4 Pointer to pointer		
9.5 Arrays and pointers		
9.6 Functions and pointers – passing pointers to functions, function returning pointers		
9.7 Dynamic memory allocation	R6(13.1-13.6)	
Chapter 10 Strings		[6]
10.1 Declaration and initialization, format specifiers	R6(Ch 8)	
10.2 Standard library functions		
10.3 Strings and pointers		
10.4 Array of strings		
10.5 Command Line Arguments	R3(Appendix I1-I2)	
Chapter 11 Structures and Unions		[6]
11.1 Creating structures	R6(Ch 10)	
11.2 Accessing structure members (dot Operator)		
11.3 Structure initialization		
11.4 Array of structures		
11.5 Passing structures to functions		
11.6 Nested structures		
11.7 Pointers and structures		
11.8 Unions		
11.9 Difference between structures and unions		
Chapter 12 File Handling		[6]
12.1 Streams	R3(7-1, 7-2)	
12.2 Types of Files		
12.3 Operations on files	R6(12.1- 12.4), 12.6, 12.7	
12.4 Random access to files		
Chapter 13 C Preprocessor		[2]

- 13.1 Format of Preprocessor directive R6(14.1 - 14.3)
 13.2 File Inclusion directive
 13.3 Macro substitution, nested macro, argumented macro

References

1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, ISBN:9788120305960, PHI Learning
2. How to Solve it by Computer, R.G. Dromey, ISBN:9788131705629, Pearson Education
3. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg ISBN:9788131500941, Cengage Learning India
4. Using The GNU Compiler Collection, Richard M. Stallman;The GCC Developer Community Pothi.com
5. Using the Gnu Compiler Collection, Richard M. Stallman, Gcc Developer community ISBN:9781441412768,Createspace
6. Programming in ANSI C, E. Balaguruswamy,ISBN:9781259004612,Tata Mc-Graw Hill Publishing Co.Ltd.-New Delhi

Computer Science: Paper – II : File Organization and Fundamental of Databases

Title : File Organization and Fundamental of Databases

Objective :-

- i) To understand data processing using computers
- ii) To teach basic organization of data using files
- iii) To understand creations, manipulation and querying of data in databases

Syllabus

Chapter 1 File Organization R3
[6]

- 1.1 Introduction
- 1.2 Physical / logical files
- 1.3 Types of file organization (heap,sorted, indexed,hashed)
- 1.4 Choosing a file organization

Chapter 2 Introduction of DBMS R1(Ch 1) [6]

- 2.1 Overview
- 2.2 File system Vs DBMS
- 2.3 Describing & storing data (Data models (relational,hierarchical, network))
- 2.4 Levels of abstraction
- 2.5 Data independence
- 2.6 Structure of DBMS
- 2.7 Users of DBMS
- 2.8 Advantages of DBMS

Chapter 3 Conceptual Design (E-R model) R1(Ch 2), R3, R4
[15]

- 3.1 Overview of DB design
- 3.2 ER data model (entities , attributes, entity sets, relations, relationship sets)
- 3.3 Additional constraints (Key constraints, Mapping constraints, Strong & Weak entities, aggregation / generalization)
- 3.4 Conceptual design using ER modelling (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER)
- 3.5 Case studies

Chapter 4 Relational data model R1(Ch 3)
[6]

- 4.1 Structure of Relational Databases (concepts of a table, a row, a relation, a Tuple and a key in a relational database)
- 4.2 Conversion of ER to Relational model
- 4.3 Integrity constraints (primary key, referential integrity, unique constraint, Null constraint, Check constraint)

Chapter 5 Relational algebra R1(Ch 3)
[7]

- 5.1 Preliminaries
- 5.2 Relational algebra (selection, projection, set operations, renaming joins, division)

Chapter 6 SQL R1(Ch 4)
[20]

- 6.1 Introduction
- 6.2 Basic structure
- 6.3 Set operations
- 6.4 Aggregate functions
- 6.5 Null values
- 6.6 Nested Subqueries
- 6.7 Modifications to Database
- 6.8 DDL commands with examples
- 6.9 SQL mechanisms for joining relations (inner joins, outer joins and their types)
- 6.10 Examples on SQL (case studies)

7 Relational Database Design R1(ch 7)
[20]

- 7.1 Pitfalls in Relational-Database Design (undesirable properties of a RDB design like repetition, inability to represent certain information),
- 7.2 Functional dependencies (Basic concepts, F+, Closure of an Attribute set, Concept of a Super Key and a primary key

- (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

1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S. Sudarshan,
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

Computer Science : Paper III : Basic 'C' Programming and Database Handling practicals#		
No	Topic	Lectures
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 guidelines for each practical Assignment.

University of Pune

Three Year B. Sc. Degree Course in Computer Science

Subject : Electronics

1) Title of the Course :

F.Y.B.Sc.Electronics of Computer Science

(To be implemented from Academic Year 2013-14)

2) Preamble:

The systematic and planned curricula for first year and second year electronics shall motivate and encourage the students for pursuing higher studies in Electronics and computer and for becoming an enterpreneur.

3) Introduction:

At **first year of under-graduation**: The basic topics related to the fundamentals of electronics are covered. Since electronics is an inherent part of technological advancements, the practical course is intended to achieve the basic skills required for circuit building and testing.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. Courses based on content of first year shall be introduced. Analog and digital circuit design concepts will be introduced at this stage.

Objectives:

- To provide indepth knowledge of scientific and technological aspects of electronics
- To familiarize with current and recent technological developments
- To enrich knowledge through programmessuch as industrial visits, hobby projects, market survey, projects etc.
- To train students in skills related to electronics industry and market.
- To creat foundation for research and development in Electronics
- To develop analytical abilities towards real world problems
- To help students build-up a progressive and successful career in Electronics

4) Eligibility:

1 First Year B.Sc.:

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

2 Second Year B.Sc.:

Keeping terms of First Year of B.Sc. Computer Science, with electronics as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.

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 : Electronics

Pattern of Examination: Annual

Theory courses (ELC-101 and ELC-102) : Annual

Practical Course (ELC-103) : 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
Theory Paper I (ELC-101) (First term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I (ELC-101) (Second term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II (ELC-102) (First term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II (ELC-102) (Second term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III (ELC-103) (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	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 (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

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 and 3 and 4	4 out of 6– short answer type questions, each of 4 marks; answerable in 8 – 10 lines
Question 5	2 out of 3 – long answer type questions; 8 marks each; answerable in analytical fashion or circuit/logic diagrams

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.

For practicals: one internal assessment test + marks for journals + attendance + hobby project - tour report etc.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 6 hours duration (2-Sessions). 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

Subject : Electronics

Pattern of examination: Semester

Theory courses (Sem I: ELC 211 and ELC 212): Semester

(Sem II: ELC 221 and ELC 222): Semester

Practical Course (ELC 223): 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 (ELC 211)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (ELC 212)	Paper II	Four lectures/Week	04	16	20 *

		(Total 48 per Semester)			
Theory Paper I (ELC 221)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (ELC 222)	Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Practical paper III (ELC 223) (First & Second Semester)	Paper III	12 Practicals of 4 lectures in each Semester (24 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) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

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

Question 1	10 sub-questions, each of 1 marks	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 8 – 10 lines	10 marks each
Question 4	2 out of 3 sub-questions, each of 5 marks; long answer type questions (12-16 lines), problems, circuit/logic diagrams and designs	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.

For practicals: one internal assessment test + marks for journals + attendance + visit report.

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 6 hours (2-Sessions) 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. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical 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 Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

5 D) External Students: There shall be no external students.

5 E) Setting Question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III papers shall be set by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5F) Verification and Revaluation Rules:

As per university Statutes and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. (Computer Science) Degree Program shall be three years. Electronics is offered at first and second year.

a) **Compulsory Papers** : All Theory and Practical Papers

b) **Optional Papers** : Nil

c) **Question Papers** :

F.Y.B.Sc.

Theory paper: University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

Practical Paper: University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y.B.Sc.

Theory paper: University Examination – 40 marks (at the end of each semester)

Internal Examination – 10 marks

Practical Paper: University Examination – 80 marks (at the end of 2nd semester)

Internal Examination – 20 marks

d) **Medium of Instruction:** The medium of instruction for the course shall be **English.**

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Electronic Devices, circuits and computer peripherals	ELC-101: Principles of Analog Electronics
Paper II: Fundamentals of Digital Electronics	ELC-102: Principles of Digital Electronics
Paper III: Practical	ELC-103: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Electronic Science or equivalent master degree in science with class/grades and NET/SET as per prevailing University /Government /UGC rules.

10) Detail Syllabus with Recommended Books:

Electronics Subject of F.Y. B.Sc. Computer Science

Paper I

ELC-101: Principles of Analog Electronics

Objectives:

1. To get familiar with basic circuit elements and passive components
2. To understand DC circuit theorems and their use in circuit analysis
3. To study characteristic features of semiconductor devices
4. To study elementary electronic circuits and applications
5. To understand basics of operational amplifiers.

Term I

Unit 1: Passive Components (12)

Study of basic circuit elements and passive components (with special reference to working principle, circuit symbols, types, specifications and applications): Resistor, Capacitor, Inductor, Transformer, Cables, Connectors, Switches, Fuses, Relays, Batteries.

Unit 2: Basic Electrical Circuits and Circuit Theorems (14)

Concept of Ideal Voltage and Current source, internal resistance, dc sources (voltage/current) and sinusoidal ac source (amplitude, wavelength, period, frequency, phase angle), Network terminology, Ohms law, series and parallel circuits of resistors, capacitors and inductors, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Superposition theorem, concept of black box, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem (numerical problems with maximum two meshes), Charging-discharging of capacitor, AC applied to R, C and L, concept of impedance, LCR series resonant circuit, concept of phase difference, RC low pass and high pass filter

Unit 3: Semiconductor Diodes and Circuits (10)

Study of semiconductor devices with reference to symbol, working principle, I-V characteristics, parameters, specifications: diode, zener diode, light emitting diode, photo diode, optocoupler, varactor diode, solar cell, clipper and clamper circuits Rectifiers (half and full wave), rectifier with capacitor-filter, Zener regulator, Block diagram of power supply

Term II

Unit 4: Bipolar Junction Transistor and Circuits (14)

Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, I-V characteristics, parameters, specifications, Concept of amplification, voltage and current amplifier, Transistor amplifier configurations - CB, CC and CE, biasing circuits - voltage divider, collector feedback bias and emitter feedback bias, DC load line (CE), Q point and factors affecting the stability, transistor as a switch, concept of class A, B

and class C amplifiers, emitter follower amplifier, Single stage RC coupled CE amplifier, concept of frequency response and bandwidth

Unit-5:UJT,FETs and Applications (10)

Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of: Uni-Junction Transistor (UJT), Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET), comparison of JFET, MOSFET and BJT

Applications: JFET as voltage variable resistor, MOSFET as a switch

Unit 6: Operational Amplifier (12)

Symbol, block diagram, Opamp characteristics, basic parameters (ideal and practical) such as input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, Concept of virtual ground, concept of feedback, Information about IC741

Opamp as inverting and non-inverting amplifier, voltage follower, adder, subtractor

Opamp as a comparator and Schmitt trigger

Text/ Reference Books:

1. Basic Electronics:Bernard Grob, McGraw Hill Publication, 8th Revised Edition, 2010
2. Electronic Principles:Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Principles of Electronics: V.K. Mehta, S.Chand and Co.
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.
5. Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., Gupta S.C., Tata McGraw Hill.
6. A First Course in Electronics: Khan Anwar, K.K.Day, PHI learning Pvt.Ltd.
7. Electronic Devices and Circuits: Bolyestad, Tata McGraw Hill.
8. Electronic Devices and circuits: A. Motorshed, Prentice Hall of India.
9. Basic Electronic Devices and Circuits: R.Y.Borse, 1stEdition 2012, Adhyayan Publishers and Distributors, New Delhi.

Paper II

ELC-102: Principles of Digital Electronics

Objectives:

1. To get familiar with concepts of digital electronics
2. To learn number systems and their representation
3. To understand basic logic gates, boolean algebra and K-maps
4. To study arithmetic circuits, combinational circuits and sequential circuits
5. To study comparative aspects of logic families.

Term I

Unit 1: Number Systems and Logic Gates (12)

Introduction to decimal, Binary and hexadecimal number systems and their inter-conversions, Signed and fractional binary number representations, BCD, Excess-3 and Graycodes, Alphanumeric representation in ASCII codes.

Positive and Negative Logic, Basic Logic gates (NOT, OR, AND) & derived gates (NAND, NOR, EX-OR) Symbol and truth table, Applications of Ex-OR gates as parity checker and generator.

Unit 2: Boolean Algebra and Karnaugh maps (12)

Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, DeMorgan's theorem, Universal gates. Min terms, Max terms, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form., Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (up to 3 variables).

Unit 3: Arithmetic Circuits (12)

Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Full subtractor, Four bit parallel adder, Universal adder / subtractor, Digital comparator, Introduction to ALU.

Term II

Unit 4: Combinational Circuits (14)

Multiplexer (2:1, 4:1), demultiplexer (1:2, 1:4) and their applications, Code converters - Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & decoder 3x4 matrix keyboard encoder, priority encoder, BCD to seven segment decoder.

Unit 5: Sequential Circuits (14)

Flip flops :RS using NAND/NOR, latch, clocked RS, JK, Master slave JK, D and T.
Counters: Ripple Binary counter, up down counter, concept of modulus counters, Decade counter, Counters for high-speed applications (Synchronous counters) with timing diagrams.
Shift registers: SISO, SIPO, PISO, PIPO shift registers, ring counter, universal 4-bit shift register and Applications.

Unit 6: Logic Families (8)

Introduction to Integrated circuit technologies TTL, ECL, CMOS
IC parameters: Logic levels, switching speed, propagation delay, power dissipation, noise margins and fanout of TTL and CMOS.
TTL NAND & NOT gate, Open collector gates, Wired OR operation. CMOS - NOT, NAND, NOR gate, precautions while handling CMOS gates, tri-state logic.

Text/ Reference Books:

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

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 toolsThese 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
-

UNIVERSITY OF PUNE, PUNE.
Syllabus for F.Y.B.Sc(Computer Science)
Subject: MATHEMATICS
(With effect from June 2013)

Introduction:

University of Pune has decided to change the syllabi of various faculties from June,2013. Taking into consideration the rapid changes in science and technology and new approaches in different areas of mathematics and related subjects Board of studies in Mathematics with concern of teachers of Mathematics from different colleges affiliated to University of Pune has prepared the syllabus of F.Y.B.Sc. (Computer Science) Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- i) Give the students a sufficient knowledge of fundamental principles ,methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling ,solving and interpreting.
- ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science.
- iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills , creative talent and power of communication necessary for various kinds of employment.
- iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

- (i) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays ,state important facts resulting from their studies.
- (ii) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- (iii) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- (iv) A student be able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- (v) A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.

Eligibility: 12th science with mathematics or equivalent examination.

Structure of the course:

Sr.No.	Paper	Theory	Oral	Internal	Total
1	MTC 101 (Discrete Mathematics)	80 Marks	-	20 Marks	100 Marks
2	MTC 102 (Algebra and Calculus)	80 Marks	-	20 Marks	100 Marks
3	MTC 103 (Mathematics Practicals)	72 Marks	08 Marks	20 Marks	100 Marks

All 3 above courses are compulsory.

Medium of Instruction: English

Examination:

A) Pattern of examination: Annual.

B) Standard of passing : 40 Marks out of 100 marks for each papers.

But for MT 101 and MT 102 for passing a student should obtain minimum 32 marks out of 80 in the theory examination and overall total marks for theory and internal should be minimum 40.

C)Pattern of question papers: For MTC 101 and MTC 102

Q1. Attempt any 08 out of 10 questions each of 02 marks. [16 Marks]
(05 questions from each term)

Q2. Attempt any 04 out of 06 questions each of 04 marks. [16 Marks].
(Based on term I)

Q.3. Attempt any 02 out of 03 questions each of 08 marks. [16 Marks].
(Based on term I)

Q4. Attempt any 04 out of 06 questions each of 04 marks. [16 Marks].
(Based on term II)

Q.5. Attempt any 02 out of 03 questions each of 08 marks. [16 Marks].
(Based on term II)

The pattern of question paper for MTC 103 is given in the detailed syllabus.

D) External Students: Not allowed.

E)Verification/Revaluation: Allowed for MTC 101,MTC 102.

Equivalence of Previous syllabus along with new syllabus:

Sr.No	New Courses	Old Courses
1	MTC 101 (Discrete Mathematics)	Paper I (Discrete Mathematics)
2	MTC 102 (Algebra and Calculus)	Paper II (Algebra and Calculus)
3	MTC 103 (Mathematics Practicals)	Paper III (Mathematics Practicals)

Qualifications for Teacher

M.Sc. Mathematics (with NET /SET as per existing rules

Details of Syllabus

MTC 101: Discrete Mathematics

First Term

Unit 1: Logic

07 Lectures

- 1.1 Revision : Propositional Logic, Propositional Equivalences.
- 1.2 Predicates and Quantifiers : Predicate, n -Place Predicate or n -ary Predicate, Quantification and Quantifiers, Universal Quantifier, Existential Quantifier, Quantifiers with restricted domains, Logical Equivalences involving Quantifiers.
- 1.3 Rules of Inference : Argument in propositional Logic, Validity Argument(Direct and Indirect methods) Rules of Inference for Propositional Logic, Building Arguments.

Unit 2 : Lattices and Boolean Algebra

10 Lectures

- 2.1 Poset, Hasse diagram.
- 2.2 Lattices, Complemented lattice, Bounded lattice and Distributive lattice.
- 2.3 Boolean Functions : Introduction, Boolean variable, Boolean Function of degree n , Boolean identities, Definition of Boolean Algebra.
- 2.4 Representation of Boolean Functions : Minterm, Maxterm Disjunctive normal form, Conjunctive normal Form.

Unit 3 : Counting Principles

10 Lectures

- 3.1 Cardinality of Set : Cardinality of a finite set.
- 3.2 Basics of Counting : The Product Rule, The Sum Rule, The Inclusion-Exclusion Principle.
- 3.3 The Pigeonhole Principle: Statement, The Generalized Pigeonhole Principle, Its Applications.
- 3.4 Generalized Permutations and Combinations : Permutation and Combination with Repetitions, Permutations with Indistinguishable Objects, Distributing objects into boxes : Distinguishable objects and distinguishable boxes, Indistinguishable objects and distinguishable boxes, Distinguishable objects and Indistinguishable boxes, Indistinguishable objects and Indistinguishable boxes

Unit 4 : Recurrence Relations

9 Lectures

- 4.1 Recurrence Relations : Introduction, Formation.
- 4.2 Linear Recurrence Relations with constant coefficients.
- 4.3 Homogeneous Solutions.
- 4.4 Particular Solutions.
- 4.5 Total Solutions.

Second Term

Unit 5 : Graphs

06 Lectures

5.1 Definition, Elementary terminologies and results, Graphs as Models.

5.2 Special types of graphs.

5.3 Isomorphism.

5.4 Adjacency and Incidence Matrix of a Graph.

Unit 6 : Operations on Graphs

04 Lectures

6.1 Subgraphs, induced subgraphs, Vertex deletion, Edge deletion.

6.2 Complement of a graph and self-complementary graphs.

6.3 Union, Intersection and Product of graphs.

6.4 Fusion of vertices.

Unit 7 : Connected Graphs

09 Lectures

7.1 Walk, Trail, Path, Cycle : Definitions and elementary properties.

7.2 Connected Graphs : definition and properties.

7.3 Distance between two vertices, eccentricity, center, radius and diameter of a graph.

7.4 Isthmus, Cutvertex : Definition and properties.

7.5 Cutset, edge-connectivity, vertex connectivity.

7.6 Weighted Graph and Dijkstra's Algorithm.

Unit 8 : Eulerian and Hamiltonian Graphs

05 Lectures

8.1 Seven Bridge Problem, Eulerian Graph : Definition and Examples, Necessary and Sufficient condition.

8.2 Fleury's Algorithm.

8.3 Hamiltonian Graphs : Definition and Examples, Necessary Condition.

8.4 Introduction of Chinese Postman Problem and Travelling Salesman Problem.

Unit 9 : Trees

06 Lectures

9.1 Definition, Properties of trees.

9.2 Center of a tree.

9.3 Binary Tree : Definition and properties.

9.4 Tree Traversal : Ordered rooted Tree, Preorder traversal, inorder traversal and postorder traversal, Prefix Notation.

9.5 Spanning Tree : Definition, Properties, Shortest Spanning Tree, Kruskal's Algorithm.

Unit 10 : Directed Graphs

06 Lectures

- 10.1 Definition, Examples Elementary Terminologies and properties.
- 10.2 Special Types of Digraphs.
- 10.3 Connectedness of digraphs.
- 10.4 Network and Flows : definition and examples.

Text Book: Text book of Discrete Mathematics, Prepared by B.O.S. in Mathematics, University of Pune, Pune.(2013).

Reference Books:

- 1) Kenneth Rosen, Discrete Mathematics and It's Applications (Tata McGraw Hill)
- 2) C. L. Liu ,Elements of Discrete Mathematics, (Tata McGraw Hill)
- 3) John Clark and Derek Holton, A First Look at Graph Theory (Allied Publishers)
- 4) Narsingh Deo, Graph Theory with Applications to Computer Science and Engineering, (Prentice Hall).

MTC 102: Algebra and Calculus

First Term: (Algebra)

Unit 1: Relations and functions

11 Lectures

- 1.1 Ordered pairs, Cartesian product of Sets.
- 1.2 Relations, types of relations, equivalence relations. Partial orderings.
- 1.3 Equivalence Class, properties and partition of a set.
- 1.4 Transitive closure and Warshall's Algorithm.
- 1.5 Digraphs of relations, matrix representation and composition of relations.
- 1.6 Definition of function as relation, types of functions (one-one, onto and bijective)

Unit 2: Binary Operations and Groups.

9 Lectures

- 2.1 Definition of binary operation, examples, properties of binary operations.
- 2.2 Definition of Monoid, semigroup, examples.

2.3 Definition of group and examples, finite and infinite groups, permutation groups, subgroups, Cyclic groups.

Unit 3: Divisibility in Integers

16 Lectures

3.1 Well ordering principle

3.2 First and second Principle of Mathematical Induction, Examples

3.3 Division Algorithm (without proof)

3.4 Divisibility and its properties, prime numbers.

3.5 Definition G.C.D and L.C.M., Expressing G.C.D. of two integers as a linear combination of the two integers.

3.6 Euclidean Algorithm (Without proof).

3.7 Relatively prime integers, Euclid's Lemma and its generalization.

3.8 Congruence relations and its properties, Residue Classes: Definition, Examples, addition and multiplication modulo n and composition tables

3.9 Euler's and Fermat's Theorems. (Without proof). Examples

Second Term: (Calculus)

Unit 4: Continuity and Differentiability

12 Lectures

4.1 Continuity and Properties of continuous functions defined on $[a, b]$ (Without proof) and examples.

4.2 Differentiability

4.3 Theorem – Differentiability implies continuity but not conversely. Left hand derivative and Right hand derivative.

4.4 Intermediate value theorem (without proof).

4.5 Rolle's theorem (with proof and geometric interpretation)

4.6 Lagrange's Mean Value Theorem (with proof and geometric interpretation)

4.7 Cauchy's Mean Value Theorem (with proof), Verification and Application.

4.8 L' Hospital's Rule (without proof)

Unit 5: Successive Differentiation

05 Lectures

5.1 The n^{th} derivatives of standard functions.

5.2 Leibnitz's Theorem (with proof).

Unit 6: Taylor's and Maclaurin's Theorems

05 Lectures

6.1 Taylor's and Maclaurin's Theorems with Lagrange's and Cauchy's form of remainders (without proof).

6.2 Taylor's and Maclaurin's Series.

Unit 7 : Matrices and System of Linear Equations

14 Lectures

7.1 Revision: Elementary operations on matrices.

7.2 Echelon form of matrix

7.3 System of linear equations: Gauss Elimination Method, Gauss –Jordan Elimination Method, L.U. Decomposition Method

7.4 Rank of matrix, Row rank, Column rank

Text Book: Text book of Algebra and Calculus, Prepared by B.O.S. in Mathematics, University of Pune, Pune.(2013).

Reference Books:

- 1) Discrete Mathematics Structure – Bernard Kolman, Robert Busby, Sharon Cutler Ross, Nadeem-ur-Rehman, Pearson Education, 5th Edition
- 2) Elements of Discrete Mathematics – C.L.Liu (Tata McGraw Hill)
- 3) Calculus and Analytical Geometry- Thomas Finny
- 4) J.B. Fraleigh, A. First Course in Abstract Algebra, Third Ed., Narosa, New Delhi, 1990
- 5) H. Anton and C. Rorres, Elementary Linear Algebra with Applications, Seventh Ed., Wiley, (1994).

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 Scilab, 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.

=====

University of Pune

STATISTICS

For First Year B. Sc. (Computer Science) Degree Course

(Formerly known as B. C. S. Course)

Syllabus

(To be implemented from Academic Year 2013-14)

Submitted by: Board of Studies, Statistics

1) Title of the Course: First Year B. Sc. (Computer Science)

2) Preamble: Statistics is a branch of science that can be applied practically in every walk of life. Statistics deals with any decision making activity in which there is certain degree of uncertainty and Statistics helps in taking decisions in an objective and rational way. The student of Statistics can study it purely theoretically which is usually done in research activity or it can be studied as a systematic collection of tools and techniques to be applied in solving a problem in real life.

In last 5 to 7 years, computers are playing very crucial role in the society. The use of computers has horizontally spread and also penetrated vertically in the society. It has become a part and parcel of common man. Thus there is a huge demand for computer education.

The University of Pune had done a pioneering work in this area and Three year degree course B. Sc. (Computer Science) of University of Pune (formerly known as B.C.S.) is very popular among the student community and I. T. Industry. This course covers various subjects which are required directly or indirectly for becoming computer professional. Statistics is one such important subject which is required and is extensively used in a vast spectrum of computer based applications. Data Mining and Warehousing, Theoretical Computer Science, Reliability of a computer Programme or Software, Machine Learning, Artificial Intelligence, Pattern Recognition, Digital Image Processing, Embedded Systems are just few applications to name where Statistics can be extensively used.

3) Introduction: The syllabus of Statistics for First Year of this course covers basic concepts and terminology in Statistics and covers basic tools and methods required for data analysis. The teachers teaching this syllabus and students should give emphasis on understanding the concepts and ability to apply statistical tools and techniques and not on the theoretical discussion. It is

expected that at the end of the course, a student should be well equipped to learn and apply acquired techniques in computer based applications.

4) Eligibility: 12th Science with Mathematics

Students admitted to F.Y.B.Sc.(C.S.) will be taking this as one of the compulsory course. Admissions to F.Y.B.Sc.(C.S.) will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5) Examination:

A) Pattern of examination and of question paper:

For Theory Papers (For Paper I and II):

Internal examination - 20 marks (10 marks for each semester)

Objective type/ short answer questions with maximum 2 marks for each question.

University Examination - 80 marks at the end of the year.

5 questions carrying 16 marks each.

Q1: Attempt all of the following: (2 marks each) (8 sub questions)

Q2, Q3, Q4, Q5: Attempt any four of the following (4 marks each) (any 4 out of 5 or out of 6)

For Practical paper in Statistics (Paper III):

Internal Evaluation of 20 marks -

(i) Statistics Journal & Attendance – 10 marks

(ii) Project Evaluation – 5 marks

(iii) Viva – 5 marks

External Examination of 80 marks – Total Duration 3 hours

(i) Questions based upon spreadsheet – 3 questions (1 question on diagrams) each of 10 marks should be asked. Total Duration – 1 hour, Total marks – 30.

(ii) Questions to be solved manually using scientific calculator – to solve any two questions out of 3 questions of 25 marks each. Total Duration – 2 hours, Total marks – 50.

B) Standard of Passing: In order to pass in the first year theory and practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks must be obtained in the University Theory Examination.)

C) ATKT Rules: Not applicable, since Statistics is one of the compulsory courses taken at F.Y. level.

D) Award of Class: Not applicable, since Statistics is one of the compulsory courses taken at F.Y. level.

E) External Students: There shall be no external students.

F) Pattern of question paper: As specified in A)

G) Verification/Revaluation: As per the University rules

6) Structure of the Course:

F. Y. B. Sc.(C.S.) Statistics

Paper	Course Title	Marks	Lectures
Paper - I	Statistical Methods I	100	Three Hours/Week per Paper (Total 36/Paper per term)
Paper - II	Statistical Methods II	100	
Practical Course	Practical Course	100	Three Hours / Week

Medium of Instruction: The medium of instruction for the course shall be English

7) Equivalence of Previous Syllabus: No equivalence required at F. Y. B. Sc. level, the course titles are same as previous syllabus.

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Course wise Detail Syllabus

Detailed Syllabus for Statistics Paper I (Statistical Methods I)

1.	Data condensation and Graphical methods 1.1 Raw data, attributes and variables, discrete and continuous variables. 1.2 Presentation of data using frequency distribution and cumulative frequency distribution. (Construction of frequency is not expected) 1.3 Graphical Presentation of frequency distribution –histogram, stem and leaf chart, less than and more than type ogive curves. 1.4 Numerical problems related to real life situations.	5
----	--	---

2.	<p>Review/Revision of Descriptive Statistics</p> <p>2.1 Measures of Central tendency: Mean, Mode, Median. Examples where each one of these is most appropriate.</p> <p>2.2 Partition values: Quartiles, Box-Plot.</p> <p>2.3 Measures of Dispersion: Variance, Standard Deviation, Coefficient of Variation.</p> <p>(Section 2.1 to 2.3 should be covered for raw data, ungrouped frequency distribution and exclusive type grouped frequency distribution)</p>	7
3.	<p>Moments</p> <p>3.1 Raw and Central moments: definition, computations for ungrouped and grouped data (only up to first four moments).</p> <p>3.2 Relation between raw and central moments upto fourth order.</p> <p>3.3 Numerical problems related to real life situations.</p>	3
4.	<p>Measures of Skewness and Kurtosis</p> <p>4.1 Concept of symmetric frequency distribution, skewness, positive and negative skewness.</p> <p>4.2 Measures of skewness-Pearson's measure, Bowley's measure, β_1, γ_1.</p> <p>4.3 Kurtosis of a frequency distribution, measure of kurtosis(β_2, γ_2) based upon moments, type of kurtosis: leptokurtic, platykurtic and mesokurtic.</p> <p>4.5 Numerical problems related to real life situations.</p>	4
5.	<p>Discrete Random variable</p> <p>5.1 Definition of random variable and discrete random variable.</p> <p>5.2 Definition of probability mass function, distribution function and its properties.</p> <p>5.3 Definition of expectation and variance, theorem on expectation.</p> <p>5.4 Determination of median and mode using p.m.f.</p> <p>5.5 Numerical problems related to real life situations.</p>	8
6.	<p>Standard Discrete Distributions</p> <p>6.1 Discrete Uniform Distribution: definition, mean, variance.</p> <p>6.2 Bernoulli Distribution: definition, mean, variance, additive property.</p> <p>6.3 Binomial Distribution: definition, mean, variance, additive property.</p> <p>6.4 Geometric Distribution (p.m.f $p(x) = pq^x$, $x = 0, 1, 2, \dots$): definition, mean, variance.</p> <p>6.5 Poisson Distribution: definition, mean, variance, mode, additive property, limiting case of $B(n, p)$</p> <p>6.6 Illustration of real life situations.</p> <p>6.7 Numerical problems related to real life situations.</p>	15
7.	<p>Correlation (for bivariate raw data)</p> <p>7.1 Bivariate data, Scatter diagram.</p> <p>7.2 Correlation, Positive Correlation, Negative Correlation, Zero Correlation</p> <p>7.3 Karl Pearson's coefficient of correlation (r), limits of r ($-1 \leq r \leq 1$), interpretation of r, Coefficient of determination (r^2), Auto-correlation upto lags 2.</p> <p>7.4 Numerical Problems.</p>	6

8	<p>Regression (for ungrouped data)</p> <p>8.1 Regression: illustrations, appropriate situations for regression and correlation.</p> <p>8.2 Linear Regression.</p> <p>8.3 Fitting of straight line using least square method.</p> <p>8.4 Properties of regression coefficients: $b_{xy} \cdot b_{yx} = r^2$, $b_{yx} \cdot b_{xy} < 1$, $b_{yx} = r(\sigma_y/\sigma_x)$ and $b_{xy} = r(\sigma_x/\sigma_y)$</p> <p>8.5 Non Linear regression models: second degree curve, growth curve models. i) $Y = ae^{bx}$ ii) $Y = ab^x$ iii) $Y = aX^b$ iv) logistic model $Y = k / (1+e^{a+bx})$</p> <p>8.6 Residual plot, mean residual sum of squares (m. s. s)</p> <p>8.7 Numerical problems related to real life situations.</p>	9
9	<p>Multiple and Partial Correlation and Regression (for trivariate data)</p> <p>9.1 Yule's notation and concept of multiple regression.</p> <p>9.2 Fitting of multiple regression plane.</p> <p>9.3 Partial regression coefficient, interpretation.</p> <p>9.4 Multiple correlation coefficient, concept, definition, computation and interpretation.</p> <p>9.5 Partial correlation coefficient, concept, definition, computation and interpretation.</p>	8
10	<p>Time Series</p> <p>10.1 Meaning and Utility.</p> <p>10.2 Components of Time Series.</p> <p>10.3 Additive and Multiplicative models.</p> <p>10.4 Methods of estimating trend: moving average method, least squares method and exponential smoothing method.</p> <p>10.5 Elimination of trend using additive and multiplicative models.</p> <p>10.6 Simple time series models: AR (1), AR (2).</p> <p>10.7 Numerical problems related to real life situations.</p>	7
Syllabus for 1 st term is upto Binomial Distribution in Topic 6.		

Detailed Syllabus for Statistics Paper II (Statistical Methods II)

1	<p>Detailed Review / Revision of Theory of Probability</p> <p>1.1 Counting Principles, Permutation, and Combination.</p> <p>1.2 Deterministic and non-determination models.</p> <p>1.3 Random Experiment, Sample Spaces (finite and countably infinite)</p> <p>1.4 Events: types of events, Operations on events.</p> <p>1.5 Probability - classical definition, probability models, axioms of probability, probability of an event.</p> <p>1.6 Theorems of probability (with proof) i) $0 \leq P(A) \leq 1$ ii) $P(A) + P(A') = 1$ iii) $P(A) \leq P(B)$ when $A \subset B$ iv) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$</p> <p>1.7 Numerical problems related to real life situations.</p>	5
---	--	---

2	<p>Advanced Theory of Probability</p> <p>2.1 Concepts and definitions of conditional probability, multiplication theorem $P(A \cap B) = P(A) \cdot P(B A)$</p> <p>2.2 Bayes' theorem (without proof)</p> <p>2.3 Concept of Posterior probability, problems on posterior probability.</p> <p>2.4 Definition of sensitivity of a procedure, specificity of a procedure. Application of Bayes' theorem to design a procedure for false positive and false negative.</p> <p>2.5 Concept and definition of independence of two events.</p> <p>2.6 Numerical problems related to real life situations.</p>	12
3	<p>Continuous Random Variable</p> <p>3.1 Definition of continuous random variable (r. v.),</p> <p>3.2 Probability density function (p.d.f.),</p> <p>3.3 Cumulative distribution function (c.d.f.), its properties.</p> <p>3.4 Calculation of mean, mode, median, variance, standard deviation for continuous r. v.</p> <p>3.5 Numerical problems related to real life situations.</p>	6
4	<p>Standard Continuous Probability Distributions</p> <p>4.1 Uniform Distribution: statement of p.d.f., mean, variance, nature of probability curve.</p> <p>4.2 Exponential Distribution: statement of p.d.f. of the form, $f(x) = (1/\theta) e^{(-x/\theta)}$, mean, variance, nature of probability curve, lack of memory property.</p> <p>4.3 Normal Distribution: statement of p.d.f., identification of parameters, nature of probability density curve, standard normal distribution, symmetry, distribution of $aX+b$, $aX+bY+c$ where X and Y are independent normal variables, computations of probabilities using normal probability table, normal approximation to binomial and Poisson distribution, central limit theorem (statement only), normal probability plot.</p> <p>4.4 Pareto Distribution: p.d.f. of the form $f(x) = \frac{\alpha}{x^{\alpha+1}}$, $x \geq 1, \alpha > 0$, mean, variance, applications.</p> <p>4.5 Numerical problems related to real life situations.</p>	13
	End of First term.	
5	<p>Concepts and definitions related to testing of hypothesis</p> <p>5.1 Definitions: population, statistic, SRSWR, SRSWOR, random sample from a probability distribution, parameter, statistic, standard error of estimator.</p> <p>5.2 Concept of null hypothesis and alternative hypothesis, critical region, level of significance, type I and type II error, one sided and two sided tests, p-value.</p>	5

6	<p>Large Sample Tests</p> <p>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)</p> <p>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)</p> <p>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)</p> <p>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)</p> <p>6.5 Numerical problems related to real life situations.</p>	7
7	<p>Tests based on t-distribution</p> <p>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)</p> <p>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)</p> <p>7.3 Paired t-test.</p> <p>7.4 Test of significance of correlation coefficient for bivariate raw data.</p> <p>7.5 Test of significance of regression coefficients for bivariate raw data.</p> <p>7.6 Numerical problems related to real life situations.</p>	8
8	<p>Test based on Chi-square distribution</p> <p>8.1 Chi square test for goodness of fit</p> <p>8.2 Test for independence of attributes (m X n contingency table)</p> <p>8.3 Test for significance of variation for a population.</p> <p>8.4 Numerical problems related to real life situations.</p>	3
9	<p>Non parametric tests</p> <p>9.1 Run test</p> <p>9.2 Sign test.</p> <p>9.3 Kolmogrov - Smirnov test</p> <p>9.4 Mann – Whitney test</p> <p>9.5 Numerical problems related to real life situations.</p>	6
10	<p>Simulation</p> <p>10.1 Introduction to Simulation, merits and demerits and pitfall.</p> <p>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.</p> <p>10.3 Model Sampling from uniform and exponential distribution.</p> <p>10.4 Model sampling from Normal distribution using Box-Muller transformation.</p> <p>10.5 Numerical problems related to real life situations.</p>	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 from 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

Gupta S. C. and Kapoor V. K.	1987	Fundamentals of Applied Statistics (3rd Edition)	S. Chand and Sons, New Delhi.
Ross S. M.	2006	A First Course In Probability 6th Edition	Pearson publication
Law A. M. and Kelton W. D.	2007	Simulation Modelling and Analysis	Tata McGraw Hill
Box G. E. P. and Jenkins G. M.	2008	Time Series Analysis, 4 th edition	Wiley
Brockwell P. J. and Davis R. A.	2006	Time Series Methods	Springer
Snedecor G. W. Cochran W. G.	1989	Statistical Methods	John Wiley & sons
Kulkarni M.B., Ghatpande S.B., Gore S.D.	1999	Common Statistical Tests	Satyajeet Prakashan, Pune
Kulkarni M.B., Ghatpande S.B.	2007	Introduction to Discrete Probability and Probability Distributions	SIPF Academy
Sarma K.V.S.	2001	Statistics Made Simple. Do it Yourself on P.C.	Prentice Hall

11) Qualification of Teacher: As per the University rules

Syllabus for S.Y.B.Sc.(Computer Science) to be implemented from 2014-15

Important to Note about Laboratory courses: It is absolutely necessary and essential that all the practical's for Paper III and Paper IV be conducted on Free and Open Source Operating System like Linux.

- All the practical's related to C and C++ needs to be conducted using GCC compiler.
- For laboratory work/assignments of Database Systems, PostgreSQL to be used.

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

S.Y.B.Sc. Computer Science Syllabus (To be implemented from Academic Year 2014-15)

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/practical' s 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' Programmi ng	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Paper II CS-102)	File Organizatio n and Fundament al 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 Semester)	04	16	20 *
Practical paper I (CS 223) (First & Second Sem)	Data structures Practicals and C++ Practicals	Practicals of 4 lectures each 25 practicals/Yr.)	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/ Yr.)	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. Computer 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 andProject	

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. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical 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 Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 13) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 22) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, the Question paper slips will be provided by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers: Papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Computer Science Degree Program shall be three years.

a) All are Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 2 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 2 Practical (Annual)

T.Y.B.Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :

F.Y.B.Sc.Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc.Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be **English.**

7) Equivalence of Previous Syllabus:

Semester & Paper	Title of Paper (Old Pattern)(Implemented from theacademic year 2009-10)	Title of Paper (New Pattern)(to be implemented from the academic year 2014-15)
Semester-I, Paper-I	CS-211, Data Structures Using C	CS-211 Data Structures using 'C'
Semester-I, Paper-II	CS- 212, Relational Database Management System	CS-212 Relational Database Management System
Semester-II, Paper-I	CS-221, Object Oriented Concepts and Programming in C++	CS-221 Object Oriented Conceptsusing C++
Semester-II, Paper-II	CS-222, Software Engineering	CS-222Software Engineering
Practical paper II (CS 223) (First & Second	CS-224: Database Assignments and Mini Project using Software Engineering	CS-224: Database Practicals & Mini Project using Software

Semester)	Techniques	Engineering techniques
-----------	------------	------------------------

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Computer Science/M.C.A. or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.

10) Detail Syllabus with Recommended Books:

S.Y.B.Sc. Computer Science Paper I

CS-211: Data Structures using 'C'
 CS-221: Object Oriented Concepts using C++

S.Y.B.Sc. Computer Science Paper II

CS-212: Relational Database Management System
 CS-222: Software Engineering

S.Y.B.Sc. Computer Science Paper III

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

S.Y.B.Sc. Computer Science Paper IV

CS-224: Database Practicals & Mini Project using Software Engineering techniques

S.Y.B.Sc. Computer Science Theory Paper I
Semester – 1
CS 211- DATA STRUCTURES USING ‘C’
(Compulsory Course)

Total Lectures: 48

Objective:

1. To learn the systematic way of solving problem
2. To understand the different methods of organizing large amount of data
3. To efficiently implement the different data structures
4. To efficiently implement solutions for specific problems

Prerequisites: Knowledge of C Programming Language

1. Introduction to data structures [3]

- 1.1 Concept
- 1.2 Data type, Data object, ADT
 - 1.2.1 Data Type
- 1.2.2 Data Object
 - 1.2.3 ADT -Definition, Operation, examples on rational number
- 1.3 Need of Data Structure
- 1.4 Types of Data Structure

2. Algorithm analysis [2]

- 2.1 Algorithm – definition, characteristics
- 2.2 Space complexity, time complexity
- 2.3 Asymptotic notation (Big O, Omega Ω)

3. Linear data structures [6]

- 3.1 Introduction to Arrays - array representation
- 3.2 Sorting algorithms with efficiency
 - Bubble sort, Insertion sort, Merge sort, Quick Sort
- 3.3 Searching techniques –Linear Search, Binary search

4. Linked List [8]

- 4.1 Introduction to Linked List
- 4.2 Implementation of Linked List – Static & Dynamic representation,
- 4.3 Types of Linked List
- 4.4 Operations on Linked List
 - create, display, insert, delete, reverse, search, sort, concatenate &merge
- 4.5 Applications of Linked List – polynomial manipulation
- 4.6 Generalized linked list – Concept and Representation

5. Stacks [6]

- 5.1 Introduction
- 5.2 Representation- Static & Dynamic
- 5.3 Operations
- 5.4 Application - infix to postfix, infix to prefix, postfix evaluation,
- 5.5 Simulating recursion using stack

6. Queues [4]

- 6.1 Introduction
- 6.2 Representation - Static & Dynamic
- 6.3 Operations
- 6.4 Circular queue, priority queue (with implementation)
- 6.5 Concept of doubly ended queue

7. Trees [12]

- 7.1 Concept & Terminologies
- 7.2 Binary tree, binary search tree
- 7.3 Representation – Static and Dynamic
- 7.4 Operations on BST – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes , non recursive inorder traversal
- 7.5 Application - Heap sort
- 7.6 Height balanced tree- AVL trees- Rotations, AVL tree examples.

8. Graph [7]

- 8.1 Concept & terminologies
- 8.2 Graph Representation – Adjacency matrix, adjacency list, inverse Adjacency list, adjacency multilist, orthogonal list
- 8.3 Traversals – BFS and DFS
- 8.4 Applications – AOV network – topological sort, AOE network – critical path

References:

1. Fundamentals of Data Structures ---- By Horowitz Sahani (Galgotia)
2. Data Structures using C and C++ --- By [YedidyahLangsam](#), [Aaron M. Tenenbaum](#), [Moshe J. Augenstein](#)
3. Introduction to Data Structures using C---By Ashok Kamthane
4. Data Structures using C --- Bandopadhyay&Dey (Pearson)
5. Data Structures using C ---By Srivastava BPB Publication.

S.Y.B.Sc. Computer Science Theory paper-II
Semester – I

CS-212-Relational Database Management System
(Compulsory Course)

Total Lectures: 48

Objective:-

- To teach fundamental concepts of RDBMS (PL/PgSQL)
- To teach principles of databases
- To teach database management operations
- To teach data security and its importance
- To teach client server architecture

Prerequisites: Knowledge of DBMS

1. Relational Database Design [14]

1.1 Preliminaries

Functional Dependencies

Basic concepts : Closure of a set of functional dependencies, Closure of attribute set, Canonical cover, Decomposition.

1.2 PL/PgSQL: Datatypes, Language structure

1.3 Controlling the program flow, conditional statements, loops

1.4 Views

1.5 Stored Functions, Stored Procedures

1.6 Handling errors and exceptions

1.7 Cursors

1.8 Triggers

2 Transaction Concepts and concurrency control [14]

2.1 Describe a transaction, properties of transaction, state of the transaction.

2.2 Executing transactions concurrently associated problem in concurrent execution.

2.3 Schedules, types of schedules, concept of Serializability, precedencegraph for Serializability.

2.4 Ensuring Serializability by locks, different lock modes, 2PL and its variations.

2.5 Basic timestamp method for concurrency, Thomas Write Rule.

2.6 Locks with multiple granularity, dynamic database concurrency (Phantom Problem).

2.7 Timestamps versus locking.

2.8 Deadlock handling methods

2.8.1 Detection and Recovery (Wait for graph).

2.8.2 Prevention algorithms (Wound-wait, Wait-die)

3 Database Integrity and Security Concepts [8]

3.1 Domain constraints

3.2 Referential Integrity

3.3 Introduction to database security concepts

3.4 Methods for database security

3.4.1 Discretionary access control method

3.4.2 Mandatory access control and role base access control for multilevel security.

3.5 Use of views in security enforcement.

3.6 Overview of encryption technique for security.

3.7 Statistical database security.

4 Crash Recovery [8]

4.1 Failure classification

4.2 Recovery concepts

4.3 Log base recovery techniques (Deferred and Immediate update)

4.4 Checkpoints

4.5 Recovery with concurrent transactions (Rollback, checkpoints, commit)

4.6 Database backup and recovery from catastrophic failure.

5. Client-Server Technology [4]

5.1 Describe client-server computing.

5.2 Evolution of Client - Server information systems.

5.3 Client – Server Architecture benefits.

5.4 Client Server Architecture

- Components, Principles, Client Components
- Communication middleware components
- Database middleware components
- Client Server Databases

References:-

1. Fundamentals of Database Systems (4th Ed) By: Elmasri and Navathe
2. Database System Concepts (4th Ed) By: Korth, Sudarshan, Silberschatz
3. Practical PostgreSQL O'REILLY
4. Beginning Databases with PostgreSQL, From Novice to Professional, 2nd Edition By Richard Stones , Neil Matthew, Apress

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.

S.Y.B.Sc.(Computer Science) : Paper III : Data Structures using C Assignments

No	Topic	Lectures
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

CS-224:Database Practicals & Mini Project using Software Engineering techniques (Semester 1)

Title: Database Assignments and Mini Project using Software Engineering techniques

Objective:-

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

S.Y.B.Sc. Computer Science Theory Paper I
Semester II
CS 221 -Object Oriented Concepts using C++

Total Lectures: 48

Objective:-

1. Acquire an understanding of basic object oriented concepts and the issues involved in effective class design
2. Write C++ programs that use object oriented concepts such as information hiding, constructors, destructors, inheritance etc.

Prerequisites: Knowledge of C Programming Language

1. Object oriented concepts [2]

- 1.1 Object oriented concepts
- 1.2 Features, advantages and Applications of OOPS

2. Introduction to C++ [6]

- 2.1 Data types, new operators and keywords, using namespace concept
- 2.2 Simple C++ Program
- 2.3 Introduction to Reference variables
- 2.4 Usage of 'this' pointer
- 2.5 Classes and Objects
- 2.6 Access specifiers
- 2.7 Defining Data members and Member functions
- 2.8 Array of objects

3. Function in C++ [8]

- 3.1 Call by reference, Return by reference
- 3.2 Function overloading and default arguments
- 3.3 Inline function
- 3.4 Static class members
- 3.5 Friend Concept – Function, Class

4. Constructors and destructor [4]

- 4.1 Types of constructors
- 4.2 Memory allocation (new and delete)
- 4.3 Destructor

5. Operator overloading [4]

- 5.1 Overloading Unary and Binary operators
- 5.2 Overloading using friend function
- 5.3 Type casting and Type conversion

6. Inheritance [8]

- 6.1 Types of inheritance with examples
- 6.2 Constructors and destructor in derived classes
- 6.3 Virtual base classes, Virtual functions and Pure virtual function
- 6.4 Abstract base classes

7. Managing Input and Output using C++ [4]

- 7.1 Managing console I/O
- 7.2 C++ stream classes
- 7.3 Formatted and unformatted console I/O
- 7.4 Usage of manipulators

8. Working with files [6]

- 8.1 File operations – Text files, Binary files
- 8.2 File stream class and methods
- 8.3 File updation with random access
- 8.4 Overloading insertion and extraction operator

9. Templates [4]

- 9.1 Introduction to templates
- 9.2 Class templates, function templates and overloading of function templates
- 9.3 Templates with multiple parameters

10. Exception Handling in C++ [2]

- 10.1 try, catch and throw primitives

Reference Books: -

1. Object Oriented Programming with C++ by Robert Lafore
2. Object Oriented Programming with C++ by E. Balagurusamy
3. Object Oriented Modeling and Design by James Rumbough
4. The Complete Reference C++ by Herbert Schildt
5. Let us C++ by – YashwantKanitkar
6. Mastering C++ by Venugopal, T Ravishankar, RajkumarTHM Pub.
7. Trouble free C++ by HarimohanPande, ANE publication

S.Y.B.Sc.Computer Science Theory paper-II

Semester – II

CS - 222: Software Engineering

Total Lectures : 48

Objectives:-

- To teach basics of System Analysis and Design.
- To teach principles of Software Engineering
- To teach various process models used in practice
- To know about the system engineering and requirement engineering
- To build analysis model

Prerequisites: Basic knowledge of DBMS

1. System Concepts [5] (R1 : Chapter 1 & R3 : Chapter 1)

1.1 System Definition

1.2 Characteristics of a System : Organization, Subsystem, Interaction, Interdependence, Integration, Central objective, Standards, Black-box

1.3 Elements of a system : Outputs, Inputs, Processor(s), Control, Feedback, Environment, Boundaries, Interface.

1.4 Types of Systems : Physical & Abstract Systems, Open & Closed Systems, Computer-based Systems (MIS : Management Information System & DSS : Decision Support System)

2. Software and Software Engineering [5] (R2 : Chapter 1)

2.1 The Nature of Software

2.1.1 Defining Software

2.1.2 Software Application Domains

2.1.3 Legacy Software

2.2 Software Engineering

2.3 The Software Process

- 2.4 Software Engineering Practice**
 - 2.4.1 The Essence of Practice**
 - 2.4.2 General Principles**
- 2.5 Software Myths**
- 3. System Development Life Cycle (SDLC) [8] (R3 : Chapter 1)**
 - 3.1 Introduction**
 - 3.2 Activities of SDLC**
 - 3.2.1 Preliminary Investigation (Request Clarification, Feasibility Study, Request Approval)**
 - 3.2.2 Determination of System Requirements**
 - 3.2.3 Design of System**
 - 3.2.4 Development of Software**
 - 3.2.5 System Testing (Unit Testing, Integration testing, System Testing)**
 - 3.2.6 System Implementation & Evaluation**
 - 3.2.7 System Maintenance**
- 4. Process Models [6] (R2 : Chapter 2)**
 - 4.1 A Generic Process Model**
 - 4.2 Prescriptive Process Models**
 - 4.2.1 The Waterfall Model**
 - 4.2.2 Incremental Process Models**
 - 4.2.3 Evolutionary Process Models**
 - 4.2.3.1 Prototyping**
 - 4.2.3.2 Spiral Model**
 - 4.2.4 Concurrent Models**
- 5. Requirements Engineering [8] (R2 : Chapter 5)**
 - 5.1 Introduction**
 - 5.2 Requirements Engineering Tasks**

- 5.2.1 Inception
- 5.2.2 Elicitation
- 5.2.3 Elaboration
- 5.2.4 Negotiation
- 5.2.5 Specification
- 5.2.6 Validation
- 5.2.7 Requirements Management
- 5.3 Initiating the Requirements Engineering Process
 - 5.3.1 Identifying the Stakeholders
 - 5.3.2 Recognizing Multiple Viewpoints
 - 5.3.3 Working toward Collaboration
- 5.4 Fact Finding Techniques (**R3 : Chapter 3**)
 - 5.4.1 Interview
 - 5.4.2 Questionnaire
 - 5.4.3 Record Review
 - 5.4.4 Observation
- 6. Structured Analysis Development Strategy [10] (R3 : Chapter 4)**
 - 6.1 Structured Analysis
 - 6.1.1 What is Structured Analysis?
 - 6.1.2 Components of Structured Analysis
 - 6.1.3 What is Data Flow Analysis?
 - 6.2 Features & Tools of Data Flow Analysis
 - 6.2.1 Logical Data Flow Diagram (Logical DFD)
 - 6.2.1.1 Notations
 - 6.2.1.2 Drawing a Context Diagram
 - 6.2.1.3 Exploding A Context diagram into Greater detail (1st level, 2nd Level DFD etc...)

6.2.1.4 Evaluating Data Flow Diagram for Correctness

6.2.2 A Data Dictionary

6.2.2.1 What is a Data Dictionary?

6.2.2.2 Why is a Data Dictionary Important?

6.2.2.3 What does a Data Dictionary Record?

7. An Agile View of Process [6] (R2 : Chapter 3)

7.1 What is an Agility?

7.2 What is an Agile Process?

7.2.1 The Politics of Agile Development

7.2.2 Human Factors

7.3 Agile Process Models

7.3.1 Extreme Programming (XP)

7.3.2 Adaptive Software Development (ASD)

7.3.3 Dynamic Systems Development Method (DSDM)

Reference Books :

R1 : System Analysis and Design (Second Edition) by Elias M. Awad, Galgotia Publications Pvt. Ltd.

R2 : Software Engineering : A Practitioner's Approach (Seventh Edition) by Roger S. Pressman, McGraw Hill International Edition.

R3 : Analysis and Design of Information Systems (Second Edition) by James A. Senn, McGraw Hill International Editions.

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

(semester 2)

C++ Lab Assignments

1	Class , Object and methods implementation	4
2	Constructor: Copy Constructor, Default Constructor, Parameterized Constructor	4
3	Memory Allocation: new and delete operators , dynamic constructor	4
4	Inline function, friend function, default argument,	4
5	Function Overloading.	4
6	Operator overloading.	8
7	Inheritance: Single, multiple, multilevel, hierarchy, Constructor and destructor in derived class	12
8	File Handling: Updation of files using random access	4

**CS-224: Database Practicals & Mini Project using Software
Engineering techniques
(Semester 2)**

No	Topic	Lectures
1	Problem definition , scope	8
2	Feasibility study	4
3	Gathering Data Requirements and Functional Requirement	12
4	ERD	4
5	Designing the normalized Database	8
6	Designing queries related to Functional requirements	12

University of Pune
S.Y.B.Sc.(Computer Science) Practical Examination
Lab Course I
(Data Structures Using C & Object Oriented Programming Concepts Using C++)

Duration: 3 hours

Max. Marks: 80

Q 1. Data Structures using C

1. Simple program based on searching / sorting / ADT of Stack, Queue, operations on linked list [15]
2. Program based on applications of stack/queue/linked list, trees / graph [25]

OR

3. Program based on case study involving multiple data structures [40]

Q 2. Object Oriented Concepts and Programming in C++

1. Program based on different concepts in C++ [30]

OR

2. Program based on different concepts in C++ [30]
3. Viva [10]

University of Pune
Board of Studies in Mathematics
S. Y. B. Sc. (Comp. Sc.)
Syllabus of Mathematics

Introduction:

University of Pune has decided to change the syllabi of various faculties from June,2013.

Taking into consideration the rapid changes in science and technology and new approaches in different areas of mathematics and related subjects Board of studies in Mathematics with concern of teachers of Mathematics from different colleges affiliated to University of Pune has prepared the syllabus of S.Y.B.Sc. Comp.Sci. Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- i) Give the students a sufficient knowledge of fundamental principles ,methods and a clear perception of innumerous power of mathematical ideas and tools and know how to use them by modeling ,solving and interpreting.
- ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science.
- iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills , creative talent and power of communication necessary for various kinds of employment .
- iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

(i) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays, state important facts resulting from their studies.

(ii) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.

(iii) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.

(iv) A student be able to apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.

(v) A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.

Eligibility: F.Y.B.Sc. Comp.Sci., as per University rules

Structure of the course:

	Semester - I		Semester -II	
Paper I	Applied Algebra	(MTC :211)	Computational Geometry	(MTC:221)
Paper II	Numerical Analysis	(MTC:212)	Operations Research	(MTC:222)
Paper III	Practical			(MTC:223)

In paper I and II, each course is of 50 marks (40 marks theory and 10 marks internal examination)

Paper III is is of 100 marks

Medium of Instruction: English

Examination:

A) Pattern of examination: Paper I and II:Semester wise
PaperIII: Practical Annual

B) Standard of passing :For Paper I and II: 20 Marks out of 50 marks for eachcourse.

But for passing a student should obtain minimum 16 marks out of 40 in the theory and oral examination and overall total marks for theory, oral and internal should be minimum 20.

C) Pattern of question papers: For Paper I and Paper II

Q1. Attempt any 05 out of 07 questions each of 02 marks. [10Marks]

Q2. Attempt any 02 out of 03 questions each of 05 marks. [10 Marks].

Q.3. Attempt any 02 out of 03 questions each of 05 marks. [10 Marks].

Q.4. Attempt any 01 out of 02 questions each of 10 marks. [10 Marks].

The pattern of question paper for Paper III : Given in details of Syllabus

D) External Students: Not allowed.

E) Variation / Revaluation: Allowed for Paper I and II.

F) Qualifications for Teacher: M.Sc. Mathematics (with NET /SET as per existing rules)

Equivalence of Previous syllabus along with new syllabus:

Semester I		Semester II	
New Course	Old Course	New Course	Old Course
(MTC :211) Applied Algebra	(MTC :211) Linear Algebra	(MTC:221) Computational Geometry	(MTC:221) Computational Geometry
(MTC:212) Numerical Analysis	(MTC:212) Numerical Analysis	(MTC:222) Operations Research	(MTC:222) Operations Research
MTC 223 Practical			

Applied Algebra (MTC: 211)

1. General Vector Spaces: [14]
 - 1.1 Real vector spaces.
 - 1.2 Subspaces.
 - 1.3 Linear independence.
 - 1.4 Basis and dimensions.
 - 1.5 Row space, Column space and null space.
 - 1.6 Rank and Nullity.
2. Eigen values and Eigen vectors: [09]
 - 2.1 Eigen values and Eigen vectors.
 - 2.2 Diagonalization.
 - 2.3 Quadratic forms.
3. Linear Transformations: [10]
 - 3.1 General linear transformations.
 - 3.2 Kernel and range. (Rank nullity theorem without proof.)
 - 3.3 Inverse linear transformation.
 - 3.4 Matrix of general linear transformation.
4. Groups and Coding: [15]
 - 4.1 Cyclic group, normal subgroup.
 - 4.2 Products and quotients of groups.
 - 4.3 Coding of binary information and error detection.
 - 4.4 Decoding and error correction.
 - 4.5 Public key cryptology.

Note: All theorems in sections 1.5, 1.6, 2.2, 2.3, 2.4, 3.3, 3.4, 4.1, 4.2, 4.3, 4.4 are without proofs.

Text Book:

1. Elementary Linear Algebra (Applications Version) by Howard Anton, Chris Rorres. (Seventh Edition) John Wiley & Sons, Inc.
Sections: 5.1 to 5.6, 7.1, 7.2, 9.5, 9.6, 8.1 to 8.4

2. Discrete Mathematical Structures (sixth edition), Kolman, Busby and Ross. PHI.

Sections: 9.5, 11.1 to 11.3

Reference Books:

- (1) M. Artin, Algebra, Prentice Hall of India , New Delhi, (1994).
- (2) K. Hoffmann and R. Kunze Linear Algebra, Second Ed. Prentice Hall of India New Delhi, (1998).
- (3) S. Lang, Introduction to Linear Algebra, Second Ed. Springer-Verlag, New York, (1986).
- (4) A. Ramchandra Rao and P. Bhimasankaran, Linear Algebra, Tata McGraw Hill, New Delhi (1994).
- (5) G. Strang, Linear Algebra and its Applications. Third Ed. Harcourt Brace Jovanovich, Orlando, (1988).

Numerical Techniques (MTC: 212)

1. Errors [02]
 - 1.1 Accuracy of Numbers
 - 1.2 Errors
2. Algebraic and Transcendental Equation [05]
 - 2.1 False Position Method
 - 2.2 Newton-Raphson Method
3. Calculus of Finite Differences [10]
 - 3.1 Differences
 - 3.1.1 Forward Differences
 - 3.1.2 Backward Differences
 - 3.1.3 Central Differences
 - 3.1.4 Other Differences
 - 3.1.5 Properties of Operators
 - 3.1.6 Relation between Operators
 - 3.2 Fundamental Theorem on Differences of polynomial
 - 3.3 Estimation of Error by Difference Table
 - 3.4 Technique to determine the Missing Term

- 4. Interpolation with Equal Interval [10]
 - 4.1 Newton's Gregory Formula for Forward Interpolation
 - 4.2 Newton's Gregory Formula for Backward Interpolation
 - 4.3 Central Difference Formulae
 - 4.3.1 Gauss Forward Difference Formula
 - 4.3.2 Gauss Backward Difference Formula
 - 4.3.3 Bessel's Interpolation Formula
- 5. Interpolation with Unequal Interval [08]
 - 5.1 Lagrange's Interpolation Formula
 - 5.2 Error in Lagrange's Interpolation Formula
 - 5.3 Divided Difference
 - 5.4 Newton's Divided Difference Formula
 - 5.5 Hermite's Interpolation Formula
- 6. Numerical Integration [06]
 - 6.1 General Quadrature Formula
 - 6.2 Trapezoidal Rule
 - 6.3 Simpson's one-Third Rule
 - 6.4 Simpson's Three-Eight Rule
 - 6.5 Euler-Maclaurin's Formula
- 7. Numerical Solution of Ordinary Differential Equation [07]
 - 7.1 Euler's Method
 - 7.2 Euler's Modified Method
 - 7.3 Runge-Kutta Method
 - 7.4 Milne's Predictor-Corrector Method

Text Book:-

A textbook of Computer Based Numerical and Statistical Techniques, by A. K. Jaiswal and Anju Khandelwal. New Age International Publishers.

Sections: 1.2, 1.3, 1.3, 2.1, 2.5, 2.7, 3.1, 3.2, 3.4, 3.5, 3.6, 3.7, 4.1, 4.2, 4.3, 4.4.1, 4.4.2, 4.4.4, 4.5, 5.1, 5.2, 5.3.1, 5.4, 5.5, 5.6, 6.1, 6.3, 6.4, 6.5, 6.6, 6.7, 6.10, 7.1, 7.4, 7.5, 7.6, 7.7

Reference Books:-

1. S.S. Sastry; Introductory Methods of Numerical Analysis, 3rd edition, Prentice Hall of India, 1999.
2. H.C. Saxena; Finite differences and Numerical Analysis, S. Chand and Company.
3. K.E. Atkinson; An Introduction to Numerical Analysis, Wiley Publications.
4. Balguruswamy; Numerical Analysis.

Computational Geometry (MTC : 221)

1. Two dimensional transformations:

[16]

- 1.1 Introduction.
- 1.2 Representation of points.
- 1.3 Transformations and matrices.
- 1.4 Transformation of points.
- 1.5 Transformation of straight lines.
- 1.6 Midpoint transformation.
- 1.7 Transformation of parallel lines.
- 1.8 Transformation of intersecting lines.
- 1.9 Transformation: rotations, reflections, scaling, shearing.
- 1.10 Combined transformations.
- 1.11 Transformation of a unit square.
- 1.12 Solid body transformations.
- 1.13 Transformation and homogeneous coordinates. Translation.
- 1.14 Rotation about an arbitrary point.
- 1.15 Reflection through an arbitrary line.
- 1.16 Projection – a geometric interpretation of homogeneous coordinates.
- 1.17 Overall Scaling.
- 1.18 Point at infinity.

2. Three dimensional transformations:

[16]

- 2.1 Introduction.
- 2.2 Three dimensional – Scaling, shearing, rotation, reflection, translation.
- 2.3 Multiple transformations.
- 2.4 Rotation about – an axis parallel to coordinate axes, an arbitrary axis in space.
- 2.5 Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary planes.

- 2.6 Affine and perspective transformations.
- 2.7 Orthographic projections.
- 2.8 Axonometric projections.
- 2.9 Oblique projections.
- 2.10 Single point perspective transformations.
- 2.11 Vanishing points.

3. Plane Curves:

[10]

- 3.1 Introduction.
- 3.2 Curve representation.
- 3.3 Non – parametric curves.
- 3.4 Parametric curves.
- 3.5 Parametric representation of a circle and generation of circle.
- 3.6 Parametric representation of an ellipse and generation of ellipse.
- 3.7 Parametric representation of a parabola and generation of parabolic Segment.
- 3.8 Parametric representation of a hyperbola and generation of hyperbolic segment.

4. Space curves:

[6]

- 4.1 Bezier Curves – Introduction, definition, properties (without proof), Curve fitting (up to $n = 3$), equation of the curve in matrix form (upto $n = 3$)

Textbook:

D. F. Rogers, J. A. Adams, Mathematical elements for Computer graphics, Mc Graw Hill Intl Edition.

Reference books:

- Schaum Series, Computer Graphics.
- M. E. Mortenson, Computer Graphics Handbook, Industrial Pres Inc

Operations Research (MTC:222)

1. **Modeling with Linear Programming** [06]
 - 1.1 Two-Variable LP Model
 - 1.2 Graphical LP Solution
 - 1.3 Linear Programming Applications
 - 1.3.1 Production Planning and Inventory Control
2. **The Simplex Method** [12]
 - 2.1 LP Model in Equation Form
 - 2.2 Transition from Graphical to Algebraic Solution
 - 2.3 The Simplex Method
 - 2.4 Artificial Starting Solution
 - 2.4.1 M-Method
 - 2.5 Special Cases in Simplex Method
3. **Duality** [08]
 - 3.1 Definition of the dual problem
 - 3.2 Primal dual relationships
4. **Transportation Model and Its Variants** [12]
 - 4.1 Definition of the Transportation problem
 - 4.2 The Transportation Algorithm
 - 4.3 The Assignment Model
5. **Decision Analysis and Games** [10]
 - 5.1 Optimal solution of two person zero sum games
 - 5.2 Solution of mixed strategy games

Text Book:-

Operation Research (An Introduction) Ninth Edition, by Hamdy A. Taha.

Sections: 2.1, 2.2, 2.4.2, 3.1, 3.2, 3.3, 3.4, 3.5, 4.1, 4.2, 5.1, 5.3, 5.4, 15.4

Reference Books:-

1. Operations Research by S. D. Sharma
2. Operations Research by R. Panneerselvam, Prentice Hall of India.
3. Principles of Operations Research by H. M. Wagner, Prentice Hall of India.
4. Operations Research by Gupta and Hira.
5. Operation Research by J.K. Sharma

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 rule.
- 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 distance from the given set
- ii. Find a pair of points with farthest 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 transformations

14. **Written practical** : Transportation and assignment problem
Verification by TORA

15. **Written practical** : 3 -D transformations.

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 to 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.

=====

S.Y.B.Sc. Computer Science (Electronics)
Revised Syllabus
To be implemented from A.Y. 2014-15

Structure of S. Y. B. Sc. (Computer Science) Course

Sem-I	Paper-I : Digital System Hardware (ELC 211)	Paper-II: Analog Systems (ELC 212)
Sem-II	Paper-I:The 8051 Architecture, Interfacing & Programming (ELC 221)	Paper-II:Communication Principles (ELC 222)
Sem-I & II	Paper- III: Practical Course (ELC 203)	

Equivalence Subject/Paper and Transitory Provision

Semester	Old Syllabus	New Syllabus
Semester I	Paper-I: Microprocessor and programming (ELC211)	Paper-I: Digital System Hardware (ELC 211)
	Paper- II: Communication Principles (ELC 212)	Paper-II: Communication Principles (ELC 222)
Semester II	Paper-I: 8051 Microcontroller and Embedded Systems (ELC 221)	Paper-I: The 8051 Architecture,Interfacing and Programming (ELC 221)
	Paper-II: Digital Signal processing (ELC 222)	Paper-II: Analog Systems (ELC 212)
Semester I and II	Practical course	Paper- III: Practical Course (ELC 203)

S.Y.B.Sc. (Computer Science) Electronics -Semester I

Paper - I: Digital System Hardware (ELC 211)

Objectives:

1. To study the applications of logic gates.
2. To use K-maps for digital circuit design.
3. To study and understand basics of microprocessors
4. To understand fundamentals of multicore technology

UNIT- 1: Digital circuit design

[12]

Introduction to digital circuit design, Circuit design using logic gates: Binary to gray converter, Gray to Binary converter, Decimal to BCD encoder
Circuit design using state table/K-map: Design of Full adder, full subtractor, BCD to seven segment decoder, Concept of excitation table, Design of 3 bit synchronous up counter , 3 bit random sequence generator .

UNIT- 2: Memory

[12]

Memory Architecture, Memory Hierarchy, Introduction to USB storage device, Memory parameters (Access time, speed, capacity, cost), Vertical & horizontal Memory expansion (increasing the capacity, increasing word size), Associative Memory, Cache memory, cache mapping techniques, virtual memory, virtual memory mapping (paging and segmentation).

UNIT- 3: Computer Organization

[14]

Concept of Address Bus, Data Bus, Control Bus. Register based CPU organization, stack organization, I/O organization: need of interface, block diagram of general I/O interface. Working concepts like polling, interrupt initiated data transfer. Concept of DMA , DMA transfer, DMA Controller Serial communication: Synchronous, asynchronous and their data transmission formats, RS-232, General block diagram of UART.

UNIT- 4: Microprocessor

[10]

Evolution of Microprocessor (8086 to Pentium 4), Features like address, data, bus size, speed, cache capacity, number of parallel instructions executed. Concept of RISC & CISC, Von-Neumann & Harvard Architecture, Concept of pipeline. Architecture of basic microprocessor:

8086 & Pentium (Basic Version), Introduction to multicore processors, its development and impact on Hardware, Software.

Recommended Books:

1. Fundamental of Digital electronics : R.P. Jain ,
2. Digital design : M. Morris Mano, Prentice-Hall of India
3. Computer System Architecture : Morris Mano, Prentice-Hall of India
4. The Pentium Microprocessor : James Antonakos
5. Microprocessors and Interfacing Programming and Hardware: Douglas V. Hall- TATA
McGRAW-HILL EDITION
6. The Intel Microprocessors : Barry B. Brey- Pearson Education Asia

S.Y.B.Sc. (Computer Science) Electronics-Semester I

Paper-II: Analog Systems (ELC 212)

Objectives:

- 1) To understand basics of analog electronics
- 2) To study different types of sensors
- 3) To understand different types of signal conditioning circuits
- 4) To learn data conversion techniques
- 5) To apply knowledge of analog systems in different applications

UNIT -1: Analog Electronic System

[14]

Introduction of analog electronic systems. Definition of sensors and transducers. Classification of sensors: Active and passive sensors. Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution, reproducibility. Temperature sensors (LM-35 and AD590), pH sensor, piezoelectric humidity sensor, optical sensor (LDR), displacement sensor (LVDT), Passive Infrared sensor (PIR), tilt sensor, touch sensor, ultrasonic sensor

UNIT- 2: Signal Conditioning

[14]

Introduction to signal conditioning, Signal conditioning of passive sensors using bridge circuit: Wheatstone 's bridge, Level Shifter, Amplifier, Three OP-amp instrumentation amplifier, Filters; active and passive filters, Concept of Order of filters. Working principle of Single order Op-Amp based Low Pass Filter, High Pass Filter, Band Pass Filter, Notch Filter, Band reject filter; Working of Voltage to frequency Converter using OpAmp.

UNIT- 3: Data Converters

[12]

Digital to Analog Converter (DAC): Resistive divider, R-2R ladder, Parameters: Linearity, resolution, accuracy, Analog to Digital Converter (ADC): Types of ADC- Flash, Successive approximation, dual slope. Parameters of ADC: Linearity, resolution, conversion time, accuracy. Applications of DAC and ADC.

UNIT – 4: Case studies

[08]

Temperature monitoring system using LM35, Intruder detector system using PIR sensor, Water Level Indicator system using float switch, Electrocardiography (ECG).

Recommended Books:

1. Sensors & Transducers : Dr. A. D. Shaligram: CTC publications
2. Op-Amps and Linear Integrated Circuits: Ramakant Gaikwad: PHI: 4th Ed.
3. Electronic Instrumentation: H. S. Kalsi: TMH: 2nd Ed.
4. Modern Electronic Instrumentation and Measurement Techniques: Albert D. Helfrick, William D. Cooper: PHI publications
5. Electronic measurements : K.A. Bakshi, A. V. Bakshi and U. A. Bakshi, Technical publications.
6. A Course in Electrical and Electronic measurements and Instrumentation: A.K. Sawhney: Dhanpat Rai & Sons Educational & technical publishers
7. Handbook of Biomedical instrumentation: R. Khandpur, Tata McGraw Hill Publications 2003.

S.Y.B.Sc(Computer Science) Electronics- Semester II

Paper-I: The 8051 Architecture, Interfacing & Programming (ELC 221)

Objectives:

1. To study the basics of 8051 microcontroller
2. To study the Programming and interfacing techniques of 8051
3. To apply knowledge of 8051 to design different application circuits
4. To introduce the basic concepts of advanced Microcontrollers

UNIT- 1: Basics of Microcontroller & Intel 8051 architecture [12]

Introduction to microcontrollers, difference in controller and processor. Architecture of 8051, Internal block diagram, Internal RAM organization, SFRS, pin diagram of 8051, I/O ports and specifications of I/O Ports, External Memory Interface.

UNIT-2: Programming model of 8051 [12]

Instruction classification, Instruction set, Addressing Modes: Immediate, register, direct, indirect and relative, assembler directives (org, end), features with example, I/O Bit & Byte programming using assembly language for LED and seven segment display (SSD) interfacing. Introduction to 8051 programming in C.

UNIT- 3: Timer / counter, serial communication, Interrupts & Programs using 'C' [12]

TMOD, TCON, SCON, SBUF, PCON Registers, Timer modes, programming for time delay using mode 1 and mode 2. Introduction to interrupt ,Interrupt types and their vector addresses, Interrupt enable register and interrupt priority register(IE,IP), Synchronous and asynchronous serial communication , Programming serial port without interrupt, Use of timer to select baud rate for serial communication.

UNIT- 4: Interfacing, programming using 'C' & Applications of 8051 [12]

Interfacing ADC, DAC, LCD, stepper motor. Study of advance micro controllers (ARM & PIC): Features and applications

Recommended books:

1. 8051 microcontroller and Embedded system using assembly and C :
Mazidi, Mazidi and McKinley, Pearson publications
2. The 8051 microcontroller – Architecture, programming and applications: K.Uma
Rao and AndhePallavi, Pearson publications.
3. ARM System Developers guide: Sloss, Andrew n. Symes.
4. Design with PIC microcontrollers: Peatman, Pearson publications.

S.Y.B.Sc(Computer Science) Electronics-Semester II
Paper- II: Communication Principles (ELC 222)

Objectives:

1. To understand basics of communication systems.
2. To understand modulation, demodulation and multiplexing of signals.
3. To understand digital communication techniques
4. To introduce concepts in advanced wireless communication.

UNIT-1: Introduction to Electronic Communication

[12]

Importance of Communication, Elements of Communication system, Electromagnetic spectrum, types of communication, serial communication, Concepts of communication system: Signal bandwidth, channel bandwidth, data rate, baud rate, Nyquist theorem, Signal to noise ratio, and channel capacity, error handling code- Hamming code, Shannon theorem, and concept of companding.

UNIT-2: Modulation and Demodulation

[14]

Introduction to concepts of modulation and demodulation. Modulation techniques: Analog modulation: Amplitude, Phase and Frequency modulation, Circuit diagram and working of transistorized amplitude modulator and diode demodulator. Equation of amplitude modulated wave, modulation index and frequency spectrum. (Phase and frequency modulation circuits are not expected).

Digital modulation: Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Block diagram and working, delta modulation circuit, MODEM - concept of ASK, FSK, BPSK, QPSK and block diagram of MODEM using FSK.

UNIT-3: Multiplexing and Multiple Access Techniques

[14]

Study of multiplexing and multiple access techniques: Space division multiplexing ,Time division multiplexing , Frequency Division Multiplexing , Code division multiplexing, spread spectrum techniques: DSSS, FHSS, Introduction to multiple access and corresponding access types: FDMA , TDMA , CDMA.

UNIT- 4: Wireless Communication system

[10]

Introduction to wireless communication system. Need of wireless communication systems. Antenna – Introduction, Need, working Principle, Parameters of antenna: Gain, directivity, Radiation pattern, Beam width, Bandwidth, front to back ratio (FBR).

Introduction to mobile communication, Cellular concept, Working of GSM, Hand over, Introduction to GPRS. Introduction to RFID, Zigbee, Bluetooth and Wi-Fi (Comparison based on range, data rate, frequency, Power).

Recommended Books:

1. Communication Electronics : Principles and Applications. L.E.Frenzel 3rd Edition.
2. Modern Electronic Communication. G.M. Miller 7th Edition.
3. Mobile Communication Jochen Schiller 2nd Edition.
4. Wireless Communications: Principles and Practice. Rappaport
5. Wireless Communications and Networks. William Stallings

**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.

UNIVERSITY OF PUNE

Revised Course Structure of English

S. Y. B. Sc. & S. Y. B. Sc. (Computer Science) English (w. e. f- 2014- 2015)

Prescribed Text: *Literary Vistas* Ed. Board of Editors, Orient Blackswan

Literature Components

1. The Sun, the Planets and the Stars- *C. Jones*
2. The Scientific Point of View- *J. B. S. Haldane*
3. TV As Babysitter- *Jerzy Kosinski*
4. A Cup of Tea- *Katherine Mansfield*
5. With the Photographer- *Stephen Leacock*
6. Purdah (1) - *Imtiaz Dharker*
7. A Psalm of Life- *Henry Wadsworth Longfellow*
8. Ozymandias of Egypt- *Percy Bysshe Shelley*
9. If— *Rudyard Kipling*
10. Daffodils- *William Wordsworth*

Language Components

1. Vocabulary

Introduction

Synonyms

Antonyms

Collocations: Words that go together

Commonly confused words

Word formation

2. Grammar

Tenses

Simple, compound and complex sentences

Transformation of sentences

3. Communication Skills

Interviews

Group discussions

Presentations

Paragraph writing

Essay writing

Reviews

Report writing

Summaries

Term-wise division of the syllabus:

Term-I

Literature components

Unit – 01, 02, 03 & 06, 07.

Language components

1. Vocabulary

2. Grammar

Term-II

Literature components

Unit – 04, 05 & 08, 09, 10.

Language component

Communication skills

Question Paper Pattern (SEMESTER-I)

Prescribed Text : Literary Vistas

Time: Two Hours Total marks-40

Ques.1. Attempt any one from (A) and one from (B) in about 100 words each.
(Questions on Unit No. **01** and **02** only) 10 Marks

Ques.2 Attempt any one from (A) and one from (B) in about 100 words each.
(Questions on Unit No.**03** , **06** and **07** only) 10 Marks

Ques.3. Objective questions on vocabulary (Fill in the blanks, Match the pairs ,
Complete the sentences ,right combinations). 10 Marks

Ques.4. Objective questions on Grammar (Fill in the blanks, Do as directed,
Transformation of sentences) 10 Marks

Question Paper Pattern (SEMESTER-II)

Time: Two Hours

Total Marks-40

Ques.1. Attempt any one from (A) and one from (B) in about 100 words each.
(Questions on Unit NO. **04** and **05** only) 10 Marks

Ques.2. Attempt any one from (A)and one from (B) in about in 100 words each.
(Questions on Unit No. **08** ,**09** and **10** only) 10 Marks

Ques.3. Practical questions on Communication Skills (any two out of four).
(Questions on topics –Interviews, Group Discussions and presentations) 10 Marks

Ques.4. Practical questions on Communication Skills (any two out of four).
(Questions on topics –paragraph writing, Essay Writing, Reviews,
Report Writing, Summaries) 10 Marks

(Note: Internal Assessment-10 marks each semester-either written or oral)

Savitribai Phule Pune University

**Three Year Degree Course in
B. Sc. Computer Science**

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

T. Y. B. Sc. Computer Science Syllabus in the Subject Computer Science (To be implemented from Academic Year 2015-16)

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.

Along with Computer Science two theories 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 theories 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 with Mathematics or its equivalent Examination as per Savitribai Phule Pune University 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 Savitribai Phule Pune University. 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 for both Theory and Practical Courses

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' Programmin g	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Paper II CS-102)	File Organizatio n and Fundament al 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)
Subject : 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	

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 Week	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/per Week (Total 48 per Semester)	04	16	20*
Theory Paper II (CS-212)	Relational Database Management System	Four Lectures/per Week (Total 48 per Semester)	04	16	20*
Theory Paper I (CS-221)	Object Oriented Concepts using C++	Four Lectures/per Week (Total 48 per Semester)	04	16	20*
Theory Paper II (CS-222)	Software Engineering	Four Lectures/per Week (Total 48 per Semester)	04	16	20*
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 224) (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 sub-questions, each of 1 mark; answerable in 2 -3 lines and based on entire syllabus	10 Marks
Question 2, 3	Sub-questions carrying 5 marks (2 out of 3)	10 Marks
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. Continuous assessment of practical performance should be using a Lab Book specifically designed for the purpose. Certified Lab book is compulsory to appear for practical examination. There is no need of attaching program printouts to the Lab Book. There shall be two experts and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. (Computer 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	

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/Practicals Per Week	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					
Theory Paper I (CS-331)	System Programming	48	04	16	20*
Theory Paper II (CS-332)	Theoretical Computer Science	48	04	16	20*
Theory Paper III (CS-333)	Computer Networks-I	48	04	16	20*
Theory Paper IV (CS-334)	Internet Programming I	48	04	16	20*
Theory Paper V (CS-335)	Programming in Java-I	48	04	16	20*
Theory Paper V (CS-336)	Object Oriented Software Engineering	48	04	16	20*
SEM IV					
Theory Paper I (CS-341)	Operating System	48	04	16	20*
Theory Paper II (CS-342)	Compiler Construction	48	04	16	20*
Theory Paper III (CS-343)	Computer Networks-II	48	04	16	20*
Theory Paper IV (CS-344)	Internet Programming II	48	04	16	20*
Theory Paper V	Programmin				

(CS-345)	g in Java-II	48	04	16	20*
Theory Paper V (CS-346)	Computer Graphics	48	04	16	20*
Practical Papers					
Practical paper I CS 347 (Semester III & IV)	Practicals Based on CS-331 and CS-341 – Sem I & Sem II	Practicals of 4 lectures each 25 practicals / year)	08	32	40**
Practical paper II CS 348 (Semester III & IV)	CS-348:Practicals Based on CS-335 and CS-345 – Sem I & Sem II and Computer Graphics using OpenGL	Practicals of 4 lectures each 25 practicals / year)	08	32	40**
Practical paper I CS 349 (Semester III & IV)	CS-349:Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	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 x 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:

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 sub-questions, each of 1 mark; answerable in 2 -3 lines and based on entire syllabus	10 Marks
Question 2, 3	Sub-questions carrying 5 marks (2 out of 3)	10 Marks
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. Continuous assessment of practical performance should be using a Lab Book specifically designed for the purpose. Certified Lab book 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.

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 13) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc. While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 22) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, the Question paper slips will be provided by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune.

Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers: Papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Computer Science Degree Program shall be three years.

a) All are Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 2 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 2 Practical (Annual)

T.Y.B.Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :

F.Y.B.Sc. Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc. Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be **English.**

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
CS 331: System Programming & Operating System I	CS 331 : System Programming
CS 341: System Programming & Operating System II	CS 341 : Operating System
CS 332 : Theoretical Computer Science & Compiler Construction I	CS 332 : Theoretical Computer Science
CS 342 : Theoretical Computer Science & Compiler Construction II	CS 342 : Compiler Construction
CS 333 :Computer Networks I	CS 333 :Computer Networks I
CS 343 :Computer Networks II	CS 343 :Computer Networks II
CS 334 :Web development and PHP programming I	CS 334 :Internet Programming I
CS 344 : Web development and PHP programming II	CS 344 :Internet Programming II
CS 335 :Programming in Java I	CS 335 :Programming in Java I
CS 345 :Programming in Java II	CS 345 :Programming in Java II
CS 336 :Object Oriented Software Engineering	CS 336 :Object Oriented Software Engineering

CS 346 :Business Applications	CS 346 :Computer Graphics
CS 347: Lab Course I	CS 347: Lab Course I
CS 348:Lab Course II	CS 348:Lab Course II
CS 349: Lab Course III	CS 349: Lab Course III

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Computer Science/M.C.A. or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.

10) Detail Syllabus with Recommended Books:

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Systems Programming
Code No. : CS-331

Semester III

Total Lectures : 48

Aim : To understand the design and implementation issues of System programs that play an important role in program development.

Objectives :

- To understand the design structure of a simple editor.
- To understand the design structure of Assembler and macro processor for an hypothetical simulated computer.
- To understand the working of linkers and loaders and other development utilities.
- To understand Complexity of Operating system as a software.

1. Introduction

[4]

- 1.1. Types of program – System program and Application program.
- 1.2. Difference between system programming and application programming.
- 1.3. Elements of Programming environment - Editor, Preprocessor, Assembler, Compiler, Interpreter, Linker and Loader, Debugger, Device drivers, Operating System.
- 1.4. Simulation of simple computer smac0 (hypothetical computer) -Memory, Registers, Condition Codes, Instruction format, Instruction Set, smac0 programs.

2. Editors

[2]

- 2.1 Definition, need/purpose of editor.
- 2.2 Types of editor- Examples ed, sed, VIM & emacs
- 2.3 Structure of editor

3. Assembler

[10]

- 3.1 Definition.
- 3.2 Features of assembly language, advantages
- 3.3 Statement format, types of statements – Imperative, Declarative, Assembler Directive.
- 3.4 Constants and Literals.
- 3.5 Advanced assembler directives (LTORG, ORIGIN, EQU),
- 3.6 Design of assembler – Analysis Phase and Synthesis Phase.
- 3.7 Overview of assembling process
- 3.8 Pass Structure of Assembler – One pass, Two pass assembler.
- 3.9 Problems of 1-pass assembler - forward reference, efficiency, Table of Incomplete Instructions.
- 3.10 Design of 2-pass Assembler – Pass-I and Pass-II
- 3.11 Data structure of 2-pass assembler.
- 3.12. Intermediate Code – Need, Forms-variant I and Variant II

4. Macros and Macro Processors

[10]

- 4.1 Definition
- 4.2 Macro definition and call
- 4.3 Macro expansion – positional and keyword parameters
- 4.4 Design of Data structures to be used for Macro definition and use
- 4.5 Nested macro calls
- 4.6 Advanced macro facilities – alteration of flow of control during expansion, expansion time variable, conditional expansion, expansion time loops. (with examples)
- 4.7 Design of macro preprocessor – Design overview, data structure, processing of macro definition and macro expansion (Except algorithms)

4.8 Macro assembler – Comparison of macro preprocessor and macro assembler. Pass structure of macro assembler.

5. Compiler Design options [2]

5.1 Interpreter - Use of interpreter, definition, Comparison with compiler, Overview of interpretation, Pure and impure interpreter.

5.2 P-code compiler

6. Linker and Loader [6]

6.1 Introduction

6.2 Concept of bindings, static and dynamic binding, translated, linked and load time addresses.

6.3 Relocation and linking concept – program relocation, performing relocation, public and external references, linking, binary program, object module.

6.4 Relocatability - nonrelocatable, relocatable, and self relocating programs (no algorithms), Linking for Overlays.

6.5 Object file formats: a.out, ELF, COFF, EXE, PE and COM

7. Debuggers & Development utilities [6]

7.1 Debugging functions and capabilities

7.2 Types of debuggers: visual & console -Case study of ddd(visual) and gdb(console)

7.3 Development utilities on UNIX/Linux strip, make, nm, objdump, intermediate files in compilation process etc.

8. Operating System as System Software [6]

8.1 What Operating Systems Do – User View, System View, Defining OS

8.2 Computer System Architecture – Single processor system, Multiprocessor systems, Clustered Systems

8.3 Operating System Operations – Dual mode operation, Timer

8.4 Process Management

8.5 Memory Management

8.6 Storage Management – File system management, Mass storage management, Caching, I/O systems

8.7 Protection and Security

8.8 Distributed Systems

8.9 Special Purpose System – Real time embedded systems, Multimedia systems, Handheld systems,

8.10 Computer Environment – Traditional computing, Client server computing, Peer to peer Computing

9. System Structure [2]

9.1 Operating System Services

9.2 User Operating-System Interface – Command interpreter, GUI

9.3 System Calls

9.4 Types of System Calls – Process control, File management, Device management, Information maintenance, Communication, Protection

Reference Books:

1. Systems Programming and Operating Systems by D.M.Dhamdhare (Second Revised Edition). [Chapters: 2, 3, 4, 5, 7]

2. System Software - An introduction to Systems Programming - Leland L. Beck (Pearson Education) [Chapter: 1]

3. Linkers and Loaders – John R. Levine, Elsevier Morgan Kaufmann[chapter 6]

4. Operating System Concepts - Siberchatz, Galvin, Gagne (8th Edition).[chapter 8, 9]

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Operating Systems
Code No. : CS-341

Semester IV

Total Lectures : 48

Aim : To understand the design and implementation issues of Operating System.

Objectives :

- To understand design issues related to process management and various related algorithms
- To understand design issues related to memory management and various related algorithms
- To understand design issues related to File management and various related algorithms

1. Introduction **[2]**

- 1.1 Operating System Structure – Simple structure, Layered approach, Micro kernels, Modules
- 1.2 Virtual Machines – Introduction, Benefits
- 1.3 System Boot

2. Process Management **[4]**

- 2.1 Process Concept – The process, Process states, Process control block.
- 2.2 Process Scheduling – Scheduling queues, Schedulers, context switch
- 2.3 Operations on Process – Process creation with program using fork(), Process termination
- 2.4 Interprocess Communication – Shared memory system, Message passing systems.

3. Multithreaded Programming **[2]**

- 3.1 Overview
- 3.2 Multithreading Models

4. Process Scheduling **[8]**

- 4.1 Basic Concept – CPU-I/O burst cycle, CPU scheduler, Preemptive scheduling, Dispatcher
- 4.2 Scheduling Criteria
- 4.3 Scheduling Algorithms – FCFS, SJF, Priority scheduling, Round-robin scheduling, Multiple queue scheduling, Multilevel feedback queue scheduling
- 4.4 Thread Scheduling

5. Process Synchronization **[6]**

- 5.1 Background
- 5.2 Critical Section Problem
- 5.3 Semaphores: Usage, Implementation
- 5.4 Classic Problems of Synchronization – The bounded buffer problem, The reader writer problem, The dining philosopher problem

6. Deadlocks **[8]**

- 6.1 System model
- 6.2 Deadlock Characterization – Necessary conditions, Resource allocation graph
- 6.3 Deadlock Prevention
- 6.4 Deadlock Avoidance - Safe state, Resource allocation graph algorithm, Banker's Algorithm
- 6.5 Deadlock Detection
- 6.6 Recovery from Deadlock – Process termination, Resource preemption

7. Memory Management **[11]**

- 7.1. Background – Basic hardware, Address binding, Logical versus physical address space, Dynamic loading, Dynamic linking and shared libraries

7.2 Swapping

7.3 Contiguous Memory Allocation – Memory mapping and protection, Memory allocation, Fragmentation

7.4 Paging – Basic Method, Hardware support, Protection, Shared Pages

7.5 Segmentation – Basic concept, Hardware

7.6 Virtual Memory Management – Background, Demand paging, Performance of demand paging, Page replacement – FIFO, OPT, LRU, Second chance page replacement

8. File System

[7]

8.1 File concept

8.2 Access Methods – Sequential, Direct, Other access methods

8.3 Directory and Disk Structure – Storage structure, Directory overview, Single level directory, Two level directory, Tree structure directory, Acyclic graph directory, General graph directory

8.4 Allocation Methods – Contiguous allocation, Linked allocation, Indexed allocation

8.5 Free Space Management – Bit vector, Linked list, Grouping, Counting, Space maps

Reference Books:

1. Operating System Concepts - Silberchatz, Galvin, Gagne (8th Edition).

2. Operating Systems : Principles and Design – Pabitra Pal Choudhary (PHI Learning Private Limited)

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Theoretical Computer Science
Code No. : CS-332

Semester III

Total Lectures : 48

Aim:

To have a introductory knowledge of automata, formal language theory and computability.

Objectives:

- To have an understanding of finite state and pushdown automata.
- To have a knowledge of regular languages and context free languages.
- To know the relation between regular language, context free language and corresponding recognizers.
- To study the Turing machine and classes of problems.

Prerequisite:

- Sets, Operations on sets, Finite & infinite sets Formal Language
- Relation, Equivalence Relation,(reflexive, transitive and symmetric closures)

1. Introduction

[3]

1.1 Symbol, Alphabet, String, Prefix & Suffix of Strings, Formal Language, Operations on Languages.

1.2 Regular Expressions (RE) : Definition & Example

1.3 Regular Expressions Identities.

2. Finite Automata

[12]

2.1 Deterministic finite Automaton – Definition, DFA as language recognizer, DFA as a pattern recognizer.

2.2 Nondeterministic finite automaton – Definition and Examples.

2.3 NFA TO DFA : Method (From Book 4)

2.4 NFA with ϵ - transitions Definition and Examples.

2.5 NFA with ϵ -Transitions to DFA & Examples

2.6 Finite automaton with output – Mealy and Moore machine, Definition and Examples.

2.7 Minimization of DFA, Algorithm & Problem using Table Method.

3. Regular Languages

[5]

3.1 Regular language-Definition and Examples.

3.2 Conversion of RE To FA-Examples.

3.3 Pumping lemma for regular languages and applications.

3.4 Closure properties of regular Languages

(Union, Concatenation, Complement, Intersection and Kleene closure)

4. Context Free Grammar and Languages

[12]

4.1 Grammar - Definition and Examples.

4.2 Derivation-Reduction - Definition and Examples.

4.3 Chomsky Hierarchy.

4.4 CFG : Definition & Examples. LMD, RMD, Parse Tree

4.5 Ambiguous Grammar : Concept & Examples.

4.6 Simplification of CFG :

4.6.1 Removing Useless Symbols,

4.6.2 Removing unit productions

4.6.3 Removing ϵ productions & Nullable symbols

4.7 Normal Forms :

4.7.1 Chomsky Normal Form (CNF) Method & Problem

- 4.7.2 Greibach Normal form (GNF) Method & Problem
- 4.8 Regular Grammar : Definition.
 - 4.8.1 Left linear and Right Linear Grammar-Definition and Example.
 - 4.8.2 Equivalence of FA & Regular Grammar
 - 4.8.2.1 Construction of regular grammar equivalent to a given DFA
 - 4.8.2.2 Construction of a FA from the given right linear grammar
- 4.9 Closure Properties of CFL's(Union, concatenation and Kleen closure) Method and examples

5. Push Down Automaton

[6]

- 5.1 Definition of PDA and examples
- 5.2 Construction of PDA using empty stack and final State method : Examples using stack method
- 5.3 Definition DPDA & NPDA, their correlation and Examples of NPDA
- 5.4 CFG (in GNF) to PDA : Method and examples

6. Turing Machine

[10]

- 6.1 The Turing Machine Model and Definition of TM
- 6.2 Design of Turing Machines
- 6.3 Problems on language recognizers.
- 6.4 Language accepted by TM
- 6.5 Types of Turing Machines(Multitrack TM,Two way TM, Multitape TM,Non-deterministic TM)
- 6.6 Introduction to LBA (Basic Model) &CSG.(Without Problems)
- 6.7 Computing TM, Enumerating TM, Universal TM
- 6.8 Recursive Languages
 - 6.5.1. Recursive and Recursively enumerable Languages.
 - 6.5.2. Difference between recursive and recursively enumerable language.
- 6.9 Turing Machine Limitations
- 6.10 Decision Problem, Undecidable Problem, Halting Problem of TM

References :-

- 1 Introduction to Automata theory, Languages and computation By John E. Hopcroft and Jeffrey Ullman – Narosa Publishing House.
2. Introduction to Automata theory, Languages and computation By John Hopcroft, Rajeev Motwani and Jeffrey Ullman –Third edition Pearson Education
3. Introduction to Computer Theory Daniel I. A. Cohen – 2nd edition – John Wiley & Sons
4. Theory of Computer Science (Automata, Language & Computation) K. L. P. Mishra & N. Chandrasekaran, PHI Second Edition
5. Introduction to Languages and The Theory of Computation John C. Martin TMH, Second Edition

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Compiler Construction
Code No. : CS-342

Semester IV

Total Lectures : 48

Aim :

To understand the various phases of a compiler and to develop skills in designing a compiler

Objective :

- To understand design issues of a lexical analyzer and use of Lex tool
- To understand design issues of a parser and use of Yacc tool
- To understand issues related to memory allocation
- To understand and design code generation schemes

1. Introduction

[5]

- 1.1 Definition of Compiler, Aspects of compilation.
- 1.2 The structure of Compiler.
- 1.3 Phases of Compiler – Lexical Analysis, Syntax Analysis, Semantic Analysis, Intermediate Code generation, code optimization, code generation.
- 1.4 Error Handling
- 1.5 Introduction to one pass & Multipass compilers, cross compiler, Bootstrapping.

2. Lexical Analysis(Scanner)

[5]

- 2.1 Review of Finite automata as a lexical analyzer,
- 2.2 Applications of Regular Expressions and Finite Automata (lexical analyzer, searching using RE), Input buffering, Recognition of tokens
- 2.3 LEX: A Lexical analyzer generator (Simple Lex Program)

3. Syntax Analysis(Parser)

[20]

- 3.1 Definition , Types of Parsers
- 3.2 Top-Down Parser –
 - 3.2.1 Top-Down Parsing with Backtracking: Method & Problems
 - 3.2.2 Drawbacks of Top-Down parsing with backtracking,
 - 3.2.3 Elimination of Left Recursion(direct & indirect)
 - 3.2.4 Need for Left Factoring & examples
- 3.3 Recursive Descent Parsing : Definition
 - 3.3.1 Implementation of Recursive Descent Parser Using Recursive Procedures
- 3.4 Predictive [LL(1)]Parser(Definition, Model)
 - 3.4.1 Implementation of Predictive Parser[LL(1)]
 - 3.4.2 FIRST & FOLLOW
 - 3.4.3 Construction of LL(1) Parsing Table
 - 3.4.4 Parsing of a String using LL(1) Table
- 3.5 Bottom-Up Parsers
- 3.6 Operator Precedence Parser -Basic Concepts
 - 3.6.1 Operator Precedence Relations form Associativity & Precedence
 - 3.6.2 Operator Precedence Grammar
 - 3.6.3 Algorithm for LEADING & TRAILING(with ex.)
 - 3.6.4 Algorithm for Operator Precedence Parsing (with ex.)
 - 3.6.5 Precedence Functions
- 3.7 Shift Reduce Parser
 - 3.7.1 Reduction, Handle, Handle Pruning
 - 3.7.2 Stack Implementation of Shift Reduce Parser (with examples)

- 3.8 LR Parser
 - 3.8.1 Model
 - 3.8.2 Types [SLR(1), Canonical LR, LALR] Method & examples.
- 3.9 YACC (from Book 3) –program sections, simple YACC program for expression evaluation

4. Syntax Directed Definition [8]

- 4.1 Syntax Directed Definitions(SDD)
 - 4.1.1 Inherited & Synthesized Attributes
 - 4.1.2 Evaluating an SDD at the nodes of a Parse Tree, Example
- 4.2 Evaluation Orders for SDD's
 - 4.2.1 Dependency Graph
 - 4.2.2 Ordering the Evaluation of Attributes
 - 4.2.3 S-Attributed Definition
 - 4.2.4 L-Attributed Definition
- 4.3 Application of SDT
 - 4.3.1 Construction of syntax trees,
 - 4.3.2 The Structure of a Type
- 4.4 Translation Schemes
 - 4.4.1 Definition, Postfix Translation Scheme

5. Memory Allocation [2]

- 5.1 Memory allocation – static and dynamic memory allocation,
- 5.2 Memory allocation in block structure languages, Array allocation and access.

6. Code Generation and Optimization [8]

- 6.1 Compilation of expression –
 - 6.1.1 Concepts of operand descriptors and register descriptors with example.
 - 6.1.2 Intermediate code for expressions – postfix notations,
 - 6.1.3 triples and quadruples, expression trees.
- 6.2 Code Optimization – Optimizing transformations – compile time evaluation, elimination of common sub expressions, dead code elimination, frequency reduction, strength reduction
- 6.3 Three address code
 - 6.3.1 DAG for Three address code
 - 6.3.2 The Value-number method for constructing DAG's.
- 6.4 Definition of basic block, Basic blocks And flow graphs
- 6.5 Directed acyclic graph (DAG) representation of basic block
- 6.6 Issues in design of code generator

References :-

1. Compilers: Principles, Techniques, and Tools ,Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman
2. Principles of Compiler Design By : Alfred V. Aho, Jeffrey D. Ullman (Narosa Publication House)
3. LEX & YACC (O'reilly Publication)

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Computer Networks -I
Code No. : CS-333

Semester III

Total Lectures : 48

Pre-requisites: Basics of computer, Knowledge of ‘C’ for assignment.

Objectives: This course will prepare students in Basic networking concepts.

1. Understand different types of networks, various topologies and application of networks.
2. Understand types of addresses, data communication.
3. Understand the concept of networking models, protocols, functionality of each layer.
4. Learn basic networking hardware and tools.

Ch.No.	Name of Chapter	Reference Book
1	Chapter 1 Introduction to Computer Networks	[Lectures 8]
1.1	Computer Networks- Goals and applications – Business Application , Home Application, Mobile User, Social Issues	Book 1 CH1 (Pg. No.3 -14)
1.2	Network Hardware - Broadcast and point-to-point	Book 1 CH1 (Pg. No.14-16)
1.3	topologies – star, bus, mesh, ring etc.	Book 2 CH1 (Pg. No. 9-13)
1.4	Network Types-LAN, MAN, WAN, Wireless Networks, Home Networks, Internetwork	Book 1 CH1 (Pg. No.16-26)
1.5	Data Communication-Definition, components, data representation, Data Flow	Book 2 CH1 (Pg. No. 3-7)
1.6	Protocols & Standards De facto and De jure standard,	Book 2 CH1 (Pg. No. 19-20)
1.7	Network Software - Protocol Hierarchies -layers, protocols, peers, interfaces Network architecture, protocol stack, Design issues of the layers –addressing, error control, flow control, multiplexing and demultiplexing, routing Connection-oriented and connectionless service, Service Primitives – listen, connect, receive, send, disconnect and Berkley Socket ,the relationships of services to protocols.	Book 1 CH1 (Pg. No.26-37)
2.	Network Models	[Lectures 5]
2.1	OSI Reference Model - Functionality of each layer	Book 2 CH2 (Pg. No 29-42)

2.2	TCP/IP Reference Model, Comparison of OSI and TCP/IP model	Book 1 CH1 (Pg. No. 41-46)
2.3	TCP/IP Protocol Suite	Book 2 CH2 (Pg. No. 42-45)
2.4	Addressing - Physical, Logical and Port addresses (No examples)	Book 2 CH2 (Pg. No.45-50)
3.	Transmission Media	[Lectures 5]
3.1	Twisted pair cable – UTP Vs STP, categories connectors & applications , Coaxial cable – standards, connectors & applications Fiber Optic cable – propagation modes, connectors & applications(No diagrams will be asked in examination)	Book 2 CH7 (Pg. No.192,193, 195-202)
3.2	Unguided Media – Wireless- Radio Waves,- Microwaves, Infrared	Book 2 CH7 (Pg. No. 203-208)
3.3	Light wave transmission	Book 1 CH2 (Pg. No. 107-108)
3.4	Types of cabling and Networking Tool - CAT5 and CAT6 Cable Color Code, Crossover Cabling and Straight Through Cable, Crimping and Line testing tool	Book 3
4.	The Physical Layer	[Lectures 14]
4.1	Analog and Digital data, Analog and Digital signals, Periodic & Non-periodic signals Digital Signals- Bit rate, bit length, baseband Transmission (no cases)	Book 2 CH3 (Pg. No. 57-58) Book 2 CH3 (Pg. No. 71-75)
4.2	Transmission Impairments –attenuation, distortion and noise, Data Rate Limits – Noiseless channel: Nyquist’s bit rate,noisy channel : Shannon’s law (Enough problems should be covered on every topic.)	Book 2 CH3 (Pg. No. 80-88)
4.3	Performance of the Network Bandwidth, Throughput, Latency(Delay), Bandwidth –Delay Product, Jitter	Book 2 CH3 (Pg. No. 89-94)
4.4	Line Coding Characteristics, Line Coding Schemes – Unipolar - NRZ, Polar-NRZ-I, NRZ-L, RZ, Manchester and Differential Manchester (Enough problems should be covered on every topic.)	Book 2 CH4 (Pg. No. 101-109)
4.5	Transmission Modes, Parallel Transmission and Serial Transmission –Asynchronous and Synchronous and Isochronous	Book 2 CH4 (Pg. No. 131-135)
4.6	Trunks & Multiplexing FDM and TDM	Book 1 CH2 (Pg. No. 137,138 140-143)

4.7	Switching - Circuit Switching, Message Switching and Packet Switching, comparison of circuit & packet switching	Book 1 CH2 (Pg. No. 146-151)
4.8	Physical Layer Devices Repeaters, Hubs- active hub Passive hub	Book 2 CH15 (pg. No. 445-447)
5.	The Data Link Layer	[Lectures 9]
5.1	Design Issues – Services provided to the Network Layer , Framing – Concept, Methods - Character Count, Flag bytes with Byte Stuffing, Starting & ending Flags with Bit Stuffing and Physical Layer Coding Violations, Error Control, Flow Control	Book 1 CH3 (pg. No. 184-192)
5.2	Error detection code CRC (Enough problems should be covered on every topic.)	Book 1 CH3 (pg. No. 196-199)
5.3	Data Link Layer Protocols –Noiseless channel -A Simplex, Stop-And-Wait protocol, noisy channel –stop & wait, ARR, Pipelining, Go –back –N ARR & ARQ, selective repeat ARR(No examples & no algorithms)	Book 1 CH3 (pg. No. 312-338)
5.4	Sliding Window Protocols Piggybacking-Need, Advantages/Disadvantages, 1-bit sliding window protocols,	Book 1 CH3 (pg. No. 211-216)
5.5	Data Link Layer Protocols-HDLC – frame format, all frame types PPP – Use, Frame Format, Use of PPP in the Internet	Book 1 CH3 (pg. No. 234-242)
5.6	Data Link Layer Devices - Bridges – Filtering, Transparent Bridges, spanning tree and Source Routing Bridges, Bridges Connecting Different LANs	Book 2 CH15 (pg. No. 447-454)
5.7	Remote bridges	Book 1 CH4 (pg. No. 325-326)
6.	The Medium Access Sublayer	[Lectures 7]
6.1	Random Access Protocols ALOHA – pure and slotted	Book 2 CH12 (pg. No. 364-390)
6.2	CSMA – 1-persistent, p-persistent and non-persistent CSMA/CD,CSMA/CA	
6.3	Controlled Access Reservation, Polling and Token Passing	
6.4	Channelization FDMA, TDMA and CDMA-Analogy, Idea, Chips, Data Representation, Encoding and Decoding, Signal Level, Sequence Generation(Enough problems should be covered on every topic.)	

Reference Books:

- 1) Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]
- 2) Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill. .[4th Edition]
- 3) Networking All In One Dummies Wiley Publication.[5th Edition]

Guidelines For Examination:

- 1) Frame and Packet formats should be asked.

- 2) Problems should be asked at least for 8 marks.
- 3) Page no listed above may vary according to year of publication of 4th edition but topics remain same.
- 4) All sub topics listed pages of respective reference books should be covered.

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Computer Networks -II
Code No. : CS-343

Semester IV

Total Lectures: 48

=====

Pre-requisites: Basics of computer networks covered last semester, Knowledge of 'C'.

Objectives: This course will prepare students in

1. Basic networking concepts.
2. Understand wired and wireless networks, its types, functionality of layer.
3. Understand importance of network security and cryptography.

Ch. No.	Name of Chapter	Reference Book
1.	Wired LANs	[Lectures 9]
1.1	IEEE Standards Data Link Layer, Physical Layer	Book 2 CH13 (Pg. No 395-397)
1.2	Standard Ethernet MAC Sublayer – Frame Format, Frame Length, Addressing, Access Method	Book 2 CH13 (Pg. No 397-402)
1.3	Physical Layer – Encoding and Decoding, 10Base5, 10Base2, 10Base-T, 10Base-F,	Book 2 CH13 (Pg. No 402-405)
1.4	Changes In The Standard – Bridged Ethernet, Switched Ethernet, Full Duplex Ethernet	Book 2 CH13 (Pg. No 406-409)
1.5	Fast Ethernet – Goals, MAC Sublayer, Topology, Implementation	Book 2 CH13 (Pg. No.409-410)
1.6	Gigabit Ethernet – goals, MAC Sublayer, Topology, Implementation	Book 2 CH13 (Pg. No 412-414)
1.7	Ten-Gigabit Ethernet – goals, MAC Sublayer, Physical Layer	Book 2 CH13 (Pg. No 416)
1.8	Backbone Networks Bus Backbone, Star Backbone, Connecting Remote LANs	Book 2 CH15 (Pg. No 456-458)
1.9	Virtual LANs Membership, Configuration, Communication between Switches, IEEE standards Advantages	Book 1 CH1 (Pg. No 458-463)
2.	Wireless LAN	[Lectures 2]
2.1	IEEE 802.11 Architecture – Basic Service Set, Extended Service Set, Station Types	Book 2 CH14 (Pg. No421-422)

2.2	Bluetooth Architecture – Piconet, scatternet	Book 2 CH14 (Pg. No 434-436)
3.	The Network Layer	[Lectures 10]
3.1	Design Issues Store-and-forward packet switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram subnets	Book 1 CH5 (Pg. No 343-349)
3.2	Logical Addressing IPV4 Addresses – Address Space, Notations, Classful Addressing, Subnetting, Supernetting, Classless Addressing, Network Address Translation(NAT), (Enough problems should be covered on Addressing),	Book 2 CH19 (Pg. No 549-566)
3.3	IPV4 Protocol Datagram Format, Fragmentation, Checksum, Options	Book 2 CH20 (Pg. No 582-596)
3.4	Routing Properties of routing algorithm, Comparison of Adaptive and Non- Adaptive Routing Algorithms	Book 1 CH5 (Pg. No 350-352)
3.5	Congestion Control – Definition, Factors of Congestion, Difference between congestion control and flow control, General Principles of Congestion Control, Congestion Prevention Policies	Book 1 CH5 (Pg. No 384-389)
3.6	Network Layer Devices –Routers	Book 2 CH15 (Pg. No. 455)
4.	Address Mapping	[Lectures 4]
4.1	Protocol(ARP)-Cache Memory, Packet Format, Encapsulation, Operation, Four Different Cases, Proxy ARP, RARP , BOOTP, DHCP – Static Address Allocation, Dynamic Address Allocation, Manual and automatic Configuration	Book 2 CH21 (Pg. No 611-620)
5.	The Transport Layer	[Lectures 6]
5.1	Process-to-Process Delivery Client Server Paradigm, Multiplexing and De-multiplexing, Connectionless Vs Connection-Oriented Service, Reliable Vs Unreliable	Book 2 CH23 (Pg. No 703-708)
5.2	User Datagram Protocol(UDP) Datagram Format, Checksum, UDP operations, Use of UDP	Book 2 CH23 (Pg. No709-715)
5.3	Transmission Control Protocol (TCP) TCP Services – Process to-Process Communication, Stream Delivery Service, sending and Receiving Buffers, Segments, Full –Duplex Communication, Connection oriented service, Reliable service	Book 2 CH23 (Pg. No 715-719)
5.4	TCP Features –Numbering System, Byte Number, Sequence Number, Acknowledgement Number, Flow Control, Error Control, Congestion Control	Book 2 CH23 (Pg. No 719-720)
5.5	TCP Segment – Format	Book 2 CH23

		(Pg. No 721-723)
6.	The Application Layer	[Lectures 7]
6.1	Domain Name System (DNS) Name Space, Domain, Name Space, Distribution of Name Space, DNS in the Internet, Resolution	Book 2 CH25 (Pg. No 797-809)
6.2	E-MAIL Architecture, User Agent, Message Transfer Agent-SMTP, Message Access Agent-POP3, IMAP4, Web Based Mail	Book 2 CH26 (Pg. No 824-840)
6.3	File Transfer Protocol (FTP) Communication over control connection, Communication over Data Connection, Anonymous FTP	Book 2 CH26 (Pg. No 840-844)
6.4	WWW Architecture, WEB Documents	Book 2 CH27 (Pg. No 851-861)
6.5	HTTP - HTTP Transaction, Persistent and Non persistent Connection, Proxy Server	Book 2 CH27 (Pg. No 861-868)
6.6	Devices- Gateways –Transport & Application Gateways	Book 1 CH4 (Pg. No 328)
7.	Network Security	[Lectures 10]
7.1	Introduction – Security Services- Message-Confidentiality, Integrity, Authentication, Non repudiation. Entity (User)- Authentication.	Book 2 CH31 (Pg. No 961-962)
7.2	Message confidentiality –Confidentiality with Asymmetric-Key Cryptography, Confidentiality with Symmetric-Key Cryptography	Book 2 CH31 (Pg. No 962-964)
7.3	Cryptography Encryption Model, Substitution Cipher and Transposition Cipher (Problems should be covered.)	Book 1 CH8 (Pg. No 724-730)
7.4	Two Fundamental Cryptographic Principles	Book 1 CH8 (Pg. No 735-736)
7.5	Communication Security Firewalls	Book 1 CH8 (Pg. No 776-779)
7.6	Web Security Threats, Secure Naming, DNS Spoofing, Secure DNS, Self Certifying names	Book 1 CH8 (Pg. No 805-813)
7.7	Mobile Code Security Java Applet Security, ActiveX, JavaScript, Viruses	Book 1 CH8 (Pg. No 816-819)
7.8	Social Issues Privacy, Anonymous Remailers, Freedom of Speech, Steganography, Copyright	Book 1 CH8 (Pg. No 819-828)

Reference Books:

1. Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]
2. Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill. .[4th Edition]

Guidelines For Examination:

1. Frame and Packet formats should be asked.
2. Problems should be asked at least for 8 marks.

3. Page no listed above may vary according to year of publication of 4th edition but topics remain same.
4. All sub topics listed pages of respective reference books should be covered.

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Internet Programming I
Code No. : CS-334

Semester III

Total Lectures: 48

Aim: To Design dynamic and interactive Web pages.

Objective:

- Learn Core-PHP, Server Side Scripting Language
- Learn PHP-Database handling.

Prerequisite: HTML.

- 1. Introduction to web techniques** **[8]**
 - 1.1 HTTP basics, Introduction to Web server and Web browser
 - 1.2 Introduction to PHP
 - 1.3 What does PHP do?
 - 1.4 Lexical structure
 - 1.5 Language basicsBook 1 chapter 2

- 2. Function and String** **[10]**
 - 2.1 Defining and calling a function
 - 2.2 Default parameters
 - 2.3 Variable parameters, Missing parameters
 - 2.4 Variable function, Anonymous function
 - 2.5 Types of strings in PHP
 - 2.6 Printing functions
 - 2.7 Encoding and escaping
 - 2.8 Comparing strings
 - 2.9 Manipulating and searching strings
 - 2.10 Regular expressionsBook 1 chapter 3 and 4

- 3. Arrays** **[6]**
 - 3.1 Indexed Vs Associative arrays
 - 3.2 Identifying elements of an array
 - 3.3 Storing data in arrays
 - 3.4 Multidimensional arrays
 - 3.4 Extracting multiple values
 - 3.5 Converting between arrays and variables
 - 3.6 Traversing arrays
 - 3.7 Sorting
 - 3.8 Action on entire arrays
 - 3.9 Using arraysBook 1 chapter 5

4. Introduction to Object Oriented Programming [8]
4.1 Classes
4.2 Objects
4.3 Introspection
4.4 Serialization
4.5 Inheritance
4.6 Interfaces
4.7 Encapsulation
Book 1 , 2 chapter 12

5. Files and directories [6]
5.1 Working with files and directories
5.2 Opening and Closing, Getting information about file, Read/write to file,
Splitting name and path from file, Rename and delete files
5.3 Reading and writing characters in file
5.4 Reading entire file
5.5 Random access to file data
5.6 Getting information on file
5.7 Ownership and permissions
Book 2 chapter 7

6. Databases (PHP-PostgreSQL) [10]
6.1 Using PHP to access a database
6.2 Relational databases and SQL
6.3 PEAR DB basics
6.4 Advanced database techniques
6.5 Sample application (Mini project)
Book 1 chapter 9

References

1. Programming PHP By Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
2. Beginning PHP 5 , Wrox publication
3. PHP web services, Wrox publication
4. AJAX Black Book, Kogent solution
5. Mastering PHP , BPB Publication
6. PHP cookbook, O'Reilly publication
7. PHP for Beginners, SPD publication
8. Programming the World Wide Web , Robert W Sebesta(3rd Edition)
9. Check out Joomla!press
Pearson (*Addison-Wesley Professional*).
10. www.php.net.in
11. www.W3schools.com
12. www.wrox.com
13. <https://api.drupal.org>

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Internet Programming II
Code No. : CS-344

Semester IV

Total Lectures: 48

Aim: To Design dynamic and interactive Web pages.

Objective:

- Learn different technologies used at client Side Scripting Language
- Learn XML,CSS and XML parsers.
- One PHP framework for effective design of web application.
- Learn JavaScript to program the behavior of web pages.
- Learn AJAX to make our application more dynamic.

1. Web Techniques **[10]**

- 1.1 Variables
 - 1.2 Server information
 - 1.3 Processing forms
 - 1.4 Setting response headers
 - 1.5 Maintaining state
 - 1.6 SSL
- Book 1 chapter 7

2. Handling email with php **[8]**

- 2.1 Email background
 - 2.2 Internet mail protocol
 - 2.3 Structure of an email message
 - 2.4 Sending email with php
 - 2.5 Email attachments.
 - 2.6 Email id validation and verification
 - 2.7 PHP error handling.
- Book 2 chapter 15

3. PHP framework **[4]**

- 3.1 Introduction to PHP framework.
 - 3.2 Features, Applications.
 - 3.3 One example like JOOMLA,DRUPAL.
- Book 11, <https://api.drupal.org>

4. XML **[8]**

- 4.1 What is XML?
 - 4.2 XML document Structure
 - 4.3 PHP and XML
 - 4.4 XML parser
 - 4.5 The document object model
 - 4.6 The simple XML extension
 - 4.7 Changing a value with simple XML
- Book 2 chapter 8

5. WEB DESIGNING TECHNOLOGIES(JavaScript-DHTML) **[10]**

- 5.1 Overview of JavaScript, DHTML
- 5.2 Object Orientation and JavaScript

- 5.3 Basic Syntax(JS datatypes, JS variables)
- 5.4 Primitives, Operations and Expressions
- 5.5 Screen Output and keyboard input(Verification and Validation)
- 5.6 JS Control statements
- 5.7 JS Functions
- 5.8 JavaScript HTML DOM Events(onmouseup, onmousedown, onclick, onload,onmouseover,onmouseout).
- 5.9 JS Strings.
- 5.10 JS String methods
- 5.11 JS popup boxes(alert, confirm, prompt).
- 5.12 Changing property value of different tags using DHTML
(ex. adding innerhtml for DIV tag, changing source of image etc.).

Book 10, www.w3schools.com.

6. AJAX

[8]

- 6.1 Introduction of AJAX
 - 6.2 AJAX web application model
 - 6.3 AJAX –PHP framework
 - 6.4 Performing AJAX validation
 - 6.5 Handling XML data using php and AJAX
 - 6.6 Connecting database using php and AJAX
- Book 4 chapter 1,2 and 9

References

1. Programming PHP By Rasmus Lerdorf and Kevin Tatroe O'Reilly publication
2. Beginning PHP 5, Wrox publication
3. PHP web services , Wrox publication
4. AJAX Black Book Kogent solution
5. Mastering PHP BPB Publication
6. PHP cookbook O'Reilly publication
7. Learning PHP and MYSQL, O'Reilly publication
8. PHP and MYSQL, O'Reilly publication
9. PHP for Beginners, SPD publication
10. Programming the World Wide Web , Robert W Sebesta(3rd Edition)
11. Check out Joomla!presss **Pearson** (*Addison-Wesley Professional*).
12. www.php.net.in
13. www.W3schools.com
14. www.wrox.com
15. <https://api.drupal.org>

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B.Sc. COMPUTER SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Programming in Java-I
Code No. : CS-335

Semester IV

Total Lectures: 48

Prerequisite:

- Knowledge of C Programming language

Objective:

- To learn Object Oriented Programming language
- To handle abnormal termination of a program using exception handling
- To create flat files
- To design User Interface using Swing and AWT

1. An Introduction to Java **[4]**

- 1.1 A Short History of Java
- 1.2 Features or buzzwords of Java
- 1.3 Comparison of Java and C++
- 1.4 Java Environment
- 1.5 Simple java program
- 1.6 Java Tools – jdb, javap, javadoc
- 1.7 Java IDE – Eclipse/NetBeans (Note: Only for Lab Demonstration)

2. An Overview of Java **[4]**

- 2.1 Types of Comments
- 2.2 Data Types
- 2.3 Final Variable
- 2.4 Declaring 1D, 2D array
- 2.5 Accepting input using Command line argument
- 2.6 Accepting input from console (Using BufferedReader class)

3. Objects and Classes **[8]**

- 3.1 Defining Your Own Classes
- 3.2 Access Specifiers (public, protected, private, default)
- 3.3 Array of Objects
- 3.4 Constructor, Overloading Constructors and use of 'this' Keyword
- 3.5 static block, static Fields and methods
- 3.6 Predefined class – Object class methods (equals(), toString(), hashCode(), getClass())
- 3.7 Inner class
- 3.8 Creating, Accessing and using Packages
- 3.9 Creating jar file and manifest file
- 3.10 Wrapper Classes
- 3.11 Garbage Collection (finalize() Method)
- 3.12 Date and time processing

4. Inheritance and Interface **[7]**

- 4.1 Inheritance Basics (extends Keyword) and Types of Inheritance
- 4.2 Superclass, Subclass and use of Super Keyword
- 4.3 Method Overriding and runtime polymorphism

- 4.4 Use of final keyword related to method and class
- 4.5 Use of abstract class and abstract methods
- 4.6 Defining and Implementing Interfaces
- 4.7 Runtime polymorphism using interface
- 4.7 Object Cloning

5. Exception Handling [4]

- 5.1 Dealing Errors
- 5.2 Exception class, Checked and Unchecked exception
- 5.3 Catching exception and exception handling
- 5.4 Creating user defined exception
- 5.5 Assertions

6. Strings, Streams and Files [7]

- 6.1 String class and StringBuffer Class
- 6.2 Formatting string data using format() method
- 6.2 Using the File class
- 6.3 Stream classes
 - Byte Stream classes
 - Character Stream Classes
- 6.4 Creation of files
- 6.5 Reading/Writing characters and bytes
- 6.6 Handling primitive data types
- 6.7 Random Access files

7. User Interface Components with AWT and Swing [10]

- 7.1 What is AWT ? What is Swing? Difference between AWT and Swing.
- 7.2 The MVC Architecture and Swing
- 7.3 Layout Manager and Layouts, The JComponent class
- 7.4 Components –
 - JButton, JLabel, JText, JTextArea, JCheckBox and JRadioButton,
 - JList, JComboBox, JMenu and JPopupMenu Class, JMenuItem and JCheckBoxMenuItem,
 - JRadioButtonMenuItem , JScrollBar
- 7.5 Dialogs (Message, confirmation, input), JFileChooser, JColorChooser
- 7.6 Event Handling: Event sources, Listeners
- 7.7 Mouse and Keyboard Event Handling
- 7.8 Adapters
- 7.9 Anonymous inner class

8. Applet [4]

- 8.1 Applet Life Cycle
- 8.2 appletviewer tool
- 8.3 Applet HTML Tags
- 8.4 Passing parameters to Applet
- 8.5 repaint() and update() method

References:

- 1) Complete reference Java by Herbert Schildt(5th edition)
- 2) Java 2 programming black books, Steven Horlzner
- 3) Programming with Java , A primer ,Forth edition , By E. Balagurusamy
- 4) Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B.Sc. COMPUTER SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Programming in Java-II
Code No. : CS-345

Semester IV

Total Lectures : 48

Prerequisite:

- Knowledge of Core Java (CS – 345)

Objectives:

- To learn database programming using Java
- To study web development concept using Servlet and JSP
- To develop a game application using multithreading
- To learn socket programming concept

1. Collection

[6]

- 1.1 Introduction to the Collection framework
- 1.2 List – ArrayList, LinkedList and Vector, Stack, Queue
- 1.3 Set - HashSet, TreeSet, and LinkedHashSet
- 1.4 Map – HashMap, LinkedHashMap, Hashtable and TreeMap
- 1.5 Interfaces such as Comparator, Iterator, ListIterator, Enumeration

2. Database Programming

[10]

- 2.1 The design of jdbc, jdbc configuration
- 2.2 Types of drivers
- 2.3 Executing sql statements, query execution
- 2.4 Scrollable and updatable result sets
- 2.5 Metadata – DatabaseMetadata, ResultSetMetadata
- 2.6 Transactions – commit(), rollback(), SavePoint
(Database : PostgreSQL)

3. Servlet

[12]

- 3.1 Introduction to Servlet and Hierarchy of Servlet
- 3.2 Life cycle of servlet
- 3.3 Tomcat configuration (Note: Only for Lab Demonstration)
- 3.4 Handling get and post request (HTTP)
- 3.5 Handling a data from HTML to servlet
- 3.6 Retriving a data from database to servlet
- 3.7 Session tracking – User Authorization, URL rewriting, Hidden form fields, Cookies and HttpSession

4. JSP

[10]

- 4.1 Simple first JSP program
- 4.2 Life cycle of JSP
- 4.2 Implicit Objects
- 4.3 Scripting elements – Declarations, Expressions, Scriptlets, Comments
- 4.4 JSP Directives – Page Directive, include directive
- 4.5 Mixing Scriptlets and HTML
- 4.6 Example of forwarding contents from database to servlet, servlet to JSP and displaying it using JSP scriptlet tag

5. Multithreading

[6]

- 5.1 What are threads?
- 5.2 Life cycle of thread
- 5.3 Running and starting thread using Thread class
- 5.4 Thread priorities
- 5.5 Running multiple threads
- 5.6 The Runnable interface
- 5.7 Synchronization and interthread communication

6. Networking

[4]

- 6.1 Networking basics – Protocol, Addressing, DNS, URL, Socket, Port
- 6.2 The java.net package – InetAddress, URL, URLConnection class
- 6.3 SocketServer and Socket class
- 6.4 Creating a Socket to a remote host on a port (creating TCP client and server)
- 6.5 Simple Socket Program Example

References:

- 1) Complete reference Java by Herbert Schildt(5th edition)
- 2) Java 2 programming black books, Steven Horlzner
- 3) Programming with Java , A primer ,Forth edition , By E. Balagurusamy
- 4) Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press
- 5) Core Java Volume-II-Advanced Features, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Object Oriented Software Engineering
Code No. : CS-336

Semester III

Total Lectures: 48

Prerequisites

- Knowledge of Object Oriented Concepts
- Knowledge of Classical Software Engineering

Aim

To Understand Object Oriented Modeling techniques and their applicability.

Objectives

- Understanding importance of Object Orientation in Software engineering
- Understand the components of Unified Modeling Language
- Understand techniques and diagrams related to structural modeling
- Understand techniques and diagrams related to behavioral modeling
- Understand techniques of Object Oriented analysis, design and testing

1. Object Oriented Concepts and Principles

[4]

1.1 What is Object Orientation ? - Introduction , Object , Classes and Instance , Polymorphism, Inheritance

1.2 Object Oriented System Development- Introduction, Function/Data Methods (With Visibility), Object Oriented Analysis, Object Oriented Construction

1.3 Identifying the Elements of an Object Model

1.4 Identifying Classes and Objects

1.5 Specifying the Attributes (With Visibility)

1.6 Defining Operations

1.7 Finalizing the Object Definition

2. Introduction to UML

[2]

2.1 Concept of UML

2.2 Advantages of UML

3. Basic Structural Modeling

[5]

3.1 Classes

3.2 Relationship

3.3 Common Mechanism

3.4 Class Diagram (Minimum three examples should be covered)

4. Advanced Structural Modeling

[7]

4.1 Advanced Classes

4.2 Advanced Relationship

4.3 Interface

4.4 Types and Roles

4.5 Packages

4.6 Object Diagram (Minimum three examples should be covered)

5. Basic Behavioral Modeling

[9]

- 5.1 Interactions
- 5.2 Use Cases and Use Case Diagram with stereo types (Minimum three examples should be covered)
- 5.3 Interaction Diagram (Minimum two examples should be covered)
- 5.4 Sequence Diagram (Minimum two examples should be covered)
- 5.5 Activity Diagram (Minimum two examples should be covered)
- 5.6 State Chart Diagram (Minimum two examples should be covered)

6. Object Oriented Analysis

[6]

- 6.1 Iterative Development and the Rational Unified Process
- 6.2 Inception
- 6.3 Understanding Requirements
- 6.4 Use Case Model From Inception to Elaboration
- 6.5 Elaboration

7. Object Oriented Design

[4]

- 7.1 The Booch Method, The Coad and Yourdon Method and Jacobson Method and Rumbaugh Method
- 7.2 The Generic Components of the OO Design Model
- 7.3 The System Design Process - Partitioning the Analysis Model, Concurrency and Sub System Allocation, Task Management Component, The Data Management Component, The Resource Management Component, Inter Sub System Communication
- 7.4 Object Design Process

8. Architectural modeling

[6]

- 8.1 Component
- 8.2 Components Diagram (Minimum two examples should be covered)
- 8.3 Deployment Diagram (Minimum two examples should be covered)
- 8.4 Collaboration Diagram (Minimum two examples should be covered)

9. Object Oriented Testing

[5]

- 9.1 Object Oriented Testing Strategies
- 9.2 Test Case Design for Object Oriented Software
- 9.3 Inter Class Test Case Design
(Use of any freeware designing tool)

References.

1. Grady Booch, James Rumbaugh, The Unified Modeling Language User/Reference Guide, Pearson Education INC
2. Ivar Jacobson, Object Oriented Software Engineering, Pearson Education INC
3. Craig Larman, Applying UML and Patterns Pearson Education INC
4. Bennett, Simon, Object Oriented Analysis and Design McGraw Hill

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER :Computer Graphics
Code No. : CS-346

Semester IV

Total Lectures: 48

Pre – Requisites

- Computer programming skills in C programming language
- Basic understanding of use of data structures
- Basic Mathematical concepts related to matrices and geometry

Objectives

- To study how graphics objects are represented in Computer
- To study how graphics system in a computer supports presentation of graphics information
- To study how interaction is handled in a graphics system
- To study how to manipulate graphics object by applying different transformations
- To provide the programmer's perspective of working of computer graphics

1. Introduction to Computer graphics **[4]**

- 1.1 Introduction to computer graphics & graphics systems
- 1.2 Components of Computer Graphics Representation, Presentation , Interaction and Transformations
- 1.3 Applications of Computer Graphics
- 1.3 Pixel/Point ,Raster v/s Vector ,RGB color model, intensity
- 1.4 Programming essentials – event driven programming. OpenGL library

2. Input devices and Interaction tasks **[4]**

- 2.1 Logical Interaction – Locator, valuator , pick and choice;
- 2.2 Physical devices used for interaction – keyboard, mouse, trackball,spaceball, tablets, light pen, joy stick, touch panel, data glove;
- 2.4 Keyboard , Mouse interaction in OpenGL
- 2.5 Graphical User Interfaces- cursors , radio buttons, scroll bars, menus, icons
- 2.6 Implementing GUI in open GL

3. Presentation and Output devices **[4]**

- 3.1 Presentation Graphics - frame buffer, display file, lookup table;
- 3.2 Display devices, Random and Raster scan display devices; CRT,
- 3.3 Hardcopy devices - Plotters and Printers

4. Raster Scan Graphics **[10]**

- 4.1 Line drawing algorithms; DDA algorithm, Bresenham's line drawing algorithm, Circle generation algorithm;
- 4.2 Scan conversions- Generation of the Display, Image compression
- 4.3 Displaying Lines and characters
- 4.3 Polygon filling -Scan converting polygons, fill algorithms, Boundary fill algorithm, flood fill algorithm

5. Transformations **[7]**

- 5.1 Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, Reflection, shear
- 5.2 Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline
- 5.3 Window to viewport co-ordinate transformation. Setting window and viewport in OpenGL.

6 Clipping [7]

- 6.1 clipping operations , point clipping ,
- 6.2 Line clipping; Cohen Sutherland algorithm, Midpoint subdivision algorithm, Cyrus beck algorithm;
- 6.3 Polygon clipping , Sutherland Hodgman algorithm, Weiler-Atherton Algorithm

7 3D transformation & viewing [6]

- 7.1 3D transformations: translation, rotation, scaling & other transformations;
- 7.2 Three dimensional viewing, Parallel and Perspective projections,
- 7.3 View Volumes and General Projection Transformations.
- 7.4 3 D clipping

8 Hidden surfaces Elimination [4]

- 8.1 Depth comparison, A-buffer algorithm, Back face detection; Depth -Buffer
- 8.2 Scan-line Method - BSP tree method, the Painter's algorithm, Area-subdivision algorithm;

Text Books:

1. Hearn, Baker – “ Computer Graphics (C version 2nd Ed.)” – Pearson education
2. F. S. Hill, Stephen Kelly, Computer Graphics using OpenGL, PHI Learning
3. David F. Rogers - Procedural Elements of Computer Graphics, Tata McGRAw Hill

Reference Books:

4. Foley, Vandam, Feiner, Hughes – “Computer Graphics principles (2nd Ed.) – Pearson Education.
5. W. M. Newman, R. F. Sproull – “Principles of Interactive computer Graphics” – TMH.
6. D. F. Rogers, J. A. Adams – “ Mathematical Elements for Computer Graphics (2nd Ed.)” – TMH
7. Z. Xiang, R. Plastock – “ Schaum's outlines Computer Graphics (2nd Ed.)” – TMH

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : System Programming & Operating System
Code No. : CS-347

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)

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER :Lab Course II – Programming in Java
Code No. : CS-348

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

University of Pune

Revised Structure & Syllabi for Three Year Degree Programme of Bachelor of Computer Applications (B.C.A.)

1. The title of the programme will be Bachelor of Computer Application (B.C.A.) under Commerce Faculty.

The revised program will be introduced for -

- a) F.Y.B.C.A. from the academic year 2013-14
- b) S.Y.B.C.A. from the academic year 2014-15
- c) T.Y.B.C.A. from the academic year 2015-16

2. Objectives : The objectives of the Programme shall be to provide sound academic base from which an advanced career in Computer Application can be developed. Conceptual grounding in computer usage as well as its practical business application will be provided.

3. Eligibility for admission : In order to be eligible for admission to Bachelor of Computer Applications a candidate must have passed.

- a. HSC (10+2) from any stream with English as passing Subject with minimum 40% marks in aggregate.
- b. Two years Diploma in Pharmacy Course of Board of Technical Education, conducted by Government of Maharashtra or its equivalent.
- c. Three Year Diploma Course (after S.S.C. i.e. 10th Standard), of Board of Technical Education conducted by Government of Maharashtra or its equivalent.
- d. MCVC
- e. Every eligible candidate has to pass Common Entrance Test to be conducted by the respective Institute/College.

4. Duration : The duration of the B.C.A. Degree Program shall be three years divided into six semesters.

5. The scheme of Examinations :

The BCA Examination will be of 3600 marks as given Below

I)

- a) F.Y.B.C.A. (Sem I + Sem II) : 1200 marks
- b) S.Y.B.C.A. (Sem III + Sem IV) : 1200 marks
- c) T.Y.B.C.A. (Sem V + Sem VI) : 1200 marks

II) For Theory Paper There Will Be 80:20 Pattern 80 Marks : University Exam
20 Marks : Internal Exam

For Practical And Project Examination Sem I to VI : 100 marks

Sem I, II, III, IV, V, VI : External Assessment

6. The Standard of Passing and Award of Class

In order to pass in the examination the candidate has to obtain 40 marks out of 100. (Min 32 marks must be obtained in University Examination .

The class will be awarded on the basis of aggregate marks obtained by the candidate for all three years examinations .

The award of class will be as follows :

Aggregate Percentage of Marks	Class
(i) Aggregate 70% and above First Class with Distinction.
(ii) Aggregate 60% and above but less than 70% First Class
(iii) Aggregate 55% and more but less than 60% Higher Second Class
(iv) Aggregate 50% and more but less than 55%. Second Class.
(v) Aggregate 40% and more but less than 50% Pass Class.
(vi) Below 40% Fail.

7. RULES OF A.T.K.T.

a) A student shall be allowed to keep term for the Second Year, if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subjects of the First year examination, which consist of First & Second Semester.

b) A student shall be allowed to keep term for the Third year, if he/she has no backlog of first Year & if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subject of the Second Year examination which consist of Third & Fourth Semester.

8. The Medium of Instruction and Examination (Written and Viva) shall be English.

9. The Semester wise Structure of the programme shall be as follows :

Syllabus structure for the course of Bachelor of Computer Application [BCA]

[Under the Faculty of Commerce]

Course Structure

Semester – I (w.e.f A.Y. 2013-14)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
101	Modern Operating Environment & MS Office	20	80	100	4	-
102	Financial Accounting	20	80	100	4	
103	Programming Principal & Algorithms	20	80	100	4	
104	Business Communication	20	80	100	4	
105	Principles of Management	20	80	100	4	
106	Laboratory Course – I [Based on Paper No. 101 & 102]	-	100	100	-	4
Total		100	500	600	20	4

Semester – II (w.e.f A.Y. 2013-14)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
201	Procedure Oriented Programming using C	20	80	100	4	-
202	Data Base Management System	20	80	100	4	
203	Organizational Behavior	20	80	100	4	
204	Computer Applications in Statistics	20	80	100	4	
205	E-Commerce Concepts	20	80	100	4	
206	Laboratory Course – II [Based on Paper No. 201 & 202]	-	100	100	-	4
Total		100	500	600	20	4

Semester – III (w.e.f A.Y. 2014-15)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
301	Relational Database Management Systems	20	80	100	4	-
302	Data Structures using C	20	80	100	4	
303	Operating System Concepts	20	80	100	4	
304	Business Mathematics	20	80	100	4	
305	Software Engineering	20	80	100	4	
306	Laboratory Course – III [Based on Paper No. 301 and 302]	-	100	100	-	4
Total		100	500	600	20	4

Semester – IV (w.e.f A.Y. 2014-15)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
401	OOP's using C++	20	80	100	4	-
402	Programming in Visual Basic	20	80	100	4	-
403	Computer Networking	20	80	100	4	-
404	Enterprise Resource Planning	20	80	100	4	-
405	Human Resource Management	20	80	100	4	-
406	Laboratory Course – IV [Based on Paper No. 401 & 402]	-	100	100	-	4
Total		100	500	600	20	4

Semester - V(w.e.f A.Y. 2015-16)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
501	Java Programming	20	80	100	4	-
502	Web Technologies	20	80	100	4	
503	Dot Net Programming	20	80	100	4	
504	Object Oriented Software Engg.	20	80	100	4	
505	Software Project – I [Based on C++ / VB Technology]	-	100	100	-	4
506	Laboratory Course – V [Based on Paper No. 501 & 502]	-	100	100	-	4
Total		80	520	600	16	8

Semester – VI (w.e.f A.Y. 2015-16)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
601	Advanced Web Technologies	20	80	100	4	-
602	Advanced Java	20	80	100	4	
603	Recent Trends in IT	20	80	100	4	
604	Software Testing	20	80	100	4	
605	Software Project – II [Java / Dot net Technology]	-	100	100	-	4
606	Laboratory Course – VI [Based on Paper No. 601 & 602]	-	100	100	-	4
Total		80	520	600	16	8

Equivalence Scheme

Sr.No	Old Course		New Course	
	Sub Code	Title of Subject	Sub Code	Title of Subject
01	101	Business Communication	104	Business Communication
02	102	Principles of Management	105	Principles of Management
03	103	Programming Principles and Algorithms	103	Programming Principles & Algorithms
04	104	Computer Fundamental and Office Automation	101	Modern Operating Environment & MS Office
05	105	Business Accounting	102	Financial Accounting
06	106	Computer Laboratory and Practical Work (OA+PPA)	106	Laboratory Course – I [Based on Paper No.101 & 102]
07	201	Organizational Behavior	203	Organizational Behavior
08	202	Elements of Statistics	204	Computer Application in Statistics
09	203	'C' Programming	201	Procedure Oriented Programming Using C
10	204	File Structure and Database Concepts	202	Database Management System
11	205	Cost Accounting	205	E-Commerce Concepts
12	206	Computer Laboratory and Practical Work (c programming + DBMS)	206	Laboratory Course - II [Based on Paper No.201 & 202]
13	301	Numerical Methods	304	Business Mathematics
14	302	Data Structure using C	302	Data Structure using C
15	303	Software Engineering	305	Software Engineering
16	304	Management Accounting	303	Operating System Concepts
17	305	RDBMS	301	Relational Database Management System
18	306	Computer Laboratory and RDBMS)	306	Laboratory Course – III [Based on Paper No.301 and 302]
19	401	Networking	403	Computer Networking
20	402	Visual Basic	402	Programming in Visual Basic
21	403	Inventory Management (SAD)	404	Enterprise Resource Planning
22	404	Human Resource Management	405	Human Resource Management
23	405	Object Oriented Programming using C++	401	Object Oriented Programming using C++
24	406	Computer Laboratory and Practical Work (VB + C++)	406	Laboratory Course – IV [Based on Paper No. 401 & 402]
25	501	.NET Frameworks	503	Dot Net Programming
26	502	Internet Programming and Cyber Law	502	Web Technologies
27	503	Principals of Marketing	504	Object Oriented Software

				Engineering
28	504	Core Java	501	Java Programming
29	505	Project work (VB)	505	Software Project- [Based on C++/VB Technology]
30	506	Computer Laboratory and Practical Work (.NET + Core Java)	506	Laboratory Course – V [Based on Paper No. 501 & 502]
31	601	E-Commerce	604	Software Testing
32	602	Multimedia Systems	603	Recent Trends in IT
33	603	Introduction to SysPro And Operating Systems	601	Advanced Web Technology
34	604	Advance Java	602	Advance Java
35	605	Project Work (Banking & Finance , Cost Analysis , Financial Analysis ,Payroll , EDP ,ERP etc.)	605	Software Project – II [Java/ Dot net Technology]
36	606	Computer Laboratory and Practical Work (Multimedia + Advanced Java)	606	Laboratory Course – VI [Based on Paper No. 601 & 602]

B.C.A. Semester I**Subject Name -: Modern Operating Environment And MS Office****Course Code -: 101**

Chapter No.	Topic Name	No. Of Lectures
1	Introduction to computer : Computer Characteristics, Concept of Hardware, Software , Evolution of computer and Generations, Types of computer – Analog & Digital computers, Hybrid computers, General purpose & Special Purpose Computer, Limitations of Computer Applications of Computer in Various fields.	6
2	Structure and Working of Computer : Functional Block diagram of computer. CPU, ALU, Memory Unit, Bus structure of Digital Computer - Address, data and control bus.	4
3	Input /Output Devices : Input device – Keyboard, Mouse, Scanner, MICR, OMR. Output devices – VDU, Printers – Dot Matrix, Daisy- wheel, Inkjet, Laser, Line printers and Plotters.	5
4	Computer Memory : Memory Concept , Memory cell, memory organization, Semiconductor memory- RAM, ROM, PROM, EPROM, Secondary Storage devices - Magnetic tape, Magnetic Disk (floppy disk & Hard disk.), Compact Disk.	6
5	Computer Language and Software :Algorithm, flowcharts, Machine language, Assembly language, High Level language, Assembler, Compiler, Interpreter. Characteristics of good Language. Software - System and application software.	5
6	Operating System :Operating system, Evolution of operating system. Function of operating system. Types of operating systems. Detailed study of Windows Operating System. Introduction and features of LINUX OS.	6
7	Networking : Concept, Basic elements of a Communication System, Data transmission media, Topologies, LAN, MAN, WAN, Internet	3
8	MS-OFFICE : Introduction to Ms-office, Components and features. MS-Word – Creating letter, table , fonts , page layout document formatting spell check, print preview, template, colour, mail merge, auto text, inserting picture , word art. MS-EXCEL – Introduction to Excel , Sorting , Queries, Graphs , Scientific functions. Power Point :- Introduction to Power Point Creation of Slides , Inserting pictures , Preparing slide show with animation. MS-ACCESS - Creation and Manipulation of Files.	12

Books Recommended:-

- 1) Computer Fundamentals by P.K. Sinha & Priti Sinha, 3rd edition, BPB pub.
- 2) Computers Today by S. Basandra Galgotia Pub.
- 3) Microsoft Office 2000 by Vipra Computers, Vipra Printers Pvt. Ltd.
- 4) Advanced Microsoft Office 2000 by Meredith Flynn, Nita Rutkosky, BPB Pub
- 5) using Microsoft office 2007 by Ed Bott ,Woody Leonhard , Pearson publication
- 6) using Microsoft office 2010 by , Pearson publication

B.C.A. Semester I
Subject Name :- Financial Accounting
Course Code :- 102

Objectives:

1. To enable the students to acquire sound knowledge of basic concepts of accounting
2. To impart basic accounting knowledge
3. To impart the knowledge about recording of transactions and preparation of final accounts
4. To acquaint the students about accounting software packages

	Contents	No. of lectures
Unit 1	Introduction: Financial Accounting- Definition, Scope, Objectives & Limitations Distinction between Accounting & Book Keeping, Branches of Accounting	06
Unit 2	Conceptual Frame work: Accounting Concepts, Principles & Conventions Accounting Standards - Concept, objectives, benefits, Overview of Accounting Standards in India. Accounting Policies, Accounting as a measurement Discipline, Valuation Principles, Accounting Estimates	06
Unit 3	Recording of Transactions: Voucher system; Accounting Process, Journals, Ledger, Cash Book , subsidiary books , Trial Balance. Depreciation: Meaning , Need, Importance & Methods (WDV & SLM)	16
Unit 4	Preparation of Final Accounts: Preparation of Trading Account, Profit & Loss Account & Balance Sheet of Sole Proprietary Business.	10
Unit 5	Introduction to Company Final Accounts: Important provisions of Companies Act 1956 in respect of preparation of final Accounts. Understanding the final accounts of a Company	04
Unit 6	Accounting in Computerized Environment: Computers and Financial Application Introduction to Accounting Software Package - Tally 9.0 An overview of Computerized Accounting systems - Salient Features and significance , Generating Accounting Reports,	06
Total		48

Recommended Books :

1. Fundamentals of Accounting & Financial Analysis: By Anil Chowdhry (Pearson Education)
2. Financial accounting: By Jane Reimers (Pearson Education)
3. Accounting Made Easy By Rajesh Agarwal & R Srinivasan (Tata McGraw –Hill)
4. Financial Accounting For Management: By Amrish Gupta (Pearson Education)
5. Financial Accounting For Management: By Dr. S. N. Maheshwari (Vikas Publishing)
6. Advanced Accounts – M.C. Shukla and S P Grewal (S.Chand & Co., New Delhi)

B.C.A. Semester I
Subject Name -: Principles of Programming and Algorithms
Course Code -: 103

Pre requisite: Basic Mathematics

Objectives: To develop Analytical / Logical Thinking and Problem Solving capabilities

Ch.1 Introduction [5]

- 1.1 Concept: problem solving, algorithm
- 1.2 Program development cycle
- 1.3 Characteristics of an algorithm
- 1.4 Time complexity: Big-Oh notation
- 1.5 Flowcharts
- 1.6 Simple Examples: Algorithms and flowcharts

Ch. 2 Simple Arithmetic Problems [13]

- 2.1 Addition / Multiplication of integers
- 2.2 Determining if a number is +ve / -ve / even / odd
- 2.3 Maximum of 2 numbers, 3 numbers
- 2.4 Sum of first n numbers, given n numbers
- 2.5 Integer division, Digit reversing, Table generation for n, ab
- 2.6 Factorial, sine series, cosine series, nCr , Pascal Triangle
- 2.7 Prime number, Factors of a number
- 2.8 Other problems such as Perfect number, GCD of 2 numbers etc
(Write algorithms and draw flowcharts)

Ch. 3 Recursion [8]

- 3.1 Concept
- 3.2 Multiplication
- 3.3 Factorial
- 3.4 Ackerman function
- 3.5 Fibonacci series
- 3.6 Permutation Generation

Ch. 4 Algorithms using arrays [8]

- 4.1 Maximum and minimum of array, reversing elements of an array
- 4.2 Mean and Median of n numbers
- 4.3 Row major and Column major form of array representation
- 4.4 Matrices: Addition, Multiplication, Transpose, Symmetry, upper/lower triangular

Ch. 5 Sorting and Searching [13]

- 5.1 Insertion sort
- 5.2 Bubble sort
- 5.3 Selection sort

5.4 Quick sort (Recursive)

5.5 Merge sort

5.6 Radix Sort

5.7 Bucket Sort

5.8 Counting Sort

5.9 Sequential and Binary search

(Performance Analysis for space requirement and speed using Big-Oh notation is essential)

Reference Books:

1. How to solve it by Computer – R. G. Dromy

2. Fundamentals of Data Structures – Horowitz and Sahani

3. Introduction to algorithms – Cormen, Leiserson, Rivest, Stein

B.C.A. Semester I
Subject Name -: Business Communication
Course Code -: 104

Objectives:

1. To understand the concept, process and importance of communication.
2. To develop an integrative approach where reading, writing, presentation skills are used together to enhance the students' ability to communicate and write effectively.
3. To create awareness among students about Methods and Media of communication.
4. To make students familiar with information technology and improve job seeking skills.

	Contents	No. of Lectures
Unit 1	Introduction to Communication 1.1 Meaning 1.2 Definition 1.3 Objective, Process, importance. 1.4 Principles of effective communication 1.5 Barriers to Communication and its types 1.6 Overcoming Barriers.	08
Unit 2	Methods of Communication 2.1 Verbal Communication 2.1.1 – Written Communication-Advantages & Limitations (Letters, Memo, Agenda, Notice & Reports) 2.2.2 Oral Communication) -Advantages & Limitations (Personal & Telephonic) 2.2 Non-Verbal Communication -Advantages & Limitations 2.2.1 Silence 2.2.2 Body Language 2.2.3 Signs & Symbols 2.3 Grapevine	10
Unit 3	Oral Communication 3.1 Meaning, Nature, Scope 3.2, Principles of Effective Oral Communication 3.3 Techniques of Effective Speaking 3.4. The Art of Listening, 3.5 Principles of Good Listening- Barriers to Listening	08
Unit 4	Business Correspondence 4.1 Need, Functions of Business Correspondence 4.2 Components and layout of Business letter, 4.3 Drafting of letters: Enquiry, order , Complaints and follow up , Sales, Circulars. 4.4 Email etiquette	08
Unit 5	Information Technology for Communication Introduction, Advantages and Limitations of – Telex, Telegram, Fax, Voice Mail, Teleconferencing, Video Conferencing, Internet and Social Media Sites, E-communication at work place.	08
Unit 6	Job Seeking Skills 6.1 Job application letter 6.2 Curriculum Vitae	06

	6.3 Group Discussion 6.4 Interview Skills 6.5 Presentation Skills	
	Total	48

Recommended Books:

1. Modern Business Organization - S.A. Sherlekar
2. Industrial Organization Management - Sherlekar
3. Business Organization and management – Y.K. Bhushan
4. Business Environment - F. Cherunilam
5. Business Organization & Management – C.B. Gupta.
6. Entrepreneurial Development – S.S. Khanna.
7. Organizing and Financing of Small scale Industry – Dr. V. Desai

B.C.A. Semester I
Subject Name -: Principles of Management
Course Code -: 105

Objectives:

1. To provide the fundamental knowledge about working of business organization.
2. To make students well acquainted with management process , functions and principles.
3. To make the students familiar with recent trends in management.

	Contents	No. of Lectures
Unit 1	Nature of Management 1. Meaning, Definition, Nature, Importance & Functions 2. Management an Art, Science & Profession-Management as social System 3. Concept of Management-Administration-Organization-Universality of management	08
Unit 2	Evolution of management Thoughts 2.1 Contribution of F.W.Taylor, Henri Fayol, Elton Mayo	08
Unit 3	Functions of Management : Part – I 3.1 Planning –Meaning –Need & Importance, types levels –advantages & limitations; 3.2 Forecasting- Need & Techniques; 3.3 Decision making – Types - Process of rational decision making & techniques of decision making. 3.4 Organizing – Elements of organizing & process Types of organizations, 3.5 Delegation of authority – Need, difficulties in delegation – Decentralization. 3.6 Staffing – Meaning & importance	08
Unit 4	Functions of Management : Part –II 4.1 Direction - Nature – Principles 4.2 Motivation - Importance – Theories 4.3 Leadership – Meaning - qualities of effective Leadership & functions of leader 4.4 Co-ordination - Need – Importance 4.5 Controlling – Need, nature, Importance, Process & techniques	08
Unit 5	Strategic Management 5.1 Definition, 5.2 Classes of Decisions 5.3 Levels of Decisions 5.4 Strategy 5.5 Role of Strategic Management and its benefits 5.6 Strategic Management in India	08
Unit 6	Recent Trends in Management 6.1 Management of change 6.2 Disaster Management 6.3 Total Quality Management 6.4 Stress Management 6.5 Social Responsibility of management	08
	Total	48

Recommended Books:

- i. Essential of Management - Harold Koontz and Itenz Wiebritch- McGraw-Hill International
- ii. Management Theory & Practice – J.N. Chandan
- iii. Essential of Business Administration – K. Aswathapa, Himalaya Publishing House
- iv. Principles & Practice of management – Dr. L.M. Prasad, Sultan Chand & Sons – New Delhi
- v. Business Organization & management – Dr. Y.K. Bhushan.
- vi. Management: Concept and Strategies by J.S. Chandan, Vikas Publishing.
- vii. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
- viii. Business organization and management by Talloo by Tata Mc Graw Hill
- ix. Business Environment and policy – A book on Strategic Management/ Corporate Planning
By Francis Cherunilam, Himalaya Publishing House.
- x. Business Organization & Management – C.B. Gupta
- xi. Dictionary of Commerce & Management -- J.L. Hanson

B.C.A. Semester II**Subject Name -: Procedure Oriented Programming using C****Course Code -: 201**

Chapter No.	Topics	No. of Lectures	Ref. Book
1	Introduction to C language 1.1 History 1.2 Basic structure of C Programming 1.3 Language fundamentals 1.3.1 Character set, tokens 1.3.2 Keywords and identifiers 1.3.3 Variables and data types 1.4 Operators 1.4.1 Types of operators 1.4.2 Precedence and associativity 1.4.3 Expression	4	Book 1, 2
2	Managing I/O operations 2.1 Console based I/O and related built-in I/O functions 2.1.1 printf(), scanf() 2.1.2 getch(), getchar() 2.2 Formatted input and formatted output	2	Book 1, 2
3	Decision Making and looping 3.1 Introduction 3.2 Decision making structure 3.2.1 If statement 3.2.2 If-else statement 3.2.3 Nested if-else statement 3.2.4 Conditional operator 3.2.5 Switch statement 3.3 Loop control structures 3.3.1 while loop 3.3.2 Do-while loop 3.3.3 For loop 3.3.4 Nested for loop 3.4 Jump statements 3.4.1 break 3.4.2 continue 3.4.3 goto 3.4.4 exit	6	Book 1, 2
4	Functions and pointers 4.1 Introduction 4.1.1 Purpose of function 4.1.2 Function definition 4.1.3 Function declaration 4.1.4 Function call 4.2 Types of functions	12	Book 1, 2,3

	4.3 Call by value and call by reference 4.4 Storage classes 4.5 Recursion 4.6 Introduction to pointer 4.6.1 Definition 4.6.2 Declaration 4.6.3 Initialization 4.7 Indirection operator and address of operator 4.8 Pointer arithmetic 4.9 Dynamic memory allocation 4.10 Functions and pointers		
5	Arrays and Strings 5.1 Introduction to one-dimensional Array 5.1.1 Definition 5.1.2 Declaration 5.1.3 Initialization 5.2 Accessing and displaying array elements 5.3 Arrays and functions 5.4 Introduction to two-dimensional Array 5.4.1 Definition 5.4.2 Declaration 5.4.3 Initialization 5.5 Accessing and displaying array elements 5.6 Introductions to Strings 5.6.1 Definition 5.6.2 Declaration 5.6.3 Initialization 5.7 Standard library functions 5.8 Implementations without standard library functions.	8	Book 1, 2
6	Structures and union 6.1 Introduction to structure 6.1.1 Definition 6.1.2 Declaration 6.1.3 Accessing members 6.2 structure operations 6.3 nested structure 6.4 Introduction to union 6.4.1 Definition 6.4.2 Declaration 6.5 Differentiate between structure and union	5	Book 1, 2
7	C Preprocessor 7.1 Definition of preprocessor 7.2 Macro substitution directory 7.3 File inclusion directory 7.4 Conditional compilation	2	Book 1, 2
8	File handling 8.1 Definitions of files 8.2 File opening modes 8.3 Standard functions	9	Book 1, 2

	8.4 Random access to files		
	8.5 Command line argument		
Total		48	

Reference Book :-

- 1) Let us C –Yashwant Kanetkar, BPB publication.
- 2) Programming in C - Balguruswamy, Tata McGraw-Hill publication.
- 3) Pointers in C - Yashwant Kanetkar, BPB publication.
- 4) C programming by Dr.Vishal Lichade dreamtech press

B.C.A. Semester II
Subject Name -: Database Management Systems
Course Code -: 202

Sr. No.	Chapter No.	Name of Chapter and Contents	No. of Lect.	Reference
1	1	File Structure and Organization 1.1 Introduction 1.2 Logical and Physical Files 1.2.1 File 1.2.2 File Structure 1.2.3 Logical and Physical Files Definitions 1.3 Basic File Operations 1.3.1 Opening Files 1.3.2 Closing Files 1.3.3 Reading and Writing 1.3.4 Seeking 1.4 File Organization 1.4.1 Field and Record structure in file 1.4.2 Record Types 1.4.3 Types of file organization 1.4.3.1 Sequential 1.4.3.2 Indexed 1.4.3.3 Hashed 1.5 Indexing 1.5.1 What is an Index? 1.5.2 When to use Indexes? 1.5.3 Types of Index 1.5.3.1 Dense Index 1.5.3.2 Sparse Index	6	1
2	2	Database Management System 2.1 Introduction 2.2 Basic Concept and Definitions 2.2.1 Data and Information 2.2.2 Data Vs Information 2.2.3 Data Dictionary 2.2.4 Data Item or Field 2.2.5 Record 2.3 Definition of DBMS 2.4 Applications of DBMS 2.5 File processing system Vs DBMS 2.6 Advantages and Disadvantages of DBMS 2.7 Users of DBMS 2.7.1 Database Designers 2.7.2 Application programmer 2.7.3 Sophisticated Users 2.7.4 End Users 2.8 Views of Data 2.9 Data Models	14	1

		2.9.1 Object Based Logical Model <ul style="list-style-type: none"> a. Object Oriented Data Model b. Entity Relationship Data Model 2.9.2 Record Base Logical Model <ul style="list-style-type: none"> a. Relational Model b. Network Model c. Hierarchical Model 2.10 Entity Relationship Diagram (ERD) 2.11 Extended features of ERD 2.12 Overall System structure		
3	3	Relational Model 3.1 Introduction 3.2 Terms <ul style="list-style-type: none"> a. Relation b. Tuple c. Attribute d. Cardinality e. Degree of relationship set f. Domain 3.3 Keys <ul style="list-style-type: none"> 3.3.1 Super Key 3.3.2 Candidate Key 3.3.3 Primary Key 3.3.4 Foreign Key 3.4 Relational Algebra Operations <ul style="list-style-type: none"> a. Select b. Project c. Union d. Difference e. Intersection f. Cartesian Product g. Natural Join 	8	1
4	4	SQL (Structured Query Language) 4.1 Introduction 4.2 History Of SQL 4.3 Basic Structure 4.4 DDL Commands 4.5 DML Commands 4.6 Simple Queries 4.7 Nested Queries 4.8 Aggregate Functions	12	2
5	5	Relational Database Design 5.1 Introduction 5.2 Anomalies of un normalized database 5.3 Normalization 5.4 Normal Form <ul style="list-style-type: none"> 5.4.1 1 NF 5.4.2 2 NF 5.4.3 3 NF 	5	1

		5.4.3.4 BCNF		
--	--	--------------	--	--

References:

- 1) Database System Concepts By Henry korth and A. Silberschatz
- 2) SQL, PL/SQL The Programming Language Oracle :- Ivan Bayross, BPB Publication.
- 3) Database Systems Concepts, Designs and Application by Shio Kumar Singh, Pearson
- 4) Introduction to SQL by Reck F. van der Lans by Pearson
- 5) Modern Database Management by Jeffery A Hoffer , V.Ramesh, Heikki Topi , Pearson
- 6) Database Management Systems by Debabrata Sahoo ,Tata Macgraw Hill

B.C.A. Semester II**Subject Name :- Organizational Behavior****Course Code :- 203****Objectives:**

- 1) To equip the students to understand the impact that individual, group & structures have on their behavior within the organizations.
- 2) To help them enhance and apply the knowledge they have received for the betterment of the organization.

	Contents	No. of Lectures
Unit 1	Fundamentals of Organizational Behavior Definition, Nature, Scope, and Goals of Organizational Behavior Fundamental Concepts of Organizational Behavior Models of Organizational Behavior Emerging aspects of Organizational Behavior: TQM, Managing Cultural Diversity, Quality Circles & Total Employee involvement	08
Unit 2	2. Attitude Values and Motivation Effects of employee attitudes Personal and Organizational Values Nature and Importance of Motivation, Motivation Process - Motivation Model Theories of Work Motivation: (a) Maslow's Need Hierarchy Theory, (b) McGregors's Theory 'X' and Theory 'Y' (c) Herzberg's Two factor theory of Motivation	08
Unit 3	3. Personality Definition of Personality, Determinants of Personality Theories of Personality – Trait theory : The Big Five Model Type Theory : Myers- Briggs Type Personality Self Theory : Locus of Control	08
Unit 4	4. Work Stress Meaning and definition of Stress, Sources of Stress: Individual Level, Organizational Level, Type A and Type B Assessment of Personality Causes of stress in organization Effect of Stress – Physiological Effect, Psychological Effect, Behavioral Impact Stress Management – Individual Strategies, Organizational Strategies	08
Unit 5	Conflict in Organizations Concept of Conflict, Process of Conflict Types of Conflict – Intrapersonal, interpersonal, intergroup, organizational, Johari Window Effects of Conflict, Conflict management Strategies	08
Unit 6	6. Group Behavior and Change in Organization Nature of Group, Types of Groups Team Building & Effective Teamwork Goals of Organizational Change, resistance to change, Overcoming resistance to change.	08

Books Recommended:-

1. Organizational Behavior Text, Cases and Games- By K. Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)
2. Organizational Behavior Human Behavior at Work By J. W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th Edition (2007)
3. Organizational Behavior - By Fred Luthans - McGRAW – HILL
4. Organizational Behavior - By **Super Robbins**
5. Organizational Behavior - Anjali Ghanekar - Everest Publishing House
6. Organizational Behavior Fundamentals, Realities and Challenges By Detra Nelson, James Campbell Quick Thomson Publications
7. Organizational Behavior through Indian Philosophy By M.N. Mishra, Himalaya Publication House
8. Organizational Behavior - Stephen P. Robbins, Timothy A. Judge, Seema Sanghi - Pearson Prentice Hall

B.C.A. Semester II

Subject Name :- Elements of Statistics

Course Code :- 204

Objectives:

1. To understand the power of excel spreadsheet in computing summary statistics.
2. To understand the concept of various measures of central tendency and variation and their importance in business.
3. To understand the concept of probability, probability distributions and simulations in business world and decision making.

Unit 1. Introduction to statistical functions of Excel (12)

Concept of population and sample, Qualitative and Quantitative variables, Raw data, Basic Spreadsheet concept, data entry and its summary statistics using excel functions, preparation of grouped and ungrouped frequency distribution using excel, creating bar charts and pie chart, frequency curves and ogive curves.

(There will be no theory question on above chapter separate practical exam of 20 marks of one hour should be conducted on it)

Unit 2. Methods of counting (06)

Fundamental principals of counting

Permutations and combination of n dissimilar objects taken r at a time, example and problems.

Unit 3. Elements of Probability Theory (12)

Random experiments, all possible outcomes (sample space), events, algebra of events.

Classical definition of probability, addition theorem of probability(without proof), Independence of events, Simple numerical problems.

Unit 4. Standard Discrete Distributions (08)

Discrete Uniform : Probability distribution, cumulative probability distribution, mean, variance (without proof)

Bernoulli : Probability function, Mean and variance

Binomial : Probability distribution, cumulative probability distribution, mean, variance(without proof)

Examples and problems.

Unit 5: Simulation Techniques (10)

Random Number Generator

Model sampling from discrete uniform and binomial distributions

Monte Carlo Simulation examples and problems.

Total lectures: 48

B.C.A. Semester II**Subject Name -: E-Commerce Concepts****Course Code -: 205**

Sr. No	Chapter No.	Name Of Chapter and Contents	No. of Lectures	Reference Book no.
1	1	Introduction to Electronic Commerce 1.1 What is E-Commerce (Introduction and Definition) 1.2 Main activities E-Commerce 1.3 Goals of E-Commerce 1.4 Technical Components of E-commerce 1.5 Functions of E-commerce 1.6 Advantages and Disadvantages of E-commerce 1.7 Scope of E-commerce 1.8 Electronic commerce Applications 1.9 Electronic commerce and Electronic Business (C2C)(2G , G2G , B2G , B2P,B2A,P2P, B2A, C2A, B2B,B2C)	6	4
2	2	Building own website 2.1 Reasons for building own website 2.2 Benefits of website 2.3 Bandwidth requirements 2.4 Cost , Time , Reach 2.5 Registering a Domain Name 2.6 Web promotion 2.7 Target email , Banner Exchange , Shopping Bots	7	4
3	3	Internet and Extranet 3.1 Definition of Internet 3.2 Adv and Dis adv of the Internet 3.3 Component of a Intranet Information technology structure 3.4 Development of a Intranet 3.5 Extranet and Intranet Difference 3.6 Role of Intranet in B2B Application	5	4
4	4	Electronic payment System 4.1 Introduction 4.2 Types of Electronic payment system 4.3 Payment types 4.4 Traditional payment 4.5 Value exchange system 4.6 Credit card system 4.7 Electronic funds transfer 4.8 Paperless bill 4.9 Modern payment cash 4.10 Electronic cash	6	1,2
5	5	Technology Solution 5.1 Protecting Internet Communications 5.2 Encryption 5.3 Symmetric Key Encryption 5.4 Public key Encryption	6	1,2

		5.5 Public Key Encryption using digital signatures 5.6 Digital Envelopes 5.7 Digital Certificates 5.8 Limitations to Encryption solutions.		
6	6	E-com Security 6.1 E-commerce security environment 6.2 Security threats in E-com environment 6.3 Malicious code and unwanted programs 6.4 Phishing and identity theft 6.5 Hacking and cyber vandalism 6.6 Credit card fraud/Theft 6.7 Spoofing 6.8 Denial of service(DOS) 6.9 Distributed denial of service(dDOS)	6	1,2

References :

1. E-Commerce- Kenneth C.Laudon and Carol Guercio Traver
2. E-Commerce by --Kamlesh K Bajaj and Debjani Nag
3. Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanam
4. E-Commerce Concepts , Models , Strategies by -- G.S.V Murthy
5. Electronic Commerce by --Gary P. Schneider

University of Pune
(Pattern – 2013) w.e.f. 2014 – 15

B.C.A. Semester III

Subject Name:- RDBMS (Relational Database Management System)
Course Code:- 301

Objectives:

1. Enables students to understand relational database concepts and transaction management concepts in database system.
2. Enables student to write PL/SQL programs that use: procedure, function, package, cursor and trigger.

Unit	Topic	No. of Lectures	Ref. Book
Unit 1	Introduction To RDBMS 1.1 Introduction to popular RDBMS product and their features 1.2 Difference Between DBMS and RDBMS 1.3 Relationship among application programs and RDBMS	2	1
Unit 2	PLSQL 2.1 Overview of PLSQL 2.2 Data Types 2.3 PLSQL Block 2.3.1 % type, % rowtype 2.3.2 Operators, Functions, comparison, numeric, character, date 2.3.3 Control Statement 2.4 Exception Handling 2.4.1 Predefined 2.4.2 User defined exceptions 2.5 Functions , Procedures 2.6 Cursor 2.6.1 Definition 2.6.2 Types of cursor- implicit, explicit (attributes) 2.6.3 Parameterized cursor 2.7 Trigger 2.8 Package	20	4
Unit 3	Transaction Management 3.1 Transaction Concept 3.2 Transaction Properties 3.3 Transaction States 3.4 Concurrent Execution 3.5 Serializability 3.5.1 Conflict Serializability 3.5.2 View Serializability 3.6 Recoverability	10	1,2,3

	3.6.1 Recoverable Schedule 3.6.2 Cascadless Schedule		
Unit 4	Concurrency Control 4.1 Lock Based Protocol 4.1.1 Locks 4.1.2 Granting of Locks 4.1.3 Two Phase Locking Protocol 4.2 Timestamp Based Protocol 4.2.1 Timestamp 4.2.2 Timestamp ordering protocol 4.2.3 Thomas's Write Rule 4.3 Validation Based Protocol 4.4 Deadlock Handling 4.4.1 Deadlock Prevention 4.4.2 Deadlock Detection 4.4.3 Deadlock Recovery	8	1,2,3
Unit 5	Recovery System 5.1 Failure Classification 5.1.1 Transaction Failure 5.1.2 System Crash 5.1.3 Disk Failure 5.2 Storage Structures 5.2.1 Storage Types 5.2.2 Data Access 5.3 Recovery & Atomicity 5.3.1 Log based Recovery 5.3.2 Deferred Database Modification 5.3.3 Immediate Database Modification 5.3.4 Checkpoints 5.4 Recovery with Concurrent Transaction 5.4.1 Transaction Rollback 5.4.2 Restart Recovery 5.5 Remote Backup System	8	1,2,3
Total No. of Lectures		48	

Recommended Books :

- 1) Database System Concepts 5th Edition - Silberschatz, Korth, Sudershan.
- 2) Database Management System - Bipin Desai
- 3) An Introduction to Database Systems Eighth Edition C. J.Date, A.Kannan,
S.Swamynathan
- 4) SQL/PLSQL the programming language of oracle - Ivan Bayross

B.C.A. Semester III

Subject Name -: Data Structure Using C

Course Code -:302

Objective:-

1. To understand different methods of organising large amounts of data
2. To efficiently implement different data structure
3. To efficiently implement solution for different problems
4. To get more knowledge on C programming language

Unit	Topic	No. of Lectures	Reference Books
Unit 1	Basic Concept and Introduction to Data Structure 1.1 Pointers and dynamic memory allocation 1.2 Algorithm-Definition and characteristics 1.3 Algorithm Analysis -Space Complexity -Time Complexity -Asymptotic Notation Introduction to Data structure 1.5 Types of Data structure 1.6 Abstract Data Types (ADT) Introduction to Arrays and Structure 1.7 Types of array and Representation of array 1.8 Polynomial - Polynomial Representation - Evaluation of Polynomial - Addition of Polynomial 1.9 Self Referential Structure	9	1,2
Unit 2	Searching and Sorting Techniques	9	1,2,3

	<p>2.1 Linear Search</p> <p>2.2 Binary Search(Recursive , Non-Recursive)</p> <p>2.3 Bubble Sort</p> <p>2.4 Insertion Sort</p> <p>2.5 Selection Sort</p> <p>2.6 Quick Sort</p> <p>2.7 Heap Sort (No Implementation)</p> <p>2.8 Merge Sort</p> <p>2.9 Analysis of all Sorting Techniques</p>		
Unit 3	<p>Linked List</p> <p>3.1 Introduction</p> <p>3.2 Static & Dynamic Representation</p> <p>3.3 Types of linked List</p> <ul style="list-style-type: none"> - Singly Linked list(All type of operation) - Doubly Linked list (Create , Display) - Circularly Singly Linked list (Create, Display) <p>3.4 Circularly Doubly Linked list (Create, Display)</p>	10	1,3
Unit 4	<p>Stack and Queue</p> <p>4.1 Introduction stack</p> <p>4.2 Static and Dynamic Representation</p> <p>4.3 Primitive Operations on stack</p> <p>4.4 Application of Stack</p> <p>4.5 Evaluation of postfix and prefix expression</p> <p>4.6 Conversion of expressions- Infix to prefix & Infix to postfix</p> <p>Queue</p> <p>4.7 Introduction queue</p> <p>4.8 Static and Dynamic Representation</p> <p>4.9 Primitive Operations on Queue</p>	9	1,2,3

	4.10 Application of Queue 4.11 Type of Queue Circular Queue De Queue Priority Queue		
Unit 5	Trees 5.1 Introduction & Definitions 5.2 Terminology 5.3 Static and Dynamic Representation 5.4 Types of tree 5.5 Operations on Binary Tree & Binary Search Tree 5.6 Tree Traversal Inorder, Preorder, Postorder (Recursive & Iterative) 5.7. AVL Tree	7	1,2
Unit 6	Graphs 6.1 Representation -Adjacency Matrix -List 6.2 In degree , out degree of graph 6.3 Graph operation DFS , BFS 6.4 Spanning Tree	4	1,2,3
	Total No. of Lectures	48	

Recommended Books:-

1. Fundamentals of data structures – Ellis Horowitz and Sartaj Sahni
2. Data Structure Using C - Radhakrishanan and Shrivastav.
3. Data Structure Using C and C++ - Rajesh K. Shukla ,Wiley -India
4. Data Structures Files and Algorithms – Abhay K. Abhyankar
5. Data Structures and Algorithms – Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman (Pearson Education)

B.C.A.Semester III

Subject Name :- Introduction to Operating System
Course Code :- 303

Objective :-

1. To know system programming
2. To know services provided by operating system
3. To know the Scheduling concepts

Unit	Topic	No. of Lect.	Reference Books
Unit 1	Introduction to Operating System 1.1 What is operating system 1.2 Computer system architecture 1.3 Services provided by OS 1.4 Types of OS	02	Book 1,2
Unit 2	System Structure 2.1 User operating system Interface 2.2 System Calls 2.3 Process or job control 2.4 Device Management 2.5 File Management 2.6 System Program 2.7 Operating System Structure	02	Book 2
Unit 3	Process Management 3.1 What is Process 3.2 Process State 3.3 Process Control Block 3.4 Context Switch 3.5 Operation on Process Process Creation Process Termination	03	Book 2
Unit 4	CPU Scheduling 4.1 What is scheduling 4.2 Scheduling Concepts 4.2.1 CPU- I/O Burst Cycle 4.2.2 CPU Scheduler 4.2.3 Preemptive and Non-preemptive scheduling 4.2.4 Dispatcher 4.3 Scheduling criteria (Terminologies used in scheduling) 4.4 Scheduling Algorithms 4.4.1 FCFS 4.4.2 SJF (Preemptive & non-preemptive) 4.4.3 Priority Scheduling (Preemptive & Non-preemptive) 4.4.4 Round Robin Scheduling 4.5 Multilevel Queues	08	Book 2

	4.6 Multilevel Feedback queues		
Unit 5	Process Synchronization 5.1 Introduction 5.2 Critical section problem 5.3 Semaphores 5.3.1 Concept 5.3.2 Implementation 5.3.3 Deadlock & Starvation 5.3.4 Binary Semaphores 5.4 Critical Sections 5.5 Classical Problems of synchronization 5.6 Bounded buffer problem 5.7 Readers & writers problem 5.8 Dining Philosophers problem	06	Book 2
Unit 6	Deadlock 6.1 Introduction 6.2 Deadlock Characterization 6.3 Necessary Condition 6.4 Resource allocation graph 6.5 Deadlock Prevention 6.6 Deadlock Avoidance Safe State Resource allocation graph algorithm Bankers algorithm 6.7 Deadlock Detection 6.8 Recovery from deadlock Process Termination Resource Preemption	07	Book 2
Unit 7	Memory Management 7.1 Introduction to memory management 7.2 Address Binding 7.3 Dynamic Loading 7.4 Dynamic Linking 7.5 Overlays 7.6 Logical vs. physical addresses 7.7 Swapping 7.8 Contiguous memory allocation 7.8.1 Single Partition Allocation 7.8.2 Multiple Partition Allocation 7.8.3 External and Internal Fragmentation 7.9 Paging 7.10 Segmentation 7.11 Segmentation with paging 7.12 Virtual memory 7.13 Demand paging 7.14 Page replacement algorithms FIFO MRU	08	Book 2

	LRU LRU approximation using reference bit MFU LFU Second Chance algorithm Optimal replacement		
Unit 8	File System 8.1 Introduction & File concepts (file attributes, Operations on files) 8.2 Access methods Sequential access Direct access 8.3 File structure Allocation methods Contiguous allocation Linked Allocation Indexed Allocation 8.4 Free Space Management Bit Vector Linked List Grouping Counting	07	Book 2
Unit 9	I/O System 9.1 Introduction 9.2 I/O Hardware 9.3 Application of I/O Interface 9.4 Kernel I/O Subsystem 9.5 Disk Scheduling FCFS Shortest Seek time first SCAN C- SCAN C- Look	05	Book 2
	Total No. of Lectures	48	

Recommended Books

1. System Programming and Operating System – D. M. Dhamdhare
2. Operating System Concepts – Silberschatz, Galvin, Gagne

BCA Semester-III
Subject Name: - Business Mathematics
Course Code: - 304

Unit No	Topic	No of Lectures
Unit 1	Ratio, Proportion and Percentage Ratio- Definition, Continued Ratio, Inverse Ratio, Proportion, Continued Proportion, Direct Proportion, Inverse Proportion, Variation, Inverse Variation, Joint Variation, Percentage- Meaning and Computations of Percentages.	08
Unit 2	Profit And Loss Terms and Formulae, Trade discount, Cash discount, Problems involving cost price, Selling Price, Trade discount and Cash Discount. Introduction to Commission and brokerage, Problems on Commission and brokerage.	08
Unit 3	Interest Simple Interest, Compound interest (reducing balance & Flat Interest rate of interest), Equated Monthly Installments(EMI), Problems	06
Unit 4	Matrices And Determinants (upto order 3 only) Multivariable data, Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Ad joint of a Matrix, Inverse of a Matrix via ad joint Matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Non-homogeneous System of Linear equations (not more than three variables). Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix, Problems.	14
Unit 5	Linear Programming problem (L.P.P.) Meaning of LPP, Formulation of LPP, and solution by graphical methods.	04
Unit 6	Transportation problem (T.P.) Statement and meaning of T.P. methods of finding initial basic feasible solution by North West corner Rule, Matrix Minimum method and Vogel's approximation method. Simple numerical problems (concept of degeneracy is not expected).	08
	Total no of lectures	48

Reference Books:

- 1) Business Mathematics by Dr. Amarnath Dikshit & Dr. Jinendra Kumar Jain.
- 2) Business Mathematics by V. K. Kapoor - Sultan chand & sons, Delhi
- 3) Business Mathematics by Bari - New Literature publishing company, Mumbai
- 4) Operations Research by Dr. S. D. Sharma – Sultan Chand & Sons.
- 5) Operations Research by Dr. J. K. Sharma – Sultan Chand & Sons.

B.C.A. Semester III

Subject Name:- Software Engineering
Course Code:- 305

Course Objective: This course enables students to understand system concepts and its application in Software development.

Unit	Name of the Topic	Number of lecturer	Reference Book
Unit 1	Introduction to System Concepts 1.1 Definition , Elements of System 1.2 Characteristics of System 1.3 Types of System 1.4 System Concepts	6	Book1
Unit 2	Requirement Analysis 2.1 Definition of System Analysis 2.2 Requirement Anticipation 2.3 Knowledge and Qualities of System Analyst 2.4 Role of a System Analyst 2.5 Feasibility Study And It's Types 2.6 Fact Gathering Techniques 2.7 SRS(System Requirement Specification)	8	Book1
Unit 3	Introduction to Software Engineering 3.1 Definition Need for software Engineering 3.2 Software Characteristics 3.3 Software Qualities (McCall's Quality Factors)	6	Book2
Unit 4	Software Development Methodologies 4.1 SDLC (System Development Life Cycle) 4.2 Waterfall Model 4.3 Spiral Model 4.4 Prototyping Model 4.5 RAD MODEL	6	Book2
Unit 5	Analysis and Design Tools 5.1 Entity-Relationship Diagrams 5.2 Decision Tree and Decision Table 5.3 Data Flow Diagrams (DFD) 5.4 Data Dictionary 5.4.1 Elements of DD 5.4.2 Advantage of DD 5.5 Pseudo code 5.6 Input And Output Design 5.7 CASE STUDIES (Based on Above Topic)	10	Book1, Book2

Unit 6	Structured System Design 6.1 Modules Concepts and Types of Modules 6.2 Structured Chart 6.3 Qualities of Good Design 6.3.1 Coupling, Types of Coupling 6.3.2 Cohesion, Types of Cohesion	6	Book1 and Book2
Unit 7	Software Testing 7.1 Definition, Test characteristics 7.2 Types of testing 7.2.1 Black-Box Testing 7.2.2 White-Box Testing 7.2.3 Unit testing 7.2.4 Integration testing 7.3 Validation 7.4 Verification	6	Book1 and Book2
	Total No. of Lectures	48	

Recommended Books :

- 1) Software Engineering - Roger s. Pressman.
- 2) SADSE (System Analysis Design) - Prof. Khalkar and Prof. Parthasarathy.

B.C.A. Semester IV
Subject Name:- Object Oriented Programming Using C++
Course Code:- 401

Objectives:

1. Acquire an understanding of basic object-oriented concepts and the issues involved in effective class design.
2. Enables student to write C++ programs that use: object-oriented concepts such as information hiding, constructors, destructors, inheritance.

Unit	Topic	No. of Lectures	Ref. Book
Unit 1	Introduction to C++ 1.1 Basic concepts of OOP, benefits, applications of OOP 1.2 A simple C++ program 1.3 Structure of C++ program 1.4 Creating a source file, compiling and Linking	2	1
Unit 2	Tokens, Expressions and Control structures 2.1 Introduction 2.2 Tokens, keywords, Identifiers and constants 2.3 Data types - Basic, User defined and Derived 2.4 Symbolic constant 2.5 Type Compatibility 2.6 Variables - Declaration and Dynamic initialization 2.7 Reference variable 2.8 Operators in C++ 2.8.1 Scope resolution operator 2.8.2.Member Referencing operators 2.8.3Memory management operators 2.8.4 Manipulators 2.8.5 Type cast operators 2.9 Expression and their types 2.10 Special Assignment Expressions 2.11 Implicit conversions 2.12 Operator overloading introduction 2.13 Operator precedence 2.14 Control structures – if-else, do-while, for , switch	3	1,2,3
Unit 3	Functions in C++ 3.1 Introduction 3.2 The main function 3.3 Function prototyping 3.4 Call by reference 3.5 Return by reference 3.6 Inline function – Making an outside function Inline 3.7 Arguments - default, constant 3.8 Math library functions	5	1,2,3

Unit 4	Classes and Objects 4.1 Introduction 4.2 Creating a class and objects 4.3 Defining member functions inside and outside class definition 4.4 Nesting of member functions 4.5 Private member functions 4.6 Arrays within a class 4.7 Memory allocation of objects 4.8 Static data members and static member functions 4.9 Array of objects 4.10 Objects as function arguments 4.11 Friend functions 4.12 Returning objects 4.13 Constructors 4.14 Types of constructor 4.15 Destructors	10	1,2
Unit 5	Inheritance 5.1 Introduction 5.2 Base class and derived class examples 5.3 Types of Inheritance 5.4 Virtual base class 5.5 Abstract class 5.6 Constructors in derived class	9	1,2
Unit 6	Polymorphism 6.1 Compile Time Polymorphism 6.1.1 Function overloading 6.1.2 Operator Overloading Introduction 6.1.3 Overloading unary and binary operator 6.1.4 Overloading using friend function 6.1.5 Overloading insertion and extraction operators 6.1.6 String manipulation using operator overloading 6.2 Runtime Polymorphism 6.2.1 this Pointer, pointers to objects, pointer to derived classes 6.2.2 Virtual functions and pure virtual functions	8	1,2
Unit 7	Managing console I/O operations 7.1 Introduction 7.2 C++ streams and C++ stream classes 7.3 Unformatted I/O operations 7.4 Formatted console I/O operations 7.5 Managing output with manipulators	3	1,2
Unit 8	Working with Files 8.1 Classes for File Stream operations 8.2 File operations - Opening, Closing and updating 8.3 Error handling during File operations 8.4 Command Line arguments	5	1
Unit 9	Templates 9.1 Introduction 9.2 Class Templates	3	1

	9.3 Function Templates 9.4 Exception Handling(Introduction)		
	Total No. of Lectures	48	

Recommended Books :

- 1) Object oriented programming with C++ - by E Balagurusamy
- 2) Object Oriented Programming with C++ by Robert Lafore
- 3) Object Oriented Programming in C++ by Dr. G. T. Thampi, Dr. S. S. Mantha,
DreamTech Press

B.C.A. Semester IV

Subject Name: Programming in Visual Basic
Course Code: 402

Objectives:-

To learn properties and events, methods of controls and how to handle events of different controls. To understand the use of active controls and how to design VB application
To learn connectivity between VB and databases.

Unit No	Topic	No. of Lectures	Ref .Book
Unit 1	<u>Getting started with V. B.</u> 1.1 Object Oriented Concept 1.2 Event Driven Programming Language 1.3 Working with properties 1.3.1 Studying the Events of a Form 1.3.2 Working code for events 1.3.3 Planning the Design	4	1,3
Unit 2	<u>Constants, Variables , Operators, Control Structure, Looping & Array</u> 2.1 Constant 2.2 Data Types 2.2.1 Number , long , Boolean , doubles , variant, String 2.2.2 User defined data types 2.3 Variables 2.4 Operators 2.5 Control Structures 2.5.1 If 2.5.2 If...Else 2.5.3 Nested If...Else 2.5.4 Select Case 2.6 Looping 2.6.1 Do Loop 2.6.2 While Loop 2.6.3 Until Loop 2.6.4 For Loop 2.6.5 With Statement 2.7 Array 2.7.1 Single Dimensional Array 2.7.2 Multidimensional Array 2.7.3 Control Array 2.8 Functions(Built in and user defined)	10	1,2,3
Unit 3	<u>Working with Controls</u> 4.1 Adding controls on form 4.2 Working with Properties and Methods of each Controls 4.3 Creating an application 4.4 Creating MDI application	10	

	4.4.1 Working with Multiple Forms 4.4.2 Loading, Showing & Hiding Forms 4.4.3 Setting the Startup form 4.4.4 Creating forms in Code 4.4.5 Using the MDI 4.4.6 Arranging MDI Child Window 4.4.7 Opening new MDI child window 4.4.8 Creating Properties in a form 4.4.9 Creating a method in a form		2,3
Unit 4	<u>Working with ActiveX Controls & Menus</u> 4.1 Creating Status Bar For your program 4.2 Working with Progress Bar 4.3 Working with Toolbar 4.4 Setting up the Image List Controls 4.4.1 Adding and Deleting Images with code 4.4.2 Study of Different Dialog Boxes 4.5 Menus 4.5.1 Creating new Menu Item 4.5.2 Modifying & Deleting Menu Item 4.5.3 Adding Access Characters 4.5.4 Adding Shortcut Keys 4.5.5 Creating Sub Menus 4.6 Pop-up Menus 4.6.1 Creating pop-up menu 4.6.2 Displaying pop-up menu 4.7 Adding & Deleting Menus At Run-time 4.8 Adding Menu Items for MDI Child Form	12	1,2,3
Unit 5	<u>Working With Database</u> 5.1 Data Control 5.1.1 Studying the Properties and methods of Data Control 5.1.2 Connectivity with MS-Access 5.1.3 Operations of database through coding 5.2 ADO Data Control 5.2.1 Advantages of ADODC over DC 5.2.2 Studying the properties and Methods of ADODC 5.2.3 Connectivity with MS-Access 5.2.4 Connectivity with Oracle 5.2.5 Report Generation 5.3 Developing ADO application through ADODC and coding 5.4 Report Generation	12	2,3
	Total No. of Lectures	48	

Recommended Books :

- 1) Mastering Visual Basic
- 2) Visual Basic Black Book
- 3) Learn VB in 21 days

B. C. A. Semester IV

Subject Name : Computer Networking

Course Code :- 403

Objective :-

1. To know about computer network.
2. To understand different topologies used in networking
3. To learn different types of network.
4. To understanding the use of connecting device used in network.

Unit No.	Topic	No. of Lectures	Ref. Books
Unit 1	Basics of Computer Networks 1.1 Computer Network 1.1.1 Definition 1.1.2 Goals 1.1.3 Applications 1.1.4 Structure 1.1.5 Components 1.2 Topology 1.2.1 Bus 1.2.2 Star 1.2.3 Ring 1.2.4 Mesh 1.3 Types of Networks 1.3.1 LAN, MAN, WAN, Internet 1.3.2 Broadcast & Point-To-Point Networks 1.4 Communication Types 1.4.1 Serial 1.4.2 Parallel 1.5 Modes of Communication : 1.5.1 Simplex 1.5.2 Half Duplex 1.5.3 Full Duplex 1.6 Server Based LANs & Peer-to-Peer LANs 1.6.1 Comparison of both 1.7 Protocols and Standards	8	1,2,3
Unit 2	Network Models 2.1 Design issues of the layer 2.2 Protocol Hierarchy 2.3 ISO-OSI Reference Model : 2.3.1 Layers in the OSI Model 2.3.2 Functions of each layer 2.4 Terminology 2.4.1 SAP 2.4.2 Connection Oriented services 2.4.3 connectionless services	8	1,2,3

	<ul style="list-style-type: none"> 2.4.4 Peer Entities 2.5 Internet Model (TCP/IP) 2.6 Comparison of ISO-OSI & TCP/IP Model 2.7 Addressing <ul style="list-style-type: none"> 2.7.1 Physical Addresses 2.7.2 Logical Addresses 2.7.3 Port Addresses 2.8 IP Addressing <ul style="list-style-type: none"> 2.8.1 Classful addressing 2.8.2 Classless addressing 		
Unit 3	<p>Transmission Media</p> <ul style="list-style-type: none"> 3.1 Guided Media(Wired) : <ul style="list-style-type: none"> 3.1.1 Coaxial Cable:- Physical Structure, Standards, BNC Connector, Applications 3.1.2 Twisted Pair :- Physical Structure, UTP vs STP, Connectors, Applications 3.1.3 Fiber Optics Cable :- Physical Structure, Propagation Modes (Single Mode & Multimode), Connectors, Applications 3.2 Unguided Media(Wireless) <ul style="list-style-type: none"> 3.2.1 Electromagnetic Spectrum For Wireless Communication 3.2.2 Propagation Methods <ul style="list-style-type: none"> 3.2.2.1 Ground, 3.2.2.2 Sky, 3.2.2.3 Line-Of-Sight 3.3.3 Wireless Transmission <ul style="list-style-type: none"> 3.3.3.1 Radio Waves 3.3.3.2 Infra-Red, 3.3.3.3 Micro-Wave 	10	1,2,3
Unit 4	<p>Wired and Wirless LANs</p> <ul style="list-style-type: none"> 4.1 IEEE Standards 4.2 Standard Ethernet <ul style="list-style-type: none"> 4.2.1 MAC Sublayer 4.2.2 Physical layer 4.3 Fast Ethernet <ul style="list-style-type: none"> 4.3.1 MAC Sublayer 4.3.2 Physical layer 4.4 Gigabit Ethernet <ul style="list-style-type: none"> 4.4.1 MAC Sublayer 4.4.2 Physical layer 4.5 Network Interface Cards(NIC) <ul style="list-style-type: none"> 4.5.1 Components of NIC 4.5.2 Functions of NIC 4.5.3 Types of NIC 4.6 Wireless LAN <ul style="list-style-type: none"> 4.6.1 IEEE802.11 Architecture 4.6.2 MAC Sub layer 4.6.3 Frame Format 	10	1,2,3

	4.6.4 Frame Types 4.6.5 Addressing Mechanism 4.6.6 Bluetooth (Architecture, Piconet and Scatternet, Applications)		
Unit 5	Network Connectivity Devices 5.1 Categories of Connectivity Devices 5.1.1 Passive & Active Hubs 5.1.2 Repeaters 5.1.3 Bridges 5.1.3.1 Transparent Bridges(Loop Problem, Spanning Tree) 5.1.3.2 Source Routing Bridges 5.1.4 Switches 5.1.5 Router 5.1.6 Gateways 5.2 Network Security Devices 5.2.1 Firewalls 5.2.1.1 Packet-Filter firewall 5.2.1.2 Proxy firewall	6	1,2,3
Unit 6	Internet Basics 6.1 Concept of Intranet & Extranet 6.2 Internet Information Server(IIS) 6.3 Web Server 6.4 World Wide Web(WWW) 6.4.1 Architecture, 6.4.2 Web Documents :- static, dynamic and active documents 6.5 Search Engines 6.6 Internet Service Providers(ISP) 6.7 HTTP 6.7.1 HTTP Transaction 6.7.2 Persistent and non persistent connection	6	2,3
Total No. of Lectures		48	

Recommended Books :

- 1) Computer Networks - Andrew Tanenbaum (III Edition)
- 2) Data Communications & Networking - Behrouz Ferouzan (III Edition)
- 3) Complete Guide to Networking - Peter Norton

B.C.A. Semester IV

Subject Name :- Enterprise Resource Planning and Management.

Course Code :-404

Objectives :-

1. To know what is ERP.
2. To learn different ERP technologies.

Unit No.	Topic	No. of Lect.	Reference Books
Unit 1	ERP : An Overview 1.1. What is ERP. 1.2. Reasons for Growth Of ERP 1.3. Problem areas in ERP implementations. 1.4. The future of ERP 1.5. Characteristics and features of ERP 1.6. Benefits of ERP.	04	1,2
Unit 2	Enterprise Modeling and Integration for ERP 2.1.Enterprise-An overview 2.2.What is enterprise 2.3.Integrated Management Information 2.4.The role of enterprise 2.5.Business modeling 2.6.Integrated Data Model 2.7.Role of Common/Shared Enterprise Database 2.8.Linkages of the Enterprise 2.8.1.Establishing Customer-Enterprise Link 2.8.2.Establishing Vendor-Enterprise Link 2.8.3.Establishing Links within the Enterprise 2.8.4.Establishing Links with Environment 2.9. Scope of Enterprise system 2.10.Generic Model of ERP System 2.11.Client/Server Architecture and Enterprise – wide Computing 2.11.1. Characteristics of client/Server Architecture 2.11.2. Different Components of ERP Client/Server Architecture	08	1,2
Unit 3	ERP And related Technologies 3.1.BPR(Business Process reengineering) 3.1.1.Definition 3.2.BPR –The different phases 3.3.Enterprise Redesign Principles 3.4.BPR and IT 3.5.Data Warehousing 3.6.Data Warehouse Components	08	1,2

	<p>3.7. Structure and Uses of Data Warehouse</p> <p>3.8. Data Mining</p> <p>3.9. What Is Data Mining</p> <p>3.10. Data Mining Process</p> <p>3.11. Advantages and Technologies Used In Data Mining</p> <p>3.12. OLAP</p> <p>3.13. Supply Chain Management</p> <p> 3.13.1. Definition</p> <p> 3.13.2. Stevan's Model</p> <p> 3.13.3. Benefits</p> <p> 3.13.4. ERP Vs SCM</p> <p>3.14. CRM</p>		
Unit 4	<p>ERP Implementation</p> <p>4.1. Evolution</p> <p>4.2. Evolution of ERP.</p> <p>4.3. Evolution of Packaged Software Solutions.</p> <p>4.4. The Obstacles in ERP implementation.</p> <p>4.5. ERP Implementation Lifecycle (Different Phases).</p> <p>4.6. Implementation Methodology.</p> <p>4.7. ERP Implementation-The Hidden Costs.</p> <p>4.8. In-house Implementation-Pros and Cons</p> <p>4.9. Vendors and role of vendors for ERP</p> <p>4.10. Consultants and role of consultants for ERP.</p>	08	1,2
Unit 5	<p>Technologies In ERP System</p> <p>5.1. Introduction</p> <p>5.2. Electronic Data Interchange(EDI)</p> <p> 5.2.1. Use of EDI</p> <p> 5.2.2. Evolution of EDI</p> <p> 5.2.3. Benefits of the EDI</p> <p> 5.2.4. EDI Standards</p> <p> 5.2.5. EDI Services</p> <p> 5.2.6. EDI Components</p> <p> 5.2.7. EDI Administration</p> <p>5.3. IDoc Application</p> <p>5.4. EDI Integration</p> <p>5.5. ALE Integration</p> <p>5.6. Internet Integration</p> <p>5.7. OCR Integration</p>	07	2
Unit 6	<p>The ERP Domain</p> <p>6.1. Vendors in the ERP Market.</p> <p>6.2. SAP's Markets</p> <p> 6.2.1. SAP Architecture And Integration</p> <p> 6.2.2. Scalability of SAP</p> <p> 6.2.3. SAP Business Structure</p> <p> 6.2.4. Common SAP Installation</p> <p> 6.2.5. SAP R/3 System</p>	07	1,2

	6.2.6.SAP Tools 6.3.Pepole Soft. 6.4.Jd Edwards 6.5.Oracle		
Unit 7	ERP Present and Future 7.1. Limitations of ERP 7.2. EIA(Enterprise Integration Application) 7.3. EIA Products 7.4. Two Flavors of EIA and Messaging 7.5. ERP And E-Commerce 7.6. ERP and Internet. 7.7. Future Directions in ERP.	06	1
	Total No. of Lectures	48	

Recommended Books

1. ERP : Demystified – Alexis Leon (Tata McGraw Hill)
2. ERP – Ravi Shankar and S. Jaiswal (Galgotia)

B.C.A .Semester IV

Subject: - Human Resource Management

Course Code:- 405

Objective: To acquaint the students with the Human Resource Management its different functions in an organization and the Human Resource Processes that are concerned with planning, motivating and developing suitable employees for the benefit of the organization.

Unit No.	Topic	No. of Lect.	Reference Books
Unit I	Introduction To HRM Definition and Concept of HRM and Personnel Management, Difference between PM and HRM, Importance of HRM, activities and functions of HRM, Challenges before HRM,HRD,HRP, Concept of recruitment –sources of recruitment. Concept of Selection –selection Procedure, Induction and placement	12	1,2,3,4
Unit II	Performance Appraisal, Training and development Meaning and Definition-need- objective –importance of training, training method –evaluation of training program, Concept and Objective Performance Appraisal-Process of performance appraisal method –uses and limitation of performance appraisal, Promotion and demotion policy, Transfer Policy.	12	1,2
Unit III	Wages and Salary Administration Method of wage payment –Employee Remuneration factors determining the level of remuneration-profit sharing –fringe benefit and employee services.	8	3,4
Unit IV	Grievance and discipline Meaning, Definition and nature of Grievance .Grievance procedure-Grievance Machinery. Definition of Discipline-aim and objective of discipline Principle of discipline.	8	1,2,3
Unit V	The E-HR Nature of E-HRM,E-HR activity, E-Recruitment , E-Selection, E-learning ,E-Compensation	8	2,4
	Total No. of Lectures	48	

Recommended Book:

- 1) P. C. Perdeshi – Human Resources Management.
- 2) K. Ashwathappa –Human Resources Management.
- 3) C. B. Mamoria – Personnel Management.
- 4) A. M. Sharma – Personnel and Human Resource Management.

B. C. A. (Semester V)

501 : Java Programming

Objectives:-

1. To learn the basic concept of Java Programming.
2. To understand how to use programming in day to day applications.

Unit No.	Topic	No. of Lectures	Reference Books
1	Introduction to Java 1.1 Features of java 1.2 JDK Environment & tools like(java, javac, appletviewer, javadoc, jdb) 1.3 OOPs Concepts Class, Abstraction , Encapsulation, Inheritance, Polymorphism 1.4 Difference between C++ and JAVA 1.5 Structure of java program 1.6 Data types ,Variables ,Operators , Keywords ,Naming Convention 1.7 Decision Making (if, switch), Looping(for, while) 1.8 Type Casting 1.9 Array Creating an array Types of Array - One Dimensional arrays - Two Dimensional array 1.10 String - Arrays , Methods. - StringBuffer class	8	1,2
2	Classes and Objects 2.1 Creating Classes and objects 2.2 Memory allocation for objects 2.3 Constructor 2.4 Implementation of Inheritance Simple, Multilevel, 2.5 Interfaces	10	1,2

	<p>2.6 Abstract classes and methods</p> <p>2.7 Implementation of Polymorphism</p> <p>2.8 Method Overloading, Method Overriding</p> <p>2.9 Nested and Inner classes.</p> <p>2.10 Modifiers and Access Control</p> <p>2.11 Packages Packages Concept Creating user defined packages</p> <p>2.12 Java Built in packages java.lang->math java.util->Random, Date, Hashtable</p> <p>2.13 Wrapper classes</p>		
3	<p>Collection</p> <p>3.1 Collection Framework.</p> <p>3.1.1 Interfaces</p> <ul style="list-style-type: none"> - Collection - List - Set - SortedSet - Enumeration - Iterator - ListIterator <p>3.1.2. Classes</p> <ul style="list-style-type: none"> - LinkedList - ArrayList - Vector - HashSet - TreeSet - Hashtable <p>3.2 Working with maps</p> <p>3.2.1 Map interface</p> <p>3.2.2 Map classes</p> <ul style="list-style-type: none"> - HashMap - TreeMap 	6	1,2

4	<p>File and Exception Handling</p> <p>Exception</p> <p>4.1 Exception types</p> <p>4.2 Using try catch and multiple catch Nested try, throw , throws and finally</p> <p>4.3 Creating user defined Exceptions</p> <p>File Handling</p> <p>4.4 Stream ByteStream Classes CharacterStream Classes</p> <p>4.5 File IO basics</p> <p>4.6 File operations Creating file Reading file(character, byte) Writing file (character, byte)</p>	8	1,2
5	<p>Applet, AWT and Swing Programming</p> <p>Applet</p> <p>5.1 Introduction</p> <p>5.2 Types applet</p> <p>5.3 Applet Life cycle</p> <ul style="list-style-type: none"> - Creating applet - Applet tag <p>5.4 Applet Classes</p> <ul style="list-style-type: none"> - Color - Graphics - Font <p>AWT</p> <p>5.5 Components and container used in AWT</p> <p>5.6 Layout managers</p> <p>5.7 Listeners and Adapter classes</p> <p>5.8 Event Delegation model</p> <p>Swing</p> <p>5.9 Introduction to Swing Component and Container Classes</p>	12	1,2
	Total no. of Lectures	44	

Reference Books:

1. Programming with JAVA - E Balgurusamy
2. The Complete Reference – JAVA Herbert Schildt

B.C.A. (Semester V)

502 : Web Technologies

Objectives :-

1. To know & understand concepts of internet programming.
2. To understand how to develop web based applications using PHP.

Unit No.	Topic	No. of Lectures	Reference Books
1	Web Essentials 1.1 Clients- Servers and Communication 1.2 Internet-Basic ,Internet Protocols(HTTP,FTP,IP) 1.3 World Wide Web(WWW) 1.4 HTTP request message, HTTP response message	3	1
2	Markup Languages 2.1 Introduction to HTML 2.2 Basic HTML Structure 2.3 Common HTML Tags 2.4 Physical and Logical HTML 2.5 Types of Images, client side and server-side Image mapping 2.6 List, Table, Frames 2.7 Embedding Audio, Video 2.8 HTML form and form elements 2.9 Introduction to HTML Front Page 2.10 CSS with HTML	8	1
3	JAVA Script 3.1 Introduction to Java Script 3.2 Identifier & operator, control structure, functions 3.3 Document object model(DOM), 3.4 DOM Objects(window, navigator, history, location) 3.5 Predefined functions, math & string functions 3.6 Array in Java scripts 3.7 Event handling in Java script	6	2

4	Introduction to PHP 4.1 Introduction to PHP 4.2 What does PHP do? 4.3 Lexical structure 4.4 Language basics 4.4.1 Variable, constant, keywords, Data Types 4.4.2 Control Structures 4.4.3 Variables variable 4.4.4 Type casting, Type Juggling 4.4.5 \$_GET, \$_POST, \$_REQUEST Variables	10	3, 4
5	Function and String in PHP 5.1 Defining and calling a function 5.2 Default parameters 5.3 Variable parameters, Missing parameters 5.4 Variable function, Anonymous function 5.5 Types of strings in PHP 5.6 Printing functions 5.7 Encoding and escaping 5.8 Comparing strings 5.9 Manipulating and searching strings	10	3, 4
6	Arrays in PHP 6.1 Indexed Vs Associative arrays 6.2 Identifying elements of an array 6.3 Storing data in arrays 6.4 Multidimensional arrays 6.5 Extracting multiple values 6.6 Converting between arrays and variables 6.7 Traversing arrays 6.8 Sorting 6.9 Action on entire arrays	7	3, 4
Total no. of Lecturers		44	

Reference Books :

1. Complete HTML- Thomas Powell
2. HTML and JavaScript – Ivan Bayross
3. Programming PHP - Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
4. Beginning PHP 5 - Wrox publication

B.C.A. (Semester V)

503 : Dot Net Programming

Objectives:-

1. This will introduce visual programming and event driven programming practically.
2. This will enhance applications development skill of the student.

Unit No.	Topic	No. of Lectures	Reference Books
1	Introduction to .Net Framework 1.1 IDE (Integrated Development Environment) 1.2 Event Driven Programming 1.3 . NET Framework 1.4 Architecture of .Net 1.5 Execution Process of .Net Application 1.6 Features of .Net 1.7 Advantages of .Net 1.8 Develop simple .Net Application	8	1,2
2	Introduction to VB.Net 2.1 Basics of VB.Net 2.1.1 Operators 2.1.2 Data Types 2.2 Control Structures 2.2.1 Decision making statements 2.2.2 Loops - For, while, do while etc. 2.3 Exit Statements 2.4 Build Console Applications 2.4.1 Methods - Read(), Readline(), Write(), Writeline() etc. 2.5 Build Windows Applications 2.5.1 Controls - Form, TextBox, Button, Label, CheckBox, Listbox, ComboBox, RadioButton. DateTimePicker, MonthCalender, Timer, Progressbar, Scrollbar, PictureBox, ImageBox, ImageList, TreeView, ListView, Toolbar, StatusBar, Datagridview 2.5.2 Menus and PopUp Menu 2.5.3 Predefined Dialog controls 2.5.4 DialogBox - InputBox(), MessageBox(), MsgBox()	10	1,2,4

3	Object Oriented Programming in VB .Net 3.1 Class and Object 3.2 Properties, methods and events. 3.3 Constructors and Destructors 3.4 Method overloading 3.5 Inheritance 3.5.1 MyBase , MyClass keywords. 3.6 Access modifiers: Public, Private, Protected, Friend. 3.7 Method Overriding. 3.8 Interfaces. 3.9 Polymorphism. 3.10 Exception Handling	6	1,2,4
4	Architecture Of ADO.Net 4.1 Database : Connection, Command, DataAdapter ,DataSet, DataReader, DataTable 4.2 Connection to database with Server Explorer 4.3 Multiple Table Connection 4.4 Data binding with controls like TextBox, ListBox, DataGrid. 4.5 Navigating data source 4.6 DataGridView, DataFormwizard, Data validation	12	3
5.	Crystal Report 5.1 Connection to Database, Table, Queries, Building Report, Modifying Report, Formatting Fields and Object 5.2 Header, Footer, Working with formula fields, Parameter fields, Special fields 5.3 Working with Multiple Tables.	9	6,7
	Total no. Of Lectures	44	

Reference Books:

1. Programming Microsoft Visual Basic.NET – Francesco Balena
2. The Complete Reference -Visual Basic .NET – Jeffrey R. Shapiro
3. Murach’s VB.NET database programming with ADO.NET -Anne Prince and Doug Lowe
4. The Visual Basic.NET COACH
5. Visual Basic .NET 2003 in 21 Days. – Steven Holzner, SAMS Publications.
6. Mastering Crystal Report - BPB Publication
7. Crystal Report – The Complete Reference :- Tata McGraw Hill

B.C.A. (Semester V)

504 : Object Oriented Software Engineering

Objectives:-

1. To Understand concept of system design using UML.
2. To understand system development through object oriented techniques.

Unit No.	Topic	No. of Lectures	Reference Books
1	Object Oriented Concepts, Modeling and UML 1.1 What is Object Orientation? (Introduction to class, object, inheritance, polymorphism) 1.2 Model 1.2.1 Introduction of Modeling 1.2.2 Object Oriented Modeling 1.3 Object oriented system development 1.3.1 Function/data methods 1.3.2 Object oriented analysis 1.3.3 Object oriented construction 1.3.4 Object oriented testing 1.4 Identifying the elements of an object model 1.4.1 Identifying classes and objects 1.4.2 Specifying the attributes 1.4.3 Defining operations 1.4.4 Finalizing the object definition 1.5 Introduction to UML 1.6 Overview of UML 1.7 Conceptual Model of UML 1.8 Architecture 1.9 Advantages of UML	08	1, 2, 3
2	Basic and Advanced Structural Modeling 2.1 Classes and Relationship 2.2 Common mechanism 2.3 Diagrams 2.4 Class diagram 2.5 Advanced classes 2.6 Advanced Relationship 2.7 Interface , Types and Roles 2.8 Packages 2.9 Object Diagram	12	1

3	Basic Behavioral and Architectural Modeling 3.1 Use cases, Use Case Diagram 3.2 Interaction Diagram 3.3 Sequence Diagram 3.4 Activity Diagram 3.5 State Chart Diagram 3.6 Collaboration Diagram 3.7 Components Diagram 3.8 Deployment Diagram (Minimum 2 case studies for each diagram)	12	1
4	Object Oriented Analysis 4.1 Iterative Development 4.2 Understanding requirements 4.3 Unified process & UP Phases Inception Elaboration Construction Transition	8	1,3
5	Object Oriented Design 5.1 The Booch Method, The Coad and Yourdon Method and Jacobson and Rumbaugh Method 5.2 Generic components of OO Design model 5.3 System Design process 5.3.1 Partitioning the analysis model 5.3.2 Concurrency and subsystem allocation 5.3.3 Task Management component 5.3.4 Data Management component 5.3.5 Resource Management component 5.3.6 Inter sub-system communication 5.4 Object Design process	4	3
Total no. of Lectures		44	

Reference Books:

1. The Unified Modeling Language User Guide by Grady Booch, James Rumbaugh, Ivar Jacobson.
2. Object Oriented Software Engineering by Ivar Jacobson
3. Software Engineering by Pressman

B.C.A. (Semester VI)

601 : Advanced Web Technologies

Objectives :-

1. To know & understand concepts of internet programming.
2. To understand the concepts of XML and AJAX.

Unit No.	Topics	No. of Lectures	Reference Books
1	Introduction to Object Oriented Programming in PHP 1.1 Classes 1.2 Objects 1.3 Introspection 1.4 Serialization 1.5 Inheritance 1.6 Interfaces 1.7 Encapsulation	6	1,2
2	Web Techniques 2.1 Web Variables 2.2 Server information 2.3 Self Processing forms 2.4 Setting response headers 2.5 Maintaining state (Cookies and Sessions)	8	1,2
3	Databases 3.1 Using PHP to access a databases 3.2 Mysql Database functions 3.3 Relational databases and SQL 3.4 PEAR DB basics 3.5 Advanced database techniques 3.6 Sample application	8	1,2

4	XML 4.1 What is XML? 4.2 XML document Structure 4.3 PHP and XML 4.4 XML parser 4.5 The document object model 4.6 The simple XML extension 4.7 Changing a value with simple XML	8	3
5	Web services 5.1 Web services concepts 5.2 WSDL, UDDI 5.3 Introduction to SOAP XML-RPC 5.4 Creating web services 5.5 Calling web services	8	3
6	Ajax 6.1 Understanding java scripts for AJAX 6.2 AJAX web application model 6.3 AJAX –PHP framework 6.4 Performing AJAX validation 6.5 Handling XML data using PHP and AJAX 6.6 Connecting database using PHP and AJAX	6	3
	Total no. of Lectures	44	

Reference Books :

1. Programming PHP - Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
2. Beginning PHP 5 - Wrox publication
3. PHP web services - Wrox publication

B. C. A. (Semester VI)

602 : Advanced Java

Objectives -:

1. To know the concept of Java Programming.
2. To understand how to use programming in day to day applications.
3. To develop programming logic.

Unit No.	Topic	No. of Lectures	Reference Books
1	JDBC 1.1 The design of JDBC 1.2 Basic JDBC program Concept 1.3 Drivers 1.4 Architecture of JDBC 1.5 Making the Connection, Statement , ResultSet , PreparedStatement, CollableStatement 1.6 Executing SQL commands 1.7 Executing queries	10	1,2
2	Networking 2.1 The java.net package 2.2 Connection oriented transmission – Stream Socket Class 2.3 Creating a Socket to a remote host on a port (creating TCP client and server) 2.4 Simple Socket Program Example.	7	1,2
3	Servlet and JSP 3.1 Introduction 3.2 How It differ from CGI 3.3 Types of servlet 3.4 Life cycle of servlet 3.5 Execution process of Servlet Application 3.6 Session Tracking 3.7 Cookie class 3.8 Servlet- Jdbc	10	1,2

	<p>JSP</p> <p>3.9 Introduction to JSP</p> <p>3.10 Components of JSP Directives , Tags, Scripting Elements</p> <p>3.11 Execution process of JSP Application</p> <p>3.12 Building a simple application using JSP</p> <p>3.13 JSP with Database</p>		
4	<p>Multithreading</p> <p>4.1 Introduction to Thread</p> <p>4.2 Life cycle of thread</p> <p>4.3 Thread Creation</p> <ul style="list-style-type: none"> - By using Thread Class - By Using Runnable interface <p>4.4 Priorities and Synchronization</p> <p>4.5 Inter thread communication</p> <p>4.6 Implementation of Thread with Applet</p>	8	1,2,3
5	<p>Java Beans and RMI</p> <p>Java Beans</p> <p>5.1 What is bean</p> <p>5.2 Advantages</p> <p>5.3 Using Bean Development kit(BDK)</p> <p>5.4 Introduction to jar and manifest files</p> <p>5.5 The java beans API</p> <p>Remote Method Invocation</p> <p>5.6 Introduction to remote object RMI architecture</p> <p>5.7 Stubs and skeleton</p> <p>5.8 Registry</p> <p>5.9 Setting up RMI</p> <p>5.10 Using RMI with applet</p>	9	1,2,3
	Total no. Of Lectures	44	

Reference Books :

1. The Complete Reference – JAVA Herbert Schildt
2. Core java –II By Cay S. Horstmann and Gary Cornell
3. Compete Reference J2EE – Jim Keogh

B. C. A. (Semester VI)

603 : Recent Trends in IT

Objectives:-

1. To introduce upcoming trends in Information technology.
2. To study Eco friendly software development.

Unit No.	Topic	No. of Lectures	Reference Books
1	Software Process And Project Metrics, Analysis Concepts And Principles Measures, metric indicators, metric in process and the project domains, software measurement, metrics for software quality, software quality assurance, Requirement analysis, communication techniques, analysis principles, software prototyping, Case Study	6	1
2	Distributed Databases Standalone v/s Distributed databases, Replication, Fragmentation, Client / Server architecture, types of distributed databases Object – Relational Databases Abstract Data types, Nested Tables, Varying Arrays, Large Objects, Naming Conventions for Objects, Case Study	8	2
3	Data Warehouse What is Data Warehouse? , A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data cube Technology, From Data Warehousing to Data Mining, Data Mining, Functionalities, Data Cleaning, Data Integration and Transformation, Data Reduction	8	4
4	Network Security Cryptography; Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, One-Time Pads, Two Fundamental Cryptographic Principles; Symmetric Key Algorithms; DES-The Data Encryption Standards, AES – The Advances Encryption Standard; Public Key algorithms; RSA, Other Public Key algorithms; Digital Signatures, Symmetric-Key Signature, Public key Signature, Message Digests	14	5

5	Computing and Informatics Introduction to computing, Types of computing: Cloud, Green, Soft, Mobile, Case Study	8	5
	Total no. of lectures	44	

Reference Books :

1. Roger S. Pressman, Software Engineering , McGraw Hill(1997).
2. Database System Concepts by Korth, Silberschatz, Sudarshan - McGraw Hill
3. Oracle 8i – The Complete Reference, by Kevin Loney, Geroge Koch - Tata McGraw Hill
4. Jiawei Micheline Kamber, “Data Mining Concepts and Techniques”,Morgan Kauf Mann Publishers.
5. William Stallings, "Network Security Essentials", Prentice-Hall.
6. Artificial Intelligence by Elaine Rich, Kevin Knight, TMH, 2nd Edition.

B. C. A. (Semester VI)
604 : Software Testing

Objectives :-

1. To know the concept of software testing.
2. To understand how to test bugs in software.
3. To develop programming logic.

Unit No.	Topic	No. of lectures	Reference Books
1	Software Testing Introduction, Nature of errors, Testing principles & Testing fundamentals, Debugging	6	1, 2
2	Approaches to Testing - I White Box Testing, Black Box Testing, Gray Box Testing, Unit Testing Integration- Top-down ,Bottom up Big Bang Sandwich	10	1, 2
3	Testing for Specialized Environments Testing GUI's, Testing of Client/Server Architectures, Testing Documentation and Help Facilities, Testing for Real-Time Systems	10	1, 2
4	Software Testing Strategies & Software metrics Validation Testing, System Testing, verification, Performance Testing, Regression Testing, Agile testing, Acceptance testing ,Smoke Testing ,Load Testing, Introduction, Basic Metrics, Complexity Metrics	12	1, 2
5	Specialized Testing & Testing Tools (Introduction) Test Case Design, Junit, Apache Jmeter, Winrunner Loadrunner, Rational Robot	6	1, 2 www.open sourcetesti ng.org
	Total No. of lectures	44	

Reference Books:

1. Software Engineering – A Practitioners Approach, Roger S. Pressman, Tata McGraw Hill
2. Software Engineering for Students- A Programming Approach, Douglas Bell, Pearson Education

UNIVERSITY OF PUNE
COURSE STRUCTURE FOR
BACHELOR OF BUSINESS ADMINISTRATION (B.B.A.)
(From 2013-14)

1. Title:

The degree shall be titled as Bachelor of Business Administration (B.B.A.) under the Faculty of Commerce Part I w.e.f. the academic year 2013-2014 B.B.A. Part II w.e.f. 2014-2015 and B.B.A. Part III w.e.f. 2015-2016.

2. Objectives:

- (i) To provide adequate basic understanding about Management Education among the students.
- (ii) To prepare students to exploit opportunities being newly created in the Management Profession.
- (iii) To train the students in communication skills effectively.
- (iv) To develop appropriate skills in the students so as to make them competent and provide themselves self-employment.
- (v) To inculcate Entrepreneurial skills.

3. Duration:

The Course shall be a full time course and the duration of the course shall be of three years.

4. Eligibility:

- (i) A candidate for being eligible for admission to the Degree course in Bachelor of Business Administration shall have passed 12th Std. Examination (H.S.C. 10+2) from any stream with English as passing subject and has secured 40% marks at 12th Std.
- (ii) Two years Diploma in Pharmacy after H.S.C., Board of Technical Education conducted by Government of Maharashtra or its equivalent.
- (iii) Three Year Diploma Course (after S.S.C., i.e. 10th Standard) of Board of Technical Education conducted by Government of Maharashtra or its equivalent.
- (iv) MCVC



(v) Every eligible candidate has to pass a Common Entrance Test to be conducted by the respective Institute/College.

5. Medium of Instruction:

Medium of instruction shall be in English only.

6. Scheme of Examination:

The B.B.A. Examination will be 3600 marks divided into 3 parts as per details given below:

(i) B.B.A. Part I (Sem I, II) Aggregate marks	1200
(ii) B.B.A. Part II (Sem III, IV) Aggregate marks	1200
(iii) B.B.A. Part III (Sem V, VI) Aggregate marks	1200

There will be written Examination of 80 marks and 3 hrs duration for every course at the end of each Semester. The class work will carry 20 marks in each course. For Courses in Business Exposure (Sem IV) there will be viva voce examination of 50 marks and for Written Report on Industrial visits 50 marks. For course on Project work (Sem VI) there will be oral presentation test consisting of 20 marks and Written Report of 30 marks.

7. Backlog:

- a) A student shall be allowed to keep term for the Second Year, if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subjects of the First Year examination, which consist of First & Second Semester.
- b) A student shall be allowed to keep for the Third Year, if he/she has no backlog of First Year & if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subjects of the Second Year examination, which consist of Third & Fourth Semester.

8. Verification and Revaluation

The candidate may apply for verification and revaluation or result through Principal of the College which will be done by the University as per ordinance framed in that behalf.

9. Equivalence and Transitory Provision

The University will conduct examination of old course for next three academic years from the date of implementation of new



The candidate of old course will be given three chances to clear his subjects as per the old course and thereafter he will have to appear for the subjects under new course as per the equivalence given to old course.

10. Standard of Passing and Award of Class:

In order to pass examination a candidate has to obtain 40% marks out of 100 (Sem-end exam 80 + class work marks 20 taken together) in each course.

The award of class:

The class shall be awarded to the student on the basis of aggregate marks obtained by him in all three years (Part I, II and III). The award of Class is as follows:

(i) Aggregate 70% and above	First Class with Distinction.
(ii) Aggregate 60% and above but less than 70%	First Class.
(iii) Aggregate 55% and above but less than 60%	Higher Second Class
(iv) Aggregate 50% and above but less than 55%.	Second Class.
(v) Aggregate 40% and above but less than 50%	Pass Class.
(vi) Below 40%	Fail.

11. Setting of Question Papers

1. A candidate shall have to answer the questions in all the subjects in English only.
2. The question papers shall be framed so as to ensure that no part of the syllabus is left out of study by a student.
3. The question paper shall be balanced in respect of various topics outlined in the syllabus.
4. The question papers shall have a combination of long and short answer type questions.
5. There shall be no overall option in the question paper; instead, there shall be internal options.

12. The subject wise Revised Syllabus for F.Y. BBA Course shall be as given in the following pages.



Subject wise Course Structure

B.B.A. First Year (F.Y.) (2013-14)

Sr. No.	Sub. Code	Sem I	Sr. No.	Sub Code	Sem II
1	101	Business Organization and System	1	201	Principles of Management
2	102	Business Communication Skills	2	202	Principles of Marketing
3	103	Business Accounting	3	203	Principles of Finance
4	104	Business Economics (Micro)	4	204	Basics of Cost Accounting
5	105	Business Mathematics	5	205	Business Statistics
6	106	Business Demography and Environmental Studies	6	206	Business Informatics

B.B.A. Second Year (S.Y.) (2014-15)

Sr. No.	Sub. Code	Sem III	Sr. No.	Sub Code	Sem IV
1	301	Personality Development	1	401	Production and Operations Management
2	302	Business Ethics	2	402	Industrial Relations & Labour Laws
3	303	Human Resource Management and Organization Behaviour	3	403	Business Taxation
4	304	Management Accounting	4	404	International Business
5	305	Business Economics (Macro)	5	405	Management Information System
6	306	I.T. in Management	6	406	Business Exposure (Field Visits)

B.B.A. Third Year (T.Y.) (2015-16)

Sr. No.	Sub. Code	Sem V	Sr. No.	Sub Code	Sem VI
1	501	Supply Chain and Logistics Management	1	601	Business Planning and Project Management
2	502	Entrepreneurship Development	2	602	Event Management
3	503	Business Law	3	603	Management Control System
4	504	Research Methodology (Tools and Analysis)	4	604	E-Commerce
5	505	Specialization- I	5	605	Specialization- III
6	506	Specialization- II	6	606	Specialization- IV

Available Specializations


- 1) Finance 2) Marketing 3) Human Resource Management
4) Service Sector Management 5) Agri Business Management



Semester I
Course code 101
Business Organization and Systems

Objectives:

1. To make the students aware about various activities of business, business practices and recent trends in business world.
2. To study the challenges before the businesses and setting up of a business enterprise.
3. To develop the spirit of entrepreneurship among the students.

	Contents	No. of Lectures
Unit 1	<p>Nature and Evolution of Business</p> <p>Human Occupations – characteristics of Business— Divisions of Business—Objectives of Business— Requisites for success in Business</p> <p>Development of commerce – Evolution of Industry—The Industrial Revolution— Globalization—Emergence of MNCs</p> <p>Recent Trends—Mergers and Acquisitions, Networking, Franchising. BPOs and KPOs, E-Commerce, On-line trading, Patents, trademarks and copy rights—Challenges before Indian business Sector</p>	10
Unit 2	<p>Forms of Business Organizations</p> <p>Mixed Economy—Private Sector—Public Sector—Co- operative sector—Joint sector Service Sector</p> <p>Forms of Business Organizations—Sole proprietorship— Partnership firm—Joint stock company—Features—Merits demerits and suitability of various forms of business</p>	10
Unit 3	<p>Setting up of a Business Enterprise</p> <p>Decision in setting up of an enterprise— Opportunity and idea generation - Role of creativity and innovation Project Report—Business size and Location decisions— Factors to be considered in starting a new unit— Government policies</p> 	10

Unit 4	Domestic and Foreign Trade 4.1 Whole sale and Retail Trade –Emergence of Foreign players in trading –Government policy-Effects of FDI on retail trade	10
	4.2 Organization of finance –Insurance—Transportation and communication and other Services—Import and Export procedure	
Unit 5	Business and Society Objectives of Business—Changing concept, Professionalization Business Ethics and culture—Technological and social changes –Social responsibility of business—CSR—Social Audit	08
	Total	48

Recommended Books:

1. *Modern Business Organization - S.A. Sherlekar*
2. *Industrial Organization Management - Sherlekar*
3. *Business Organization and management – Y.K. Bhushan*
4. *Business Organization and system – Dr.M.V.Gite, Dr.R.D.Darekar, Prof.S.N.Nanaware, Dr.V.D. Barve- Success Publication,Pune*
5. *Business Environment - F. Cherunilam*
6. *Business Organization & Management – C.B. Gupta.*
7. *Entrepreneurial Development – S.S. Khanna.*
8. *Organizing and Financing of Small scale Industry – Dr. V. Desai*



Semester I

Business Communication Skills

Course Code: 102

Objectives:

1. To improve various skills such as linguistic, non linguistic and Paralinguistic skills.
2. To develop an integrative approach where reading, writing, oral and speaking components are used together to enhance the students' ability to communicate and write effectively.
3. To create awareness among student about Methods and Media of communication.

	Contents	No. of Lectures
Unit 1	Introduction to Communication Meaning, Definition, objective, Process, importance. Principles of good Communication, Barriers to Communication, Overcoming Barriers.	08
Unit 2	Methods and Types of Communication Written Communication, Oral Communication, Silent Communication – Body Language, Proximity, Touch, Signs and Symbols, Paralinguistic, -Advantages and disadvantages of each	10
Unit 3	Oral Communication Meaning, Nature, Scope, Principles of Effective Oral Communication, Techniques of Effective Speech, Press Conference, Group Discussion, Interviews, Negotiation, Presentations, The Art of Listening, Principles of Good Listening, Barriers of Listening, Phone Etiquette, Grapevine	12
Unit 4	Business Correspondence Need, Functions, Component and layout of Business letter, Drafting of letters: Enquiry letter, Placing order, Complaints and follow up letters, Sales letter, Circulars, Application for employment and Resume, Notices, Agenda, Memo, Email etiquette	10
Unit 5	Media of Communication Introduction, Advantages and Disadvantages of – Telex, Telegram, Fax, Voice Mail, Teleconferencing, Video Conferencing, SIM Card, Dictaphone, SMS, MMS, Internet and Social Media Sites.	08
	Total	48



Recommended Books:

- 1) *Business Communication (Principles, Methods and Techniques)* - Nirmal Singh- Deep & Deep Publications Pvt. Ltd, New Delhi.
- 2) *Essentials of Business Communication* – Rajendra Pal & J. S. Korhalli- Sultan Chand & Sons, New Delhi.
- 3) *Media and Communication Management* – C.S.Raydu - Himalaya Publishing House, Mumbai.
- 4) *Professional Communication*- Aruna Koneru- Tata McGraw-Hill Publishing Co. Ltd, New Delhi.
- 5) *Creating a Successful CV* - Siman Howard - Dorling Kindersley.
- 6) *Business Communication skills* – Dr.G.M.Dumbre, Dr.Anjali Kalkar, Dr.P.N.Shende, Dr.S.D.Takalkar-success Publication, Pune
- 7) *Effective Documentation and Presentation*- Urmila Rai & S.M. Rai – Himalaya Publishing House, Mumbai.
- 8) *Principles Practices of Business Communication* – Aspi Doctor & Rhoda Doctor – Sheth Publishers Pvt. Ltd.
- 9) *Business Communication – Concepts, Cases and Applications* – P.D. Chaturvedi, Mukesh Chaturvedi, 2nd Edition (2013)



Semester I
Business Accounting
Course Code – 103

Objectives:

1. To enable the students to acquire sound knowledge of basic concepts of accounting
2. To impart basic accounting knowledge
3. To impart the knowledge about recording of transactions and preparation of final accounts
4. To acquaint the students about accounting software packages

	Contents	No. of lectures
Unit 1	Introduction: Financial Accounting-definition and Scope, objectives, Accounting concepts , principles and conventions Accounting Standards in general: - AS1, AS2, AS6.	6
Unit 2	Accounting Transactions and Final Accounts :- Voucher system; Accounting Process, Journals, Ledger, Cash Book , subsidiary books ,Trial Balance preparation of Final Accounts of Sole Proprietorship(Trading and Profit & Loss Account and Balance Sheet)	18
Unit 3	Bank Reconciliation Statement :- Meaning , importance and preparation of Bank Reconciliation Statement	12
Unit 4	Depreciation: - Meaning, need, importance and methods of charging depreciation - Written Down Value, Straight Line Method.	8
Unit 5	Computerized Accounting: Computers and Financial application, Accounting Software packages.	4
	Total	48

Allocation of Marks:

Theory - 30%

Practical problems - 70%



Recommended Books

1. *Fundamentals of Accounting & Financial Analysis: By Anil Chowdhry (Pearson Education)*
2. *Business Accounting-Dr.G.M.Dumbre, Dr.Kishor Jagtap, Dr.A.H.Gaikwad, Dr.N.M.Nare-Success Publication,Pune*
2. *Financial accounting: By Jane Reimers (Pearson Education)*
3. *Accounting Made Easy By Rajesh Agarwal & R Srinivasan (Tata McGraw –Hill)*
4. *Financial Accounting For Management: By Amrish Gupta (Pearson Education)*
5. *Financial Accounting For Management: By Dr. S. N. Maheshwari (Vikas Publishing)*
6. *Advanced Accounts – M.C. Shukla and S P Grewal (S.Chand & Co., New Delhi)*



Semester I
Business Economics (Micro)

Course Code - 104

Objectives:

1. To expose students to basic micro economic concepts.
2. To apply economic analysis in the formulation of business policies.
3. To use economic reasoning to problems of business.

	Contents	No. of Lectures
Unit 1	<p>INTRODUCTION</p> <p>Meaning, Nature and Scope of Business Economics – Micro and Macro</p> <p style="padding-left: 20px;">Basic Economic Problems</p> <p style="padding-left: 20px;">Circular Flow of Income and Expenditure</p>	07
Unit 2	<p>DEMAND and SUPPLY ANALYSIS</p> <p>Concept of Demand and Supply</p> <p>Elasticity of Demand and their types.</p> <p>Factors Affecting Supply</p> <p>Concept and Law of Supply</p>	09
Unit 3	<p>REVENUE AND COST ANALYSIS</p> <p>Revenue Concepts - Total Revenue, Marginal Revenue, Average Revenue and their relationship</p> <p style="padding-left: 20px;">Types of costs –</p> <p style="padding-left: 40px;">i) Accounting Costs and Economic Costs</p> <p style="padding-left: 40px;">ii) Short Run Cost Analysis: Fixed, Variable and Total Cost Curves, Average and Marginal Costs</p> <p style="padding-left: 40px;">iii) Long Run Cost Analysis: Long Run Average and Marginal Cost Curves</p>	10
Unit 4	<p>PRICING UNDER VARIOUS MARKET CONDITIONS</p> <p>Perfect Competition - Equilibrium of Firm and Industry under Perfect Competition</p> <p style="padding-left: 20px;">Monopoly - Price Determination under Monopoly</p> <p style="padding-left: 20px;">Monopolistic Competition – Non- price competition</p> <p style="padding-left: 20px;">Duopoly and Oligopoly – Meaning and characteristics</p>	10
Unit 5	<p>DISTRIBUTION</p> <p>Rent: Modern Theory of Rent</p> <p style="padding-left: 20px;">Wages: Marginal Productivity Theory of Wage Determination</p> <p>Interest: Liquidity Preference Theory of Interest</p> <p>Profits: Dynamic, Innovation, Risk - Bearing and Uncertainty</p> <p>Bearing Theories of Profits</p>	12
	Total	48



Recommended Books:

1. *Textbook of Economic Theory* - Stonier and Hague; Longman Green and Co., London.
2. *Introduction to Positive Economics* - Richard G. Lipsey
3. *Business Economics (Micro)* - Dr. Girijashankar; Atharva Prakashan, Pune.
4. *Micro Economics* - M. L. Seth
5. *Business Economics (Micro)* - Dr. Girija Shankar, Dr. B. D. Khedkar, Dr. S. G. Shinde, Prof. Anjali Sane - Success Publication, Pune
6. *Micro Economics* - M. L. Jhingan; Vrinda Publications, New Delhi.
7. *Business Economics* – Dr. D. M. Mithani and Mrs. Anjali Sane, Himalaya Publications



Semester I
Business Mathematics
Course code 105

Objectives:

1. To understand applications of matrices in business.
2. To understand the concept and application of Permutations & Combinations in business.
3. To use L.P.P. and its applications in business.
4. To understand the concept of Transportation problems & its applications in business world.
5. To understand the concept of shares & share market.

	Contents	No. of Lectures
Unit 1	Shares and Dividends Concept of Shares, Stock exchange, Face Value, Market Value, Dividend, Equity Shares, Preferential Shares, Bonus Shares, Examples.	08
Unit 2	Permutations and Combinations Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetition). $nPr = n! / (n-r)!$ (Without proof). Combinations of 'r' objects taken from 'n' objects. $nCr = n! / r! (n-r)!$ (Without proof) problems, Applications.	08
Unit 3	Matrices and Determinants (up to order 3 only) Multivariable data, Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Adjoint of a Matrix, Inverse of a Matrix via Adjoint Matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Non-homogeneous System of Linear equations (not more than three variables). Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix, Problems.	14
Unit 4	Linear Programming problem (L.P.P.) Meaning of LPP, Formulation of LPP, and solution by graphical methods.	10
Unit 5	Transportation problem (T.P.) Statement and meaning of T.P. methods of finding initial basic feasible solution by North West corner Rule, Matrix Minimum method and Vogel's approximation method. Simple numerical problems (concept of degeneracy is not expected).	08
	Total	48



Reference Books:

- 1) *Business Mathematics* by Dr. Amarnath Dikshit & Dr. Jinendra Kumar Jain.
- 2) *Business Mathematics* by Padmalochan Hazarika – Sultan chand & sons, Delhi
- 3) *Business Mathematics* by Bari - New Literature publishing company, Mumbai
- 4) *Operations Research* by V.K. Kapoor - Sultan chand & sons
- 5) *Operations Research* by Dr. S. D. Sharma – Sultan Chand & Sons.
- 6) *Operations Research* by Dr. J. K. Sharma – Sultan Chand & Sons.
- 7) *Business mathematics* – Dr.Anwar Shaikh, Prof.R.G.Gurav, Prof.Tawade, Prof. Vaibhav Joshi- Success Publication,Pune



Semester I

Business Demography and Environmental Studies

Course Code: 106

Objectives :

- 1) To develop knowledge base for demographic and environmental factors affecting business.
- 2) To make the students aware of environmental problems related to business and Commerce.
- 3) To inculcate values of Environmental ethics amongst the students.

	Contents	No. of Lectures
Unit 1	Introduction of demography Meaning, Definition, Need, Importance & need of Demography Studies for Business Scope of demography, interdisciplinary approach of demography Components of demography: Fertility, mortality and migration Measures to calculate fertility and mortality rate Factors affecting fertility and mortality	10
Unit 2	Distribution of Population and Population Growth Meaning of population distribution and population density, Physical and cultural factors affecting the distribution of population Concepts of over, optimum and under population with suitable examples Meaning and definition of population growth, Methods of calculating population growth Population growth in India since 1901	08
Unit 3	Population as Resource Meaning of resource, types of resources Importance of human resource in development and growth of business Concept of Literacy: importance of literate population as a resource Concept of sex ratio, Concept of Age & Sex Pyramid, Types of age and sex pyramid, age and sex pyramids of different countries Classification of population - Urban and rural population Population below poverty line, working population, dependent Population	12
	Urbanization	06



Unit 4	Meaning, definitions of urbanization, factors responsible for urbanization and problems of urbanization Urbanization as Behavioral concept, structural concepts and demographic concept	
Unit 5	Environment and Environmental issues related to Business Meaning and definition of environment Types of Environment Physical and Cultural components of environment Need of environmental studies for Business Management Environment factors affecting Business – Physical factors –topography, climate, minerals, water resources; Cultural factors – infrastructure – technology tradition, political, social, education Global warming and Kyoto Protocol, Oil Crisis and its impact on Business Problems related to water resources Types of pollution –Air, Water, Noise - Effects and causes of pollution Remedial measures to control pollution Interrelationship between industrialization and pollution	12
	Total	48

Recommended books:

1. *Population Geography* : R.C. Chandana, Lyall Book Depot/ Kalyani Publishers (2006)
2. *Population Geography*: Qazi, S. Shah, Shargi Qazi APH Publishing Corp. New Delhi
3. *Environmental Geography*: Dr. Savindra Singh Prayag Pustak Bhawan
4. *Geography of India*: Majid Hussain Tata McGraw Hill
5. *Population Geography* : I Singh: Alfa Publication (2006)
6. *Business Demography and Environmental studies*-Miss Joshi Sunita, Dr.Jaybhaye Ravindra- Success Publication,Pune



Semester II

Principles of Management

Objectives:

Course Code – 201

- To provide conceptual knowledge to the students regarding nature, complexity and various functions of management
- To give historical perspective of management
- Students will also gain some basic knowledge on recent trends and international aspects of management

	Contents	No. of Lectures
Unit 1	Nature of Management Meaning, Definition, Nature, Importance & Functions Management an Art, Science & Profession-Management as social System Concept of Management-Administration-Organization-Universality of management	08
Unit 2	Evolution of management Thoughts Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Chester Barnard & Peter Drucker to the management thought Various approaches to management (i.e. School of management thought) Indian management Thought	10
Unit 3	Functions of Management : Part – I Planning –Meaning –Need & Importance, types levels – advantages & limitations; Forecasting- Need & Techniques; Decision making – Types - Process of rational decision making & techniques of decision making. Organizing – Elements of organizing & process Types of organizations, Delegation of authority – Need, difficulties in delegation – Decentralization. Staffing – Meaning & importance	12
Unit 4	Functions of Management : Part –II 4.1 Direction - Nature – Principles	10



	Communication – Types & Importance Motivation - Importance – Theories Leadership – Meaning - Styles, qualities & functions of leaders Controlling – Need, nature, Importance, Process & techniques Co-ordination - Need – Importance	
Unit 5	Recent Trends in Management Management of change Management of Crisis Total Quality Management Stress Management International Management	08
	Total	48

Recommended Books:

1. *Essential of Management - Harold Koontz and Iteinz Wiebritch- McGraw-Hill International*
2. *Management Theory & Practice – J.N. Chandan*
3. *Essential of Business Administration – K. Aswathapa, Himalaya Publishing House*
4. *Principles & Practice of management – Dr. L.M. Prasad, Sultan Chand & Sons – New Delhi*
5. *Business Organization & management – Dr. Y.K. Bhushan.*
6. *Management: Concept and Strategies by J.S. Chandan, Vikas Publishing.*
7. *Principles of Management, By Tripathi, Reddy Tata McGraw Hill*
8. *Business organization and management by Talloo by Tata Mc Graw Hill*
9. *Business Environment and policy – A book on Strategic Management/ Corporate Planning By Francis Cherunilam, Himalaya Publishing House.*
10. *Business Organization & Management – C. B. Gupta*



Semester II
Principles of Marketing
Course Code: 202

Objectives:

- a. To introduce and familiarize the student's basic concepts of marketing, its general nature, scope and importance.
- b. To impart appropriate knowledge and understanding of its primary functions and applications and its gradual evolution and development.
- c. To develop basic and essential skills related to marketing.
- d. To provide a learning platform for preparing students for marketing employability opportunities essential for industries.

	Contents	No. of Lectures
Unit 1	<p>Introduction and Functions of Marketing</p> <p>Marketing – Definitions, Concept, objectives, importance and functions of marketing: on the basis of exchange, on the basis of physical supply and facilitating functions</p> <p style="padding-left: 40px;">Approaches to the study of Marketing</p> <p style="padding-left: 40px;">Relevance of Marketing in a developing economy.</p> <p style="padding-left: 40px;">Changing profile and challenges faced by a Marketing manager</p>	08
Unit 2	<p>Classification and types of markets</p> <p>Traditional classification of marketing</p> <p style="padding-left: 40px;">Service Marketing: 7P's of services marketing, importance of services marketing, importance of service sectors</p> <p style="padding-left: 40px;">Rural Marketing: Meaning, feature & importance of rural marketing, Difficulties in rural marketing and suggestions for improvement of Rural Marketing</p> <p>Retail marketing</p> <p>Tele marketing</p> <p>E-Marketing</p> <p style="padding-left: 40px;">Digital marketing: meaning, importance of digital marketing</p> <p>Green marketing</p>	08
Unit 3	<p>Marketing Environment and Market Segmentation</p> <p>Marketing Environment – Meaning, Internal & external factors influencing Marketing environment: political, social, economical, international, technological multi cultural environment</p> <p style="padding-left: 40px;">Market Segmentation: Meaning, Definition, Essentials of effective Market Segmentation, types of segmentation</p>	08



<p>Unit 4</p>	<p>Marketing Mix</p> <p>: Product mix and Price mix Meaning, scope and importance of marketing mix</p> <p>a. Product mix: concept of a product, product characteristics: intrinsic and extrinsic , PLC, Product simplification, product elimination, product diversification , new product development</p> <p>b. Price mix : meaning, element , importance of price mix , factors influencing pricing , pricing methods and recent trends</p> <p>: Place mix and Promotion mix</p> <p>c. Place mix: meaning and concepts of channel of distribution, types of channel of distribution or intermediaries, Factors influencing selection of channels, types of distribution strategies: intensive, selective and extensive recent changes in terms of logistics and supply chain management.</p> <p>d. Promotion mix: meaning, elements of promotion mix: advertising: meaning, definitions, importance and limitations of advertising, types of media: outdoor, indoor, print, press, transit - merits and demerits, concept of media mix, Recent trends in promotion</p>	<p>16</p>
<p>Unit 5</p>	<p>Marketing Planning, Marketing Information System, Marketing Research</p> <p>Marketing planning: meaning, scope, importance, essentials and steps in marketing planning ,Importance and difficulties in marketing planning</p> <p>Marketing Information System: Concept, components and importance of Marketing Information System</p> <p>Marketing Research – Meaning, definitions, objectives and scope of marketing research, difference between market research and marketing research, types & techniques of Marketing Research, Use of Marketing Research in management</p>	<p>10</p>
<p>Total</p>		<p>48</p>

All topics should be supported with assignments, group discussions, visits and case lets as per requirements.

Reference Books

1. *Marketing Management By Philip Kotler*
2. *Marketing Management Cravens By Hills – Woodruff*
3. *Marketing – A Managerial Introduction By Gandhi*
4. *Marketing Information System By Davis – Olsan*
5. *Consumer Behavior By Schiffman – Kanuk*
6. *Principles and practice of Marketing By John Frain.*



Semester II
PRINCIPLES OF FINANCE
Course Code – 203

Objectives -

1. To provide understanding of nature, importance, structure of finance related areas.
2. To impart knowledge regarding sources of finance for a business.

	Contents	No. of lectures
Unit 1	Introduction Finance - Definition - Nature and scope of finance function Financial Management - Meaning – Approaches :- Traditional , Modern Role of finance manager.	4
Unit 2	Sources of Finance External: - Shares, Debentures, Public Deposits, Borrowing from banks: - meaning, types, advantages and limitations of these sources. Internal: - Reserves and surplus, Bonus shares, Retained earnings, Dividend policy; Meaning, advantages and limitations of these sources.	16
Unit 3	Capital Structure Meaning - criteria for determining capital structure. Factors affecting capital structure. Capitalization:- Meaning , Over capitalization and Under Capitalization - meaning, causes, consequences, remedies	14
Unit 4	Financial planning Meaning and objectives Process Methods of forecasting Basic considerations Limitations.	6
Unit 5	Recent Trends in business finance:- Meaning and nature of- Venture Capital Leasing Microfinance Mutual Fund	8
	TOTAL	48

BOOKS RECOMMENDED:

1. P.V. Kulkarni - *Financial Management - Himalaya Publishing House, Mumbai.*
2. S.C. Kucchal - *Corporation Finance - Chaitanya Publishing House, Allahabad.*
3. I.M. Pandey - *Financial Management - Vikas Publishing House.*
4. R.M. Shrivastava - *Pragati Prakashan, Meerut.*
5. M.Y. Khan and P.K. Jain - *Financial Management - Tata - McGraw Hill Publishing co. Ltd., New Delhi.*
6. Prasanna Chandra - *Financial Management - Tata - McGraw Hill Publishing co. Ltd., New Delhi.*



Semester II

Basics of Cost Accounting

Course Code: 204

Objectives:

1. To Impart the Knowledge of Basic cost concepts, element of cost & preparation of Cost Sheet.
2. To provide basic knowledge of important Methods of costing.

	Contents	No. of Lectures
Unit 1:	Introduction Concept of Cost, Costing, Cost Accounting & Cost Accountancy Limitations of Financial Accounting Origin, Objectives and Features of Cost Accounting Advantages and Limitations of Cost Accounting Difference between Financial and Cost Accounting Conceptual analysis of Cost Unit & Cost Centre	8
Unit 2:	Elements of cost and Cost Sheet Material, Labour and other Expenses Classification of Cost & Types of Costs Preparation of Cost Sheet	10
Unit 3:	Overheads Meaning and Definitions Classification of Overheads Collection, allocation, apportionment and reapportionment of overheads Under and over absorption – Definition and Reasons	8
Unit 4	Methods of Costing Contract Costing – Meaning and features of contract costing, works certified and uncertified, escalation clause, cost plus contract, work in progress, profit on incomplete contract Process Costing - Meaning, Features of process costing, preparation of process costing including Normal and Abnormal Loss/Gains 4.3 Service costing – Meaning, Features and application, cost unit – simple and composite, Preparation of cost sheet for transport service	16
Unit 5	Cost Audit: Meaning , definition, objectives and scope Advantages of Cost Audit Difference between Financial and Cost Audit Types of Cost Audit	6
	Total	48



Allocation of Marks:

Theory - 50%

Practical problems - 50%

Area of Practical problems:

Cost-Sheet

Contract costing

Process costing

Service costing

Books Recommended: -

1. *Advanced cost Accounting by S.P.Jain and Narong.*
2. *Cost Accounting by S.N.Maheshwari*
3. *Cost Accounting by Ratnam.*
4. *Practice in Advanced Costing and Management Accounting by Prof. Subhash Jagtap*
5. *Cost Accounting – Bhatta HSM, Himalaya Publication*
6. *Cost Accounting – Prabhu Dev , Himalaya Publication*
7. *Advanced Cost Accounting – Made Gowda, Himalaya Publication*
8. *Cost Accounting Principles and Practice by M.N.Arora*



Semester II

Business Statistics

Course code 205

Objectives:

1. To understand the basics of statistics - concept of population and sample & to use frequency distribution to make decision.
2. To understand and to calculate various types of averages and variation.
3. To understand Correlation and use of regression analysis to estimate the relationship between two variables and its applications.
4. To understand the concept - Time Series and its applications in business.
5. To understand the concept - Index numbers and applications in business.
6. To inculcate the research culture among students.

	Contents	No. of Lectures
Unit 1	Population and Sample: Definition of Statistics, Scope of Statistics in Economics, Management Sciences and Industry. Concept of population and sample with illustration. Methods of Sampling – SRSWR, SRSWOR, Stratified, Systematic. (Description of sampling procedures only). Data Condensation and graphical Methods: Raw data, attributes and variables, classification, frequency distribution, cumulative frequency distributions. Graphs - Histogram, Frequency polygon. Diagrams - Multiple bar, Pie, Subdivided bar.	08
Unit 2	Measures of Central Tendency & Dispersion: Criteria for good measures of central tendency Arithmetic mean, Median and Mode for grouped and ungrouped data, combined mean. Concept of dispersion, Absolute and relative measure of dispersion, Range, Variance, Standard deviation, Coefficient of variation, Quartile Deviation, Coefficient of Quartile deviation.	11
Unit 3	Correlation and Regression (for ungrouped data): Concept of correlation, positive & negative correlation Scatter Diagram, Karl Pearson's Coefficient of correlation Meaning of regression, Two regression equations, Regression coefficients and properties (Statements Only).	10
Unit 4	Time Series:	14



	<p>Definitions and Utility of Time Series Analysis; Components of Time Series: Secular Trend, Seasonal Variation, and Cyclic Variation, Irregular or Erratic Variations.</p> <p>Measurement of Trend: Freehand or Graphic Method, Method of Semi-averages, Moving Average Method, Method of Least Squares.</p> <p>Measurement of Seasonal Variations: Method of Seasonal Averages, Ratio – to – trend Method, Moving Average method, Link Relative Method. (Only Application, No Proof required.)</p>	
Unit 5	<p>Index Numbers:</p> <p>Important definitions of Index Numbers</p> <p>Characteristics of Index Numbers, Uses of Index Numbers, Types of Index Numbers: Price Index, Quantity Index, Value Index, numerical problems</p> <p>Problems in the construction of Index Numbers; Methods of constructing Index Numbers. (Only Application, No Proof required.)</p>	05
	Total	48

Recommended Books:

1. S.C. Gupta – *Fundamentals of Statistics - Sultan chand & Sons, Delhi.*
2. D.N. Elhance – *Fundamentals of Statistics – Kitab Mahal, Allahabad.*
3. *Business Statistics* by N. D. Vohra – *Tata Mc Graw Hill*
4. *Fundamentals of Mathematical Statistics* by V.K. Kapoor -*Sultan Chand & Sons, Delhi.*



Semester II

Business Informatics

Course Code – 206

Objectives:

1. To know the basics of Computer
2. To understand the basics of networking
3. To know the basics of internet
4. To know the basics of databases

	Contents	No. of Lectures
Unit 1	Introduction to Computers Introduction Characteristics of Computers Block diagram of computer Booting Process Types of Programming Languages Machine Languages Assembly Languages High Level Languages Data Organization Drives Files Directories Storage Devices Primary Memory RAM ROM Secondary Storage Devices - FD, CD, HDD, Pen drive I/O Devices Monitor and types of monitor Printer and types of printer Scanners Digitizers Plotters Number Systems Introduction to Binary, Octal, Hexadecimal system Conversion Simple Addition, Subtraction, Multiplication, Division	10
Unit 2	Operating System and Services in O.S. Definition of operating system Services provided by OS Types of O.S. Features of Windows and Linux Files and Directories	8



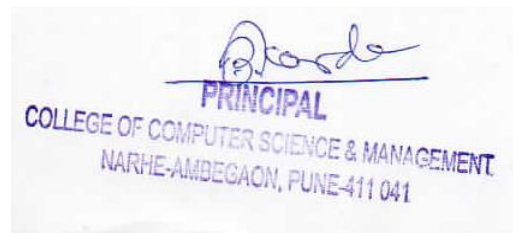
	Internal and External Commands of DOS Batch Files	
Unit 3	Editors and Word Processors Basic Concepts Examples : MS-Word2007 Introduction to desktop publishing Spreadsheets and Database packages Purpose MS-Excel2007 Creation of table in MS-Access2007 MS –PowerPoint2007	9
Unit 4	Introduction to Networking Basics of Computer Networks Definition Goals Applications Components Topology Types of Topology Types of Networks (LAN, MAN, WAN) Modes of Communication : (Simplex Half Duplex Full Duplex) Transmission media Twisted pair Coaxial cable Fiber optic cable Protocols and purpose Network Connectivity Devices Hubs Repeaters Bridges Switches Gateways Internet Basics Concept of Internet, Intranet and Extranet Web Client Web Server WWW Search Engine Internet Service Providers(ISP)	15
Unit 5	Introduction To R.D.B.M.S Advantages and Limitations Normalization Entity Relationships	6



	5.4 Use Of simple SQL Commands involving both single table and joins.	
	Total	48

Reference Books:

1. *Fundamental of Computers – By V. Rajaraman (Prentice Hall)*
2. *Fundamental of Computers – By P. K. Sinha (B.P.B publication)*
3. *Computer Applications in Management- By Niranjan Shrivastava (Dreamtech Press)*
4. *MS- Office 2000(For Windows) – By Steve Sagman*
5. *Data Communications & Networking- Behrouz Ferouzan (III Edition)*



First Year Bachelor of Business Administration (F.Y. BBA)

Pattern of Question papers (w.e.f. A.Y. 2013-2014)

Following subjects have been identified as theory papers in First Year B.B. A. which will have uniform question paper format as given under:

Semester I:

- 1) 101 - Business Organization and Systems
- 2) 102 - Business Communication Skills
- 3) 104 - Business Economics (Micro)
- 4) 106 - Business Demography and Environmental Studies

Semester II:

- 1) 201 – Principles of Management
- 2) 202 – Principles of Marketing
- 3) 203 – Principles of Finance

Question paper pattern for following Practical Subjects is given separately:

Semester I:

- 1) 103 – Business Accounting
- 2) 105 – Business Mathematics

Semester II:

- 1) 204 – Basics of Cost Accounting
- 2) 205 – Business Statistics
- 3) 206 – Business Informatics



First Year Bachelor of Business Administration (F.Y. B.B.A.)

Pattern of Question paper of Theory papers

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat and well labeled diagrams wherever necessary.

Theory question (15)

OR

Theory Question

Theory question (15)

OR

Theory Question

Theory question (15)

OR

Theory Question

Theory question (15)

OR

Theory Question

Write Short Notes (Any **four** out of **six**) (20)



Bachelor of Business Administration (B.B.A.) Semester I

Pattern of Question paper of Business Accounting

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of calculator is allowed.

Q1.	Objective Type Questions (True or False, Fill in the Blanks, Match the pairs)	12
Q2.	Write short notes on (Any three out of five)	12
Q3.	Practical Problem	20
Q4.	Practical Problem	18

OR

	Practical Problem	
Q5.	Practical Problem	18

OR

Practical Problem



First Year Bachelor of Business Administration (F.Y. B.B.A.)

Pattern of Question paper of Business Mathematics and Business Statistics

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. All questions carry equal marks.
3. Use of simple electronic calculator is allowed.

Answer the following (any four out of

six) Q.2) Answer the following (any

four out of six) Q.3) Answer the

following (any four out of six) Q.4)

Answer the following (any four out of

six) Q.5) Answer the following (any two

out of six)



Bachelor of Business Administration (B.B.A.) Semester II

Pattern of Question paper of Basics of Cost Accounting

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of calculator is allowed.

Q1. Objective Type Questions 10

(True or False, Fill in the Blanks, Match the pairs)

Q2. Theory Question 15

OR

Theory Question

Q3. Write short notes on (Any three out of five) 15

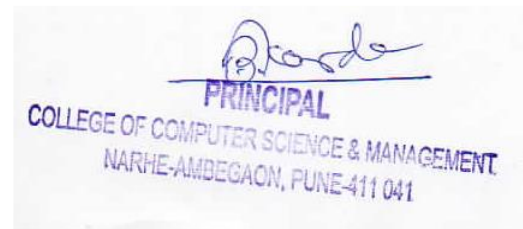
Q4. Practical Problem 16

Q5. a) Practical Problem 12

b) Practical Problem 12

OR

Practical Problem



Bachelor of Business Administration (B.B.A.) Semester II

Pattern of Question paper of Business Informatics

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. All questions carry equal marks.
3. Use of calculator is allowed.

Q.1) Answer the following (any eight out of ten) Small Answer questions

Q.2) Attempt any four out of five Questions

Q.3) Attempt any four out of five Questions

Q.4) Attempt any four out of five Questions

Q.5) Attempt any two out of three Questions



University of Pune

(Pattern – 2013)w.e.f. 2014-2015

B.B.A. SEM – III
Subject: Personality Development
(Course Code –301)

Objectives:

1. To make the students aware about the dimensions and importance of effective personality.
2. To understand personality traits and formation and vital contribution in the world of business .
3. To make the students aware about the various dynamics of personality development.

Sr. No.	Topics	Number of lectures
UNIT 1	Introduction: <ul style="list-style-type: none">• Meaning and Definition of Personality.• Factors affecting Personality Development: Biological, Home Environment and Parents, School Environment and Teachers, Peer Group, Sibling Relationships and Mass Media, Cultural Factors, Spiritual Factors, Public Relations.	5
UNIT 2	Personality Traits. <ul style="list-style-type: none">• Meaning and Definition: Personality Traits.• Developing Positive Personality Traits: Attitude:Factors that determine Attitude, Benefits of Positive Attitude and Consequences of negative attitude, steps to build positive attitude.• Personality habits: Meaning and concept of habits.• Developing effective Habits:Behaviour and Character. Being Proactive/Creative and Innovative Beginning with the end in mind Putting first things first with determination, discipline, clarity and concentration. Thinking Big and Winning Through: Action, Active, Facing Challenges, striving for	10



	<p>success. Apologizing, Appreciating, Accepting feedback. Aiming high, enthusiasm, team building, setting goals, zeal and passion building. (Practical Examples of the above)</p>	
UNIT 3	<p>Pillars of personality development:</p> <ul style="list-style-type: none"> • Introspection: Meaning and importance, Views about Introspection, Self Introspection Skills. • Self Assessment: Meaning, importance, types and self assessment for students. • Self Appraisal: Meaning, importance, tips for self appraisal. • Self Development: Meaning, process of self development, Self Development Techniques, Use of self Development, Individual Development Plan. • Self Introduction: Meaning, tips for effective self introduction, Self Acceptance, Awareness, Self Knowledge, belief, confidence, criticism and self examination. • Defining Success: Real or Imaginative, obstacles to success, factors and qualities that make person successful. • Concept of Failure: Reasons for failure. • Personal SWOT analysis & STAR analysis. <p>(One or two caselets on the above topic)</p>	15
Unit 4	<p>Self Esteem:</p> <ul style="list-style-type: none"> • Self Concept: Meaning, definition and development • Self Esteem: concept, significance of Self esteem, types (positive, negative), characteristics of people of high and low Self esteem, steps for enhancing positive Self esteem. • Sigmund Freud ID, EGO and SUPER EGO Concepts. • Ego Management, What ego mismanagement can do. • Managing Egoistic insults <p>(One or two case lets on the above topic)</p>	8



Unit 5	Personality Formation Structure: <ul style="list-style-type: none"> • Mind mapping. • Competency mapping. • Developing interpersonal and group skills. • Building positive relationships. • Strategies of gaining power and influence. • Enhancing personality through effective communication. • Intentional Communication. • Intentional Listening. • Effective Speech: Writing and delivering and successful negotiation. • Understanding body language, projecting positive body language. • Manners and etiquettes. • Proper dressing for varied occasions. (One or two case lets on the above topic) 	10
Total		48

Recommended Books:

1. Seven Habits Of Highly Effective People – Stephen Covey
2. You Can Win – Shiv Khera
3. Three Basic Managerial Skills For All – Hall Of India Pvt Ltd New Delhi
4. Hurlock Elizabeth B Personality Development Tata Mcgraw Hill New Delhi
5. Understanding Psychology: By Robert S Feldman. (Tata McGraw Hill Publishing)
6. Personality Development and Career management: By R.M.Onkar (S Chand Publications)
7. Social Psychology: By Robert S Feldman. (Tata McGraw Hill Publishing)
8. Mcgrath Eh Basics Management Skills For All Printish Hall Of India Pvt Ltd New Delhi
9. Wehtlel David A and Kin S Kemerron – Developing Managerial Skills – Pearson Education New Delhi.
10. Essentials of Business Communication - Rajendra Pal and J. S. Korlhalli - Sultan Chand & Sons, New Delhi.
11. Business Communication (Principles, Methods and Techniques) Nirmal Singh - Deep & Deep Publications Pvt. Ltd., New Delhi
12. Effective Business Communication – H.Murphy.



University of Pune
(Pattern – 2013) w.e.f. 2014-2015

B.B.A. SEM – III

Subject: Business Ethics
(Course Code –302)

Objectives:

1. To impart knowledge of Business Ethics to the students.
2. To promote Ethical Practices in the Business.
3. To develop Ethical and Value Based thought process among the future manager's entrepreneurs.

Sr. No	Topics	Number of lectures
Unit 1.	Introduction to Ethics : ∪ Meaning and Nature of Ethics. ∪ Moral and Ethics. ∪ Importance of Ethics. ∪ Types of Ethics. ∪ Causes of Unethical behavior.	08
Unit 2.	Area of Business Ethics : ∪ Meaning , Nature and Importance of Business Ethics. ∪ Types of Business Ethics. ∪ Factors influencing business ethics. ∪ Corporate Ethics – ethical behavior & audit of ethical behavior. ∪ Individual ethics, Professional Ethics. ∪ Gandhian Philosophy of ethical behaviour. ∪ Social Audit.	10
Unit 3	Business Ethics in Global Economy : ∪ Concept of Globalization. ∪ Global Business Network. ∪ Relationship among Business, Business Ethics and Business Development. ∪ Developing Business ethics in Global Economy. ∪ Marketing ethics in foreign trade. ∪ Role of Business Ethics in a developing civilized society.	13



Unit 4	Moral Issues in Business : ↳ Concept of Corporate Social Responsibility. ↳ Relationship between C.S.R. and Business Ethics. ↳ Justice & Economic system ethics relating to environment protection. ↳ Business Ethics and Environment Protection. ↳ Business Ethics and Consumer Protection. ↳ Business Ethics and Social Justice. ↳ Arguments for and against Corporate Social Responsibility.	10
Unit 5.	Functional Ethics: ↳ Meaning of Functional Ethics. ↳ Types of Ethics according to Functions of Business, (Marketing, HRM, Purchase, Selling & Distribution). ↳ Patents ,Copy-rights, Intellectual Property Rights, Trade Marks and Business Ethics. ↳ Ethical Challenges for managers in the 21 st Century	07
	Total	48

Recommended Books:

1. Business Ethics - GautamPherwani
2. Business Ethics - RituPamraj
3. Business Ethics - Prof. Agalgatti
4. Business Ethics - Manuel G Velasquez
5. Business Ethics - O.C.Ferrell, John Paul Fraedrich,Lindaferrell



University of Pune
(Pattern – 2013)w.e.f. 2014-2015

BBA SEM – III
Subject: Human Resource Management and Organizational Behavior
(Course Code - 303)

Objectives:

1. To introduce to the students the functional department of human resource management and acquaint them with planning, its different functions in an organization.
2. To introduce the human resource processes that are concerned with planning, motivating and developing suitable employees for the benefit of the organization.

Sr. No.	Topics	No. of Lectures
UNIT 1	<p>Introduction to Human Resource Management:</p> <ul style="list-style-type: none"> • Definition and concept of human resource / personnel management. • History of Human Resource Management. • Importance of human resource management. • Functions of human resource management. • Organization of HRM- <ul style="list-style-type: none"> ➤ Personnel department in Line organization. ➤ Personnel department in Functional Organization. ➤ Personnel department in Line and staff Organization. • Role of personnel manager <ul style="list-style-type: none"> ➤ Administrative Role ➤ Operational Role ➤ Strategic Role • Challenges before human resource management. 	08
UNIT 2	<p>Human Resources Planning:</p> <ul style="list-style-type: none"> • Definition and objectives of Human Resource planning. • Process of Human Resource planning. • Factors influencing estimation of Human Resources. • Concept of Recruitment-Recruitment policy-Sources of Recruitment- Methods of Recruitment, Traditional Vs Modern Recruiting methods. • Concept of Selection , importance of selection and procedure, Standards for Selection Test. • Distinguish between Recruitment and Selection. • Case study on Human Resource Planning. 	09



UNIT 3	Training and Development: <ul style="list-style-type: none"> • Meaning and Definition <ul style="list-style-type: none"> ➤ Needs-Objectives- ➤ Importance of Training- ➤ Training Methods ➤ Evaluation of Training Programme ➤ Methods of Evaluation. • Concept of Management Development <ul style="list-style-type: none"> ➤ Management Development Process and methods. ➤ Evaluation of Management Development Programme. • Distinguish between training and Development. • Case Study on Training Development. 	09
UNIT 4	Performance Appraisal & Wage and Salary Administration: Part A : Performance Appraisal <ul style="list-style-type: none"> ➤ Concept and objectives of performance Appraisal. ➤ Process of Performance Appraisal. ➤ Performance Appraisal Methods. ➤ 360 degree Feedback System. ➤ Factors effecting for a sound Performance Appraisal policy. ➤ Problems with Performance Appraisal. ➤ Challenges in Performance Management. ➤ Case study on Performance Appraisal. Part B : Wage and Salary Administration <ul style="list-style-type: none"> ➤ Methods of Wage Payments. ➤ Employee Remuneration Factors. ➤ Determining the level of remuneration. ➤ Profit sharing-Fringe Benefits and Employee services-Wages & Salary Administration. ➤ Case study on Wage and Salary Administration. 	14
UNIT 5	Introduction to Organizational Behaviour: <ul style="list-style-type: none"> • Meaning- Definition- Scope- Disciplines Contributing to Organizational Behaviour. • Emerging aspects of Organization Behaviour. • Challenges and Opportunities for Organization Behaviour. • Organization Behaviour across cultures. • Models and Approaches of Organizational Behaviour. • Organization Changes and Development. • Nature of Change – Levels of Change, Types of Change, Resistance to Change. • Cases of Organizational Behaviour. 	8
TOTAL		48



Recommended Books:

1. P. C. Pardeshi - Human Resource Management.
2. C. B. Mamoria - Personnel Management
3. K. Ashwathappa - Organisational Behaviour
4. K. Ashwathappa - Human Resource Management.
5. V.S. P. Rao- Human Resource Management. Texts and cases
6. L.M. Prasad- Human Resource Management



University of Pune

(Pattern – 2013)w.e.f. 2014-2015

B.B.A. SEM – III

Subject: Management Accounting
(Course Code - 304)

Objectives:

1. To impart basic knowledge of Management Accounting.
2. To know the implications of various financial ratios in decision making.
3. To study the significance of working capital in business.
4. To understand the concept of budgetary control and its application in business.
5. To develop the calculating ability of various techniques of management accounting.

Sr. No.	Topics	No. of Lectures
UNIT 1	Introduction: ∩ Management Accounting – Definition, Objectives, Scope, Functions, Advantages, Limitations, Distinction between, Financial Accounting and Management Accounting, Distinction between Cost Accounting and Management Accounting. ∩ Strategic Management Accounting.	10
UNIT 2	Analysis and Interpretation of Financial Statement: ∩ Methods of Analysis, Comparative Statements, Common Size Statement, Trend Percentage or Trend Ratio (Horizontal Analysis), Ratios, Fund Flow Statement ∩ Ratio Analysis: Meaning of Ratio, Necessity and Advantages of Ratio Analysis, Interpretation of Ratios. • Types of Ratio: i) Liquidity Ratios ii) Leverage Ratios iii) Activity Ratios iv) Profitability Ratios <i>(Problems on following ratios only :-</i> Gross Profit , Net Profit , Operating Expenses , Current Ratio, Quick Ratio, Stock Turnover	12



	Ratio, Debtors Turnover Ratio, Debt Equity Ratio, Return on Investment Ratio, Interest Coverage Ratio.)	
UNIT 3	Fund Flow Statement and Cash Flow Statement: <ul style="list-style-type: none"> Meaning of Fund Flow Statement, Working Capital, Causes of changes in working Capital, Proforma of Sources and Application of Funds, Proforma of Adjusted Profit and Loss Account , Proforma of Cash Flow Statement. 	8
UNIT 4	Working Capital: <ul style="list-style-type: none"> Meaning, Objective and Importance, Factors determining requirement of Working Capital, Sources of Working Capital, Problems on computation of Working Capital. 	10
UNIT 5	Budget and Budgetary Control <ul style="list-style-type: none"> Meaning , Definition, Nature of Budget and Budgetary Control, Types of Budget - as per time and Function, Objective of Budget and Budgetary Control, Limitations of Budget and Budgetary Control, Steps in Budgetary Control. 	8
	TOTAL	48

(Problem Area: Ratio Analysis, Working Capital and Cash Budget.)

Recommended Books:

1. R. N. Anthony, G. A. Walsh:: Management Accounting
2. M. Y. Khan,. K. P. Jain:: Management Accounting I. M. Pandey::Management Accounting (Vikas)
3. J. Betty: Management Accounting
4. Sr. K. Paul: Management Accounting
5. Dr. Jawaharlal:: Management Accounting
6. Man Mohan Goyal: Management Accounting
7. S. N. Maheshwari:: Principles of Management Accounting
8. R. K. Sharma and Shashi K. Gupta: Management Accounting
9. Richard M. Lynch and Robert Williamson: Accounting for Management Planning and Control
10. Horngren: Introduction to Management Accounting (Pearson)



University of Pune
(Pattern – 2013)w.e.f. 2014-2015

B.B.A. SEM – III

Subject: Business Economics (Macro)

(Course Code - 305)

Objectives:

1. To study the behavior of working of the economy as a whole.
2. To develop an analytical framework to understand the inter-linkages among the crucial macroeconomic variables.
3. To apply economic reasoning to problems of business and public policy.

Sr. No	Topics	Number of lectures
Unit 1	Introduction: <ul style="list-style-type: none"> • Definition and Nature of Macroeconomics. • Scope, Importance and Limitations. 	6
Unit 2	National Income Accounting: <ul style="list-style-type: none"> • National Income Aggregates (GDP, GNP etc. at market price and factor cost). • Approaches to measuring national income. • Nominal and real measures of national income. 	8
Unit 3	Theory of Income and Employment: <ul style="list-style-type: none"> • Say's Law of Markets. • Consumption Function. • Saving Function. • Investment Function. • Aggregate Expenditure Function. • Keynes' Theory of Income and Employment. • Concept of underemployment equilibrium. 	12
Unit 4	Business Cycle, Inflation and Deflation: <ul style="list-style-type: none"> • Nature and characteristics of Business Cycle. • Phases of Business Cycle. • Inflation – Meaning, Types, Causes and control. • Concept of Deflation. 	11
Unit 5	Macro Economic Policies: <ul style="list-style-type: none"> • Creation of Credit • Monetary Policy, Fiscal Policy. • Supply side Economics – An introduction. 	11
Total		48



Recommended Books:

- 1) Ackley G. – Macro Economics: Theory and Policy, Macmillan Publishing Company, New York. 1978
- 2) Ahuja H.L. – Macro Economics: Theory and Policy, S. Chand & Co. Ltd. New Delhi. 2006
- 3) Gupta S.B. – Monetary Economics, S. Chand & Co. Ltd. New Delhi. 2002
- 4) Shapiro E. – Macro Economic Analysis, Galgotia Publications, New Delhi. 1996 5th Ed.
- 5) Jhingan M. L. – Macro Economic Theory: Vrinda Publications, New Delhi. 2006
- 6) William Branson – Macro Economics: Theory and Policy. 1988 2nd Edn.
- 7) J. Harvey and H. Johnson – Introduction to Macro Economics
- 8) D. N. Dwivedi – Macro Economics – Tata McGraw Hill, New Delhi-2006



University of Pune
(Pattern – 2013)w.e.f. 2014-2015

B.B.A. SEM – III BBA

Subject: IT in Management
(Course Code - 306)

Objectives:

1. To understand the role of IT in Management.
2. To understand the basics of operating systems.
3. To know the current happenings.

Chapter No.	Topic Name	No. Of Lectures
Unit 1	Managing Hardware and Software Assets: <ul style="list-style-type: none"> • Computer Hardware and Information Technology Infrastructure. • Categories of Computers and Computer System. • Types of Software's. • Managing Hardware and Software Assets. 	8
Unit 2	Managing Data Resources: <ul style="list-style-type: none"> • Organizing Data in a Traditional File Environment. • The Database Approach to Data Management. • Creating a Database Environment. • Database Trends. 	6
Unit 3	Networking: <ul style="list-style-type: none"> • Concept, Basic elements of a Communication System, Data transmission media, Topologies, LAN, MAN, WAN, Internet. Current Trends in IT management: <ul style="list-style-type: none"> • Use of Social Networks in Business. • Use of ICT enabled application in Business. (design a case study to understand the requirement of IT infrastructure in management of business)	12
Unit 4	The Internet and The New Information Technology Infrastructure : <ul style="list-style-type: none"> • The IT infrastructure for the Digital Firm. • The Internet : The IT infrastructure for the Digital Firm. • The World Wide Web. • Management Issues and Decisions. 	12



Unit 5	Understanding the Business values of System and Managing Change: <ul style="list-style-type: none"> • Understanding the Business Values of Information System. • The Importance of Change Management in Information System Success and Failure. • Managing Implementations. 	10
	Total	48

Books Recommended:-

- 1) Computer Fundamentals by P.K. Sinha&PritiSinha, 3rd edition, BPB pub.
- 2) Computers Today by S. BasandraGalgotia Pub.
- 3) Microsoft Office 2000 by Vipra Computers, Vipra Printers Pvt. Ltd.
- 4) Advanced Microsoft Office 2000 by Meredith Flynn, Nita Rutkosky, BPB Pub
- 5) using Microsoft office 2007 by Ed Bott ,Woody Leonhard , Pearson publication
- 6) using Microsoft office 2010 by , Pearson publication
- 7) Managing Information System – W.S. Jawadekar
- 8) Managing Information System – Kenneth C. Laudon& Jane P. Laudon
- 9) Information Technology – Williams / Tata McGraw H
- 10) Management Information System : Kenneth C. Laudon , Jane P Laudon



University of Pune
(Pattern – 2013) w.e.f. 2014-2015

B.B.A. SEM – IV

Subject: Production & Operations Management

(Course Code - 401)

Objectives:

1. To provide goods and services at the right time, at the right place at the right manufacturing cost of the right quality.
2. To understand manufacturing technology and its role in developing business strategy.
3. To identify the role of operation function.
4. To understand the external and internal effects of five operation performance objectives

Sr. No	Topics	Number of Lectures
UNIT 1	Introduction: <ul style="list-style-type: none"> • Meaning, Nature and Scope of Production Management, Historical Development of Production Management, Objectives of Production Management, Functions of Production Management, Qualities of Production Manager, Responsibilities of Production Manager • Plant Location: Importance and Factors responsible for Plant Location Decision • Classification or Types of Production System: Job Shop Production, Batch Intermittent Production, Continuous Production and Cellular Production • Plant Layout: Definition, Objectives and Types, Factors influencing Plant Layout 	10
UNIT 2	Product Design and Product Development: <ul style="list-style-type: none"> • Definition of Product Design, Factors affecting Product Design, Product Policy of an Organisation. • Product Development: Meaning of Product Development, Relationship between research, development and design, Stages of Product Development, Techniques or Tools of Product Development, Factors responsible for Product Development. 	8
UNIT 3	Production Planning and Control: <ul style="list-style-type: none"> • Meaning, Nature, Objectives, Functions, Importance and 	6



	<p>Problems of Production Planning and Control.</p> <ul style="list-style-type: none"> • Production Procedure, Factors determining Production Planning and Control, Techniques or Tools of Production Planning and Control. 	
UNIT 4	<p>Productivity and Ergonomics:</p> <ul style="list-style-type: none"> • Productivity: Concept and Definition of Productivity, Importance of Productivity, Measurement of Productivity and Productivity Measurement Models, Techniques of Productivity Improvement, Factors influencing Productivity. • Ergonomics: Introduction and Definition of Ergonomics, Objectives of Ergonomics, Components of Ergonomics. 	8
Unit 5	<p>Quality Management:</p> <ul style="list-style-type: none"> • Six Sigma: Introduction & Meaning, Benefits, Steps in implementing Six Sigma. • Kaizen: Introduction & Meaning, Principles, Procedure for Implementation, Benefits and Reasons for failure. • Just-In-Time (JIT): Introduction & Meaning, Objectives, Benefits, Methodology in implementation of JIT, Basic Elements of JIT, Enabling JIT to Occur. • Quality Circle (QC): Introduction & Meaning, Objectives, Benefits, Limitations, Organisation for Quality Circles, Causes of Quality Circle Failure. • Total Quality Management (TQM): Introduction & Definition, Major Ingredients in TQM, Principles of TQM, Need & Importance of TQM, Limitations of TQM, Dimensions or Characteristics of TQM, TQM Models, Key Issues for achieving TQM Objectives. • ISO 9000: Introduction & Meaning, ISO Standards for Quality System, Factors for selecting an ISO Model, Clauses in ISO, Essential Steps in implementing an ISO. 	16
	Total	48

Recommended Books:

1. Production and operations management -K.Aswathappa K. ShridharaBhat
2. Production and operations management -L.C.Jhamb
3. Plant Layout and Material Handling - James Apple & John Wileysons
4. Production & Operations Management - R S Goel
5. A Key to Production Management - KalyaniPublicaion, Ludhiyana
6. Production & Operation Management - S N Chavy, TMH Delhi
7. Modern Production and Operation Management - Elwood S Butta
8. Production and operations management - Ajay Garg



University of Pune
(Pattern – 2013)w.e.f. 2014-2015

B.B.A.SEM-IV
Subject :Industrial Relations and Labour Law
(Course Code - 402)

Objectives:

1. To impart the students with the knowledge about complexities between labour and management relationships.
2. To make the students aware about mechanisms of Industrial Dispute and friendly interventions to deal with employee-employer problems.
3. To impart the students with the knowledge of laws & how law affects the industry & labour.

Sr. No	Topics	No of Lectures
Unit 1	Introduction to Industrial Relations: <ul style="list-style-type: none">• Meaning, definition, importance, scope of Industrial Relations and factors in Industrial Relations• Approaches towards the study of Industrial Relations (Psychological Approach , Sociological Approach, Socio Ethical Approach, Gandhian Approach, Industrial Relations Approach and HR Approach)• Evolution of Industrial Relations• Trade Unions: concept, functions, TU Movement in India	04
Unit 2	Industrial Disputes, Collective Bargaining & Workers Participation in Management: <ul style="list-style-type: none">• Meaning, definition & Causes of Industrial Disputes• Model Grievance Procedure• Types of Conflict Resolution: Negotiation, Investigation, Mediation, Conciliation, arbitration & Adjudication.	12



	<p>Works Committee, Conciliation Officer, Board of Conciliation, Court of Enquiry, Labour Court, Industrial Tribunal & National Tribunal.</p> <ul style="list-style-type: none"> • Collective Bargaining – Meaning, Characteristics, Importance, Process, Pre-requisites and Types. û Employee Engagement: Concept, Importance & Employee Engagement in India. • Workers Participation in Management(WPM): Meaning, Pre-Requisites, Advantages & Disadvantages, Levels and Types Labor Laws. 	
Unit 3	<p>The Industrial Disputes Act,1946 & The Factories ACT 1948:</p> <p>The Industrial Disputes Act,1946 -</p> <ul style="list-style-type: none"> • Definitions, Authorities under the Act, Power & Duties of Authorities, Strike & lockout, Lay-off ,retrenchment, closure and dismissal, Grievance Redressal Machinery, Penalties <p>The Factories Act, 1948 -</p> <ul style="list-style-type: none"> û Definitions, Authorities, Provisions regarding Safety, Provisions regarding Health, Provisions regarding Welfare, Provisions regarding Leave with Wages, Provisions regarding Working hours of adults, Penalties. 	12
Unit 4	<p>The Payment of Wages Act, 1936 & The Minimum Wages Act ,1948:</p> <p>The Payment of Wages Act, 1936 -</p> <ul style="list-style-type: none"> û Definitions, Provisions, Penalties. <p>The Minimum Wages Act ,1948 -</p> <ul style="list-style-type: none"> û Definitions, Provisions, Penalties. 	10
Unit 5	<p>Trade Union Laws:</p> <ul style="list-style-type: none"> û The Trade Union Act 1926: Definitions, authorities and all provisions. û Maharashtra Recognition of Trade Union and Prevention of 	10



	Unfair Labour practices Act, 1971: Definition, authorities and all provisions under the Act.	
	Total Lectures	48

Recommended Books :

1. Dynamics of IR – Mamoria, Mamoria and Gankar
2. Industrial Relations -Arun Monappa
3. Personnel and HRM- P Subbarao
4. Industrial & Labour Laws -S.P. Jain
5. Industrial Law - P.L. Malik
6. Bare Acts.



University of Pune

(Pattern – 2013)w.e.f. 2014-2015

BBA SEM-IV

Subject: Business Taxation
(Course Code - 403)

Objectives:

1. To understand the basic concepts and definitions under the Income Tax Act, 1961.
2. To update the students with latest development in the subject of taxation.
3. To Acquire knowledge about Computation of Income under different heads of Income of Income Tax Act, 1961.
4. To acquire knowledge about the submission of Income Tax Return, Advance Tax, Tax deducted at Source, Tax Collection Authorities.
5. To prepare students Competent enough to take up to employment in Tax planner.
6. To develop ability to calculate taxable income of firms, co-operative societies and charitable trust.

Sr.No	Topics	Number of Lectures
Unit 1	Income Tax Act -1961(Meaning,Concepts and Definitions) ∪ History of Income Tax in India, ∪ Fundamental concepts and definitions under Income Tax Act 1961, ∪ canons of Taxation, ∪ objective of Income Tax, ∪ Taxation structure in India, ∪ Concept and definitions- Income Person,Assessee, Assessment year, Previous year, Residential Status of an Assessee.	12
Unit 2	Computation of Taxable Income under the different heads of Income: a) Income From Salary : Salient features, meaning of salary, allowances and tax Liability- Perquisites and their Valuation- Deduction from salary. (Theory and Problems)	12



	<p>b) Income from House Property : Basis of Chargeability-Annual Value- Self occupied and let out property- Deductions allowed. (Theory and Problems).</p> <p>c) Profits and Gains of Business and Profession : Definitions, Deductions expressly allowed and disallowed (Theory and Problems). Chargeability- Meaning and concept of Short term and long term capital gains-permissible deductions (Theory and problems).</p> <p>d) Income from Other Sources Chargeability- Meaning and concept –Inclusion and deduction.(Theory only).</p>	
Unit 3	Computation of Total Taxable Income of an Individual: û Meaning and concept, Gross Total Income - deduction u/s-80 and Tax Liability for respective Assessment year.	12
Unit 4	Miscellaneous: û Tax deducted at source, Return of Income, Advance payment of Tax, methods of payment of Tax, forms of Returns, Refund of Tax. (Theory only)	06
Unit 5	Assessment of various Entities: (TheoryOnly) û Assessment of firms and their partners. û Assessment of co-operative societies. û Assessment of charitable trust.	06
	Total	48

Notes:

1. Amendments made prior to commencement of Academic Year in the above act should be considered.
2. Theory questions will carry 50% marks.
3. Problems will carry 50 % marks.

Recommended books:

1. Indian Income Tax Act--H.C.Malhotra
2. Practical Approach to Income Tax-- Dr.GirishAhujaandDr. Ravi Gupta.
3. Income Tax Act –R. N. Lakhotia
4. Students guide to Income Tax.--Dr.VinodSinghnia./ Dr. Monica Singhnia.
5. Income Tax.--Dr.GirishAhuja and Dr.RaviGupta , -Bharat Prakashan.
6. Indian Income Tax Act.--Dr.VinodSinghnia.
7. Hand Book of Income Tax Law.-- T. N. Manoharam.
8. Direct Tax—B.B. Lal and N. Vashisht.



University of Pune

(Pattern-2013) w.e.f 2014-2015

B. B. A. SEM – IV

Subject: International Business
(Course Code - 404)

Objectives:

1. To acquaint the students with emerging issues in international business.
2. To study the impact of international business environment on foreign market operations.
3. To understand the importance of foreign trade for Indian economy.

Sr. No.	Topics	Number of lectures
Unit 1	Introduction: ∩ Nature. ∩ Theories of International Trade ∩ Ricardo's Theory ∩ Heckscher- Ohlin Theory.	10
Unit 2	Multinational Enterprises: ∩ Meaning of International Corporations. ∩ Role and importance of Multi-national Corporations in international business.	6
Unit 3	International Finance: ∩ Meaning of Exchange Rate. ∩ Determination of Exchange rate – Fixed, Flexible and Managed. ∩ Concept of Spot rate, Forward rate and Futures ∩ Balance of Trade and Balance of Payments ∩ International Monetary Fund (IMF) – Objectives and Functions. ∩ World Bank - Objectives and Functions	14
Unit 4	Regional Economic Grouping: ∩ Evolution, structure and functions of WTO ∩ European Union (EU) ∩ North American Free Trade Agreement (NAFTA) ∩ Association of South East Asian Nations (ASEAN) ∩ South Asian Association for Regional Cooperation (SAARC)	8



Unit 5	India's Foreign Trade: ◊ Composition and Direction of India's Foreign Trade since 2000 ◊ Case studies in International Business with reference to Indian Economy on - a. International Marketing b. International Finance c. International Human Resource Management	10
	Total	48

Recommended Books:

1. International Economics – Miltiades Chacholiades, Mc-Graw Hill Publishing Co, New York. 1990.
2. International Economics – W. Charles Sawyer and Richard L. Sprinkle, Prentice Hall of India Pvt. Ltd. Delhi. 2003
3. International Economics – M. L. Jhingan, Vrinda Publications, Delhi.2006.
4. International Business – Competing in the Global Market Place – Charles Hill, ArunKumarJain, Tata McGraw Hill, New Delhi. 2008.
5. International Economics -Francis Cherunilam.
6. International Business - K Aswathappa, TataMcGraw Hill



University of Pune
(Pattern – 2013)w.e.f. 2014-2015

BBA SEM – IV

Subject: Management Information System
(Course Code - 405)

Objectives:

1. To understand the concepts of Information System
2. To study the concepts of system analysis and design
3. To understand the issues in MIS

Sr. No	Topics	No. of Lectures
Unit 1	Management Information Systems: Û Need, Purpose and Objectives, Contemporary Approaches to Management Information Systems (MIS), Information as a strategic Resource, Use of information for competitive Advantage, Management Information Systems as an instrument for the organizational change .	10
Unit 2	Information, Management and Decision Making: Û Models of Decision Making, Classical, Administrative and Herbert Simon's Models Attributes of information and its relevance to Decision Making, Types of information.	10
Unit 3	Systems Analysis and Design: Û Systems Development Life Cycle, Alternative System Building Approaches, Prototyping model Spiral model, Rapid Development Tools, CASE Tools.	10
Unit 4	Decision Support Systems: Û Group Decision Support Systems, Executive Information Systems, Executive Support Systems, Expert Systems and Knowledge Based Expert Systems, Artificial Intelligence.	09
Unit 5	Management Issues in MIS: Û Information Security and Control, Quality Assurance, Ethical and Social Dimensions, Intellectual Property Rights as related to IT Services /IT Products Managing Global Information Systems.	09
Total		48



Reference Books:-

1. Management Information Systems, Laudon and Laudon, 7th Edition, Pearson Education Asia.
2. Management Information Systems, Jawadekar, Tata McGraw Hill.
3. Management Information Systems, Davis and Olson, Tata McGraw Hill.
4. Analysis and Design of Information Systems, Rajaraman, Prentice Hall.
5. Decision Support Systems and Intelligent Systems, Turban and Aronson, Pearson Education Asia.
6. Management Information Systems, Schulthesis, Tata McGraw Hill.
7. Management Information Systems - Sadagopan, Prentice Hall.
8. Management Information Systems - JayantOke.



University of Pune

(Pattern – 2013)w.e.f. 2014-2015

BBA SEM - IV

**Subject: Business Exposure
(Course Code - 406)**

Objectives:

1. To develop the understanding of the student with a realistic and practical perception of the industry its layout, procedures, processes, organization structure
2. The objective of the Industrial Visit is to help students gain firsthand information regarding the functioning of the Industry which presents the students with opportunities to plan, organize and engage in active learning experiences both inside and outside the classroom

Guidelines for subject teachers for preparing students for the visit:

The preparation should be such so as to guide students towards recognizing the important elements in an industrial visit and provide support materials necessary to increase the effectiveness of this experience

1. Draw up a questionnaire so that a student may ask during the actual visit:

Questionnaire for the process:

- Devising the questionnaire:
- Class brainstorming
- Dividing the class into groups
- Assign a section of the process to each group
- Each group draws up a set of questions
- Compile final questionnaire
- Issue final questionnaire

Content of the questionnaire:

- Considerations of the location of the industry
- Explore the processes running in organization
- Investigate policies and Procedures
- Explore the compliance of policies and Procedures
- Analyze the economics of the process
- Investigate the health and safety considerations
- Investigate the skills and expertise of the workforce



- Investigate the career opportunities
- Investigate the environmental considerations
- Examine the quality control in the process

2. Assign roles to particular students

3. Appropriate clothing for the day

The Outcome of the visit should enable the students to:

1. Understand the industry process
2. Experience actual chemistry and human interactions at the industry
3. Become aware of the roles of different people the organization
4. Become aware of career opportunities
5. Recognize the need for health and safety in the workplace
6. Focus students on specific aspects of their studies

Ancillary investigations by students

1. Health and safety aspects
2. Environmental aspects
3. Waste management aspects
4. Career identification and planning

Post-visit activities by students

1. Write a full report on visit
2. Prepare presentations on ancillary investigations
3. Thank to the company in writing

Report by students

1. Aims and objectives
2. Report on the industrial process
3. Conclusion and recommendations

Evaluation by the teacher

1. What have the students got out of the visit?
2. Deficiencies of the visit
3. How could the visit be improved in next time?

Assessment:

The division of marks will be as under:

- a. Scrutiny of reports by the teacher: 50 Marks.
- b. Viva based on field visits: 50 Marks.

Each student shall visit four industries



Second Year Bachelor of Business Administration (S.Y.B.B.A.)

Theory and Practical Subjects for Semester III, IV

Theory Subject for Semester -III :

1. 301 - Personality Development
2. 302 - Business Ethics
3. 303 - Human Resource Management and Organization Behaviour
4. 305 - Business Economics
5. 306 - IT in Management

Theory Subject for Semester – IV :

1. 401 - Production and Operations Management
2. 402 - Industrial Relations and Labor Law
3. 404 - International business
4. 405 - Management Information System

Practical Subject for Semester – III :

1. 304 - Management Accounting

Practical Subject for Semester – IV :

1. 403 - Business Taxation



Second Year Bachelor of Business Administration (S.Y.B.B.A.)

Pattern of Question Paper of Theory Papers w.e.f.2014-2015

Time : 3 Hours

Total Marks 80

Instructions :

1. All questions are compulsory.
2. Figures to the right indicate full marks.

Theory Question**(15 marks)**

OR

Theory Question

Theory Question

(15 marks)

OR

Theory Question

Theory Question

(15 marks)

OR

Theory Question

Theory Question

(15 marks)

OR

Theory Question

Write Short Note (any 4 out of 6)

(20 marks)



Second Year Bachelor of Business Administration (S.Y.B.B.A.)

Pattern of Question Paper of Practical Paper w.e.f.2014-2015

Subject : Management Accounting (304)

Time : 3 Hours

Total Marks 80

Instructions :

1. All questions are compulsory.
2. Figures to the right indicate full marks.

Theory Question **(16 marks)**

OR

Theory Question

Practical Problem**(16 marks)**

OR

Theory Question

Practical Problem **(16 marks)**

OR

Theory Question

Practical Problem (Compulsory) **(16 marks)**

Write Short Note (any 4 out of 6) **(16 marks)**

-----*****-----



Second Year Bachelor of Business Administration (S.Y.B.B.A.)

Pattern of Question Paper of Practical Paper w.e.f.2014-2015

Subject : Business Taxation (403)

Time : 3 Hours

Total Marks 80

Instructions :

1. All questions are compulsory.
2. Figures to the right indicate full marks.

Total Marks 80

Theory Question (16 marks)

OR

Theory Question

Theory Question (16 marks)

OR

Theory Question

A) Short Notes (any 2 out of 4) (08 marks)

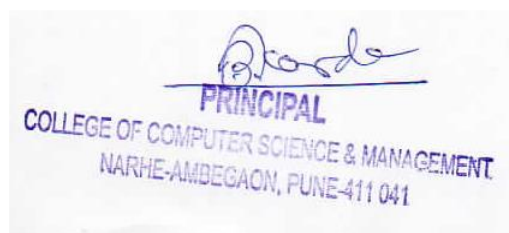
B) Practical Problem (08 marks)

Practical Problem (12 marks)

OR

Practical Problem

Practical Problem (Compulsory) (20 marks)



**Savitribai Phule Pune University
(Pattern – 2013) w.e.f. 2015-2016**

**T.Y. B.B.A.
Semester V
Compulsory Paper**

Subject Name -: Supply Chain and Logistics Management

Course Code -: 501

Objectives:

1. To introduce the fundamental concepts in Materials and Logistics Management.
2. To familiarize with the issues in core functions in materials and logistics management

Unit Number	Particulars	No. of lectures
1	Supply Chain Management – Concept, objectives, significance Process view of a supply chain-cycle and push pull view Drivers/components of supply chain – Facilities, Inventory, Transportation, Information, Material Handling Achieving tradeoff between customer service and cost	10
2	Physical distribution – Definition, Importance, participants in physical distribution process. Marketing Channels – Definition and Importance Different forms of channels - Unconventional channels - Channels for Consumer goods, Industrial Goods & Services – Integrated Marketing Channels – Horizontal, Vertical, Multi channel Functions of Marketing Channels Channel Management – Channel Selection Process & criteria Performance appraisal of Channel Members - Channel Conflicts & Techniques to resolve channel conflicts	10
3	Procurement - Supplier Management, Management Supplier Selection, Tendering, E-Tendering, Negotiation Warehouse and Dispatch Management - Types of Warehousing, Warehouse Layout Docking and Marshalling, Warehouse Safety Management.	10
4	Inventory - Need and Types of Inventory - Costs associated with Inventory– Basic EOQ Model - EOQ with discounts; ABC Analysis - (<i>Numericals expected on Basic EOQ, EOQ with discounts & ABC</i>) Stacking and Racking Systems. LIFO , FIFO	10
5	Current trends in Supply chain management – 5.1 Green Supply Chain Management	8



	Role and Future of IT in the Supply Chain Customer Relationship Management Supplier Relationship Management E-Business and the Supply Chain; E-Business in Practice	
	Total	48

Reference Books:

1. *Supply Chain Management* by Sunil Chopra, Peter Meindl & D.V. Kalra
2. *Inventory Management* by L.C. Jhamb
3. *Principles and Practices of Costing* by Sunita Pokharna, Success Publications, Pune
4. *Sales and Distribution Management* by Krishna K. Havaldar & Vasant M Cavale
5. *Purchasing and Supply Management* by Dobler and Burt
6. *Supply Chain Management Best Practices* by David Blanchard
7. *Channel Management & Retail Management* by Meenal Dhotre
8. *The Supply Chain handbook* by James A. Tompkins, Dale A. Harmelink



Compulsory Paper

Subject Name :- Entrepreneurship Development

Course Code :- 502

Objectives:

1. To create entrepreneurial awareness among the students.
2. To help students to up bring out their own business plan.
3. To develop knowledge and understanding in creating and managing new venture.

Unit Number	Particulars	No. of lectures
1	Entrepreneur and Entrepreneurship: Concept of Entrepreneur, Manager, Intrapreneur Definition ,meaning and functions of an entrepreneur Concept of Manager Roles and Responsibilities of Manager Concept of Intrapreneur Need and Importance of Entrepreneurship Enterprise v/s Entrepreneurship Self Employment v/s Entrepreneurship Problem of Unemployment and Importance of wealth creation Entrepreneurial career as an option.	10
2	Business opportunity Identification and Preliminary Project Report(PPR): Opportunity Search: Divergent Thinking Mode: Meaning ,Objectives Tools and Techniques: Environmental scanning for business opportunity Identification Opportunity Selection: Convergent Thinking Mode: Meaning ,Objectives Tools And Techniques: Market Survey Preliminary Project Report(PPR)	10
3	Business Plan: Meaning and ,Objectives of Business Plan Elements of Business Plan Business Planning Process - Self Audit, Evaluation of Business Environment, Setting Objectives, Forecasting Market Conditions, Stating actions and resources required, Evaluating Proposed plan, Assessing Alternative strategic plans, Controlling the plan through Annual Budget	10
4	Institutional Support to New Venture (Students are expected to study the assistance scheme of following institutions) 4.1 District Industries Center(DIC)	12 3



	Maharashtra Industrial Development Corporation(MIDC) Small Industries Service Sector(SISI) Micro, Small & Medium Enterprise(MSME) Financial Assistance for Small Enterprise: Institutional: a)Bank Loan b) Angel Funding c) Venture Funding d) Self Employment Schemes of Government of Maharashtra e) Government Financial Institutions: Khadi and Village Industries Board(KVIB),Rajiv Gandhi Udyami Mitra Yojana (RUGMY) f) Prime Minister Employment Generation Programme (PMEGP)	
5	Study of Entrepreneurs' Biographies: Rahul Bajaj Kiran Muzumdar Shaw Azim Premji Sabeer Bhatia	6
	Total	48

Reference Books:

1. Desai Vasant: "Management of Small Scale Industries" - Himalaya Publishing House
2. Taneja Satish and Gupta: "Entrepreneurship Development-New Venture Creation" - Galgotia Publishing Company, New Delhi
3. Jain P.C: Handbook For New Entrepreneurs Entrepreneurship Development Institute of India
4. Sangle B. R. : Business Environment & Entrepreneurship, Success Publications, Pune
5. Gupta C.B. & Srinivas: "Entrepreneurial Development"- Sultan D, Chand & Sons, New Delhi
6. Prof Rajeev Roy: "Entrepreneurship" - Oxford University Press
7. Edward D. Bono: "Opportunities"



Compulsory Paper

Subject Name -: Business Law

Course Code -: 503

Objectives:

1. To understand basic legal terms and concepts used in law pertaining to business
2. To comprehend applicability of legal principles to situations in Business world by referring to few decided leading cases.

Unit Number	Particulars	No. of lectures
1	Indian Contract Act 1872 Definition, kinds and concepts of contracts, Essentials U/S10 Offer and Acceptance Consideration Legality and Objects of consideration Capacity of Parties Free Consent Void Agreements and Agreements opposed to public policy Performance of Contract. Discharge of Contract and Remedies.	10
2	The Sale of Goods Act 1930 Contract of Sales of Goods-Essentials Distinction between Sale and Agreement to Sale Subject matter of Contract of Sale-Classification of goods & Concept of Price Conditions and Warranties-Types and Distinction Transfer of Property-Possession & Risk, Passing of property, Goods sent on approval or "on sale or return" basis, Sale by Non-owner Performance of a contract of sale-Delivery of goods, Rights and duties of the buyer, buyers liability for rejecting or refusing delivery Rights of unpaid Seller Remedies for Breach of Contract of Sale	8
3	The Companies Act, 1956 3.1 Company-Definition, Meaning, Features and Types of Companies 3.2 Incorporation of a Company-Mode of forming ,Documents to be filed with registrar, Certificate of Incorporation, Effects of Registration, Promoter and his position Memorandum of Association-Its contents and alteration, Doctrine of Ultra Vires Article Of Association- Its contents and alteration- Comparison between Articles and Memorandum, Doctrine of	8



	Indoor Management Prospectus- Registration and contents Statement in lieu of Prospectus	
4	Information Technology Act, 2000 Preliminary and Definitions Digital Signature: Concept, Authentication of electronic records Electronic Governance (Legal recognition of electronic records, Legal recognition of digital signatures, Use of electronic records and digital signatures in Government and its agencies) Advantages and Disadvantages of E-Governance	8
5	The Right To Information Act, 2005 Preliminary & Definitions Right to Information and obligations of Public Authority: Designation of Public Information Officers: Request for obtaining information, Disposal of request, Exemption from disclosure of information. Grounds for rejection to access in certain cases, Severability, Third party information The Central Information Commission: <ul style="list-style-type: none"> • Constitution of State Information Commission. • Tenure of office and conditions of service. • Removal of State Chief Information Commissioner or State Information Commissioner • Powers & Functions of the Information Commissions, Appeals and Penalty 	14
	Total	48

Reference Books:

- 1) *Business and Commercial Laws-Sen and Mitra.*
- 2) *Mercantile Law-S. U. Jadhavar, Success Publications, Pune*
- 3) *Business Law-G. M. Dumbre, Success Publications, Pune.*
- 4) *An Introduction to Mercantile Laws-N. D. Kapoor*
- 5) *Business Laws-N. M. Wechlekar*
- 6) *Company Law-Avatar Singh*
- 7) *Law of Contract-Avtar Singh*
- 8) *Business Laws-Kuchhal M.C.*
- 9) *Business Law for Management-Bulchandani K.R.*
- 10) *Consumer Protection Act in India. Niraj Kumar*
- 11) *Consumer protection in India. V.K.Agrawal*
- 12) *Consumer Grievance Redressal under CPA. Deepa Sharma.*
- 13) *Commentary on the Information Technology Act 2000 by Bhansali S.R*
- 14) *E Governance Issues and Strategies by Chaudhary, Suman Kalyan & Nayak, Sudhanshu Shekhar*
- 15) *Information Technology Act, 2005*



Compulsory Paper

Subject Name :- Research Methodology

Course Code :- 504

Objectives:

1. To provide the students with basic understanding of research process and tools for the same.
2. To provide an understanding of the tools and techniques necessary for research and report writing.

Unit Number	Particulars	No. of lectures
1	Introduction to Research Research – Meaning, Characteristics & Importance Basic Research Process – An overview & steps involved Research Design – Meaning, Characteristics of a good research design Components of Research Design Sampling Design – Steps involved & Types of Samplings	10
2	Sources of Collection of Data: Primary Data: Concept and Definitions Respondents: Concept and Meaning Secondary Data: Concept and Definition Types of sources of secondary data	8
3	Methods of Collecting of Data: Primary Data: Methods of collecting primary data, Survey Method: Types of surveys Questionnaire Method: Types of questions, Essentials of good questionnaire Interview Method: Types of Interviews Experimentation & Observation Methods: Types of observations Focus Group Methods like Panel groups & Group Discussions Secondary Data: Methods of collecting secondary data Evaluating Quality of Data Advantages and Disadvantages of Secondary Data	10
4	Data Processing & Analysis Data Processing – Editing, Codification, Classification, Tabulation, Scaling & Measurement (Should be taught with help of computer) Data Analysis – Methods of analyzing data Hypothesis - Concept and Types of Errors Hypothesis Testing – Chi Square Test, Z-test & t-test	10



5	Writing Skills for Business Research: Project Report Writing – Selecting and defining topic, Writing Chapters, Subject Matter, Style and Structure Research Paper Writing – Structure of research paper, referencing styles One Research Paper to be written and presented by student (50 % Weightage in Internal Evaluation to be given for the same)	10
	Total	48

Reference Books:

1. Ghosh, B.N. *Scientific Method and Social Research* (Sterling: New Delhi)
2. Kothari. C.R. *Research Methodology – Methods and Techniques* (New Age: New Delhi)
3. Sangale B. R. *Research Methodology – (Success Publications, Pune)*
4. Donald. R. Cooper and Pamela S. Schindler, *Business Research Methods* (Irwin McGraw-Hill Publications, New Delhi).
5. Naresh K. Malhotra, *Basic Marketing Research 4/E* (Pearson Education Publications).
6. S. N. Murthy and U. Bhojanna, *Business Research Methods*. (Excel Books, New Delhi).



Finance Special Paper I

Subject Name :- Analysis of Financial Statements

Course Code :- 505 – A

Objectives:

1. This course is designed to prepare students for interpretation and analysis of financial statements effectively.
2. To make the student well acquainted with current financial practices
3. This course is designed primarily for students who expect to be intensive users of financial statements as part of their professional responsibilities.

Unit Number	Particulars	No. of lectures
1	Financial Statements of Corporate Organizations Meaning of Financial statements Need of Financial statements Importance of Financial statements. Preparation of Financial Statements as per schedule VI of the Amended Companies Act 2013 Revised Schedules How to read company's Balance Sheet	8
2	Introduction to analysis and Interpretation of financial statements Analysis and Interpretation of financial statements – Meaning/ introduction Types of financial analysis Advantages of financial analysis Limitations of financial analysis Techniques of financial analysis i. Comparative financial statements ii. Trend Analysis iii. Common Size Financial Statements iv. Funds Flow Analysis v. Cash Flow Analysis vi. Ratio Analysis	8



3	<p>Ratio Analysis Concept of Ratio Meaning of Ratio Analysis Interpretation of Ratios Classification of Ratios i) Liquidity Ratios ii) Turnover Ratios iii) Solvency Ratios iv) Profitability Ratios V) Miscellaneous Group Role of Ratio Advantages of Ratio Analysis Limitations of Ratio Analysis Practical Problems</p>	10
4	<p>Cash Flow Analysis Meaning of Cash Flow Statement Objectives of Cash Flow Statement Uses of Cash Flow Statement Limitations of Cash Flow Statement Preparation of Cash Flow Statement Methods of Cash Flow Statement a) Direct Method – b) Indirect Method Cash Flow Activities – Operating, Investing, Financing Practical Problems on Indirect Method</p>	11
5	<p>Funds Flow Analysis Concept of Fund Meaning of Fund Flow Statement Uses of Fund Flow Statement Limitations of Fund Flow Statement Preparation of Fund Flow Statement a) Funds From Operations b) Statement of Changes in Working Capital</p>	11



	c) Funds Flow Statement.	
	5.6 Practical Problems	
	Total	48

Allocation of Marks:

Theory - 50%

Practical problems - 50%

Reference Books:

1. *N.M. Vechlekar* *Financial Management*
2. *G. M. Dumbre* *Advanced Management Accounting, Success Publications, Pune*
3. *I.M Pandey* *Financial Management*
4. *Ravi. M. Kishore* *Financial Management*
5. *P.C Pardeshi* *Business Finance.*
6. *Khan and Jain* *Financial Management*
7. *N.D.Kapoor* *Financial Management*
8. *Prasanna Chandra* *Financial Management*
9. *Prof.Satish Inamdar* *Financial Statement and Analysis*



Marketing Special Paper I

Subject Name :- Sales Management

Course Code :- 505 – B

Objectives:

1. To provide the students with basic understanding of the processes and skills necessary to be successful in personal selling and insights about recent trends in sales management.

2. To provide an understanding of the tools and techniques necessary to effectively manage the sales function - organization - sales individual.

3. To provide students with advanced skills in the areas of interpersonal communications, Motivational techniques

Unit Number	Particulars	No. of lectures
1	Introduction to Sales Management: Definition Meaning Objectives Role of sales management in marketing Recent trends in sales management Ethical and legal issues involved in sales management	10
2	Sales Organization: Need for sales organization Types and structures of sales organization Principles for building successful sales organization Functions and responsibilities of sales manager	8
3	Managing the Sales Force: Recruitment and Selection: Sales personnel selection process, criteria used for selection of sales personnel Training: Importance, Areas of sales training- Company specific knowledge, product knowledge, Industry and market trend knowledge, Customers and technology, Relationship Selling, Customer education, Value added Selling. Motivation: Motivation and productivity of sales force, Types of compensation plans, sales meetings, sales contests, fine tuning of compensation plan Sales Reporting: Sales records, Sales reports, Sample of Sales Report Format, Key Performance Indicators of sales	10
4	Sales planning and control: 4.1 Sales planning: Sales forecasting – concept and methods- qualitative and quantitative 4.2. Market and Sales potential- concept and methods 4.3 Sales quotas- concept, purpose and types	10

	4.4 Sales control: process of sales control- Goal setting, Performance Measurement, diagnosis and corrective actions	
5	Personal Selling and Relationship Management: Personal Selling: concept, process, Tools for personal selling Effective selling techniques Concepts of Sales leads, sales calls, types of sales calls, sales presentation Characteristics of a successful salesman Use of technology in personal selling Relationship Management: concept Role of relationship management in personal Selling Characteristics of relationship	10
	Total	48

Reference Books:

1. *Sales and Distribution Management* by Havaladar & Cavale, TMGH
2. *Sales Management* by Still, Cundiff & Govani, Pearson Education
3. *Sales and Distribution Management*, SL Gupta, Excel books
4. *Marketing Management*, B. R. Sangale, Success Publications, Pune
5. *Retailing Management* by Michael Levy & Barton Weitz, TMGH, 5th Edition
6. *Building a Winning Sales Team* – Gini Graham & Scott
7. *Sales Management Handbook* – Forsyth Prick
8. *Professional Sales Management* – Anderson, Hair and Bush
9. *Sales Management* - Richard R Still Edward W. Cundiff
10. *International Marketing* – Robert Reed
11. *Strategies for selling*-Gerald A. Michaelson



Human Resource Management Special Paper I

Subject Name -: Human Resource Management Principles and Functions

Course Code -: 505 – C

Objective:

To introduce the concept, principles and practices of H.R.M. to the students

Unit Number	Particulars	No. of lectures
1	Human Resource Management and HR planning Introduction to Human Resource Management Nature of Human Resource Management Scope & Functions of HRM Objectives of HRM Role of H.R. manager Strategic HRM: Meaning, Objectives & Challenges HR Planning: Meaning, Definition Need for HR Planning Process HR Planning Job Analysis, Job Design & Job Evaluation	12
2	HR Recruitment and Selection Recruitment: Meaning & Definition Recruitment Source: Internal vs. External E-recruiting Methods, Benefits and Limitations Factors Affecting Recruitment Selection: Meaning & Process E-selection, Advantages and Disadvantages. Promotion: Policy and Types Transfer: Policy and Procedure for Transfer Demotion: Meaning, Causes of Demotion Labor Turnover: Meaning. Measurement of Labor Turnover, Causes and Control measures	10
3	Training, development and evaluation Training: Meaning, Objectives & Need Training Process & Evaluation Methods of Training: On the Job & Off the Job Management Development: Meaning & Methods of MDP Management Development Process and Evaluation Performance Appraisal: Meaning, Definition & Need Techniques of PA: Traditional & Modern Techniques Possible Errors or Problems in Appraisal E-performance Management: Meaning, Advantages & Disadvantages Performance Management System: Meaning & Importance	12



4	Personnel records reports and audit Meaning & Significance of Records and Reports Essentials of a good Record and good Report Personnel Audit: Objective, Scope & Importance Methods of Analysis Audit Report: Meaning & Importance	6
5	New trends in HRM and exit policy Exit Policy: Meaning & Procedure Challenges in implementing Exit Policy Voluntary Retirement Schemes: Meaning, Merits & Demerits Effects of Excess Manpower HR in International Context: Global competency and Global Dimensions Developing Cross Cultural Sensitivity Human Resource Accounting Human Resource Audit Bench marking Human Resource Research	8
	Total	48

Reference Books:

1. *Personnel Management: - Bhatia S. K. and Singh Nirmal*
2. *Business Administration – G. M. Dumbre, Success Publications, Pune*
3. *Personnel Management: - Kumar Arun and Sharma Rachana*
4. *Human Resource Management- Ashwathappa*
5. *International Human Resource Management by Peter J Dowling, Device E Welch, 4th Edition.*
6. *International Human Resource Management by K Aswathappa and Sadhna Dash, TMGH*



Service Sector Management Special Paper I

Subject Name :- Management of Services

Course Code :- 505 – D

Objectives:

1. To inculcate in depth knowledge of services as an essential economic activity.
2. To get overall understanding about special features of services, various concepts and issues related with management of services.

Unit Number	Particulars	No. of lectures
1	An Introduction to services Concept of services – Definitions and meaning Characteristics of services Differences between goods and services Stages of Economic Development - Preindustrial Society, Industrial Society, Post Industrial Society Dependency of Manufacturing on Services Fastest Growing Services – Banking, Insurance, Wholesale and Retail Trading, Health care, Travel and Tourism, I.T. and B.P.O. Role of services in the economy Management challenges in the service sector	10
2	Classification of services Bases for Classifying services Service Package Distinctive Characteristics of Service Operations Nature of service Act Relationship of service organisation with customers, Customization and Judgment in Service Delivery Nature of demand and supply of service delivery	8
3	Managing Service Operations Forecasting demand for services – Meaning and Techniques Managing Service Capacity - Strategies for managing demand, Strategies for managing supply Yield management – Meaning, Characteristics and Applications Managing waiting lines - Inevitability of waiting, The Psychology of waiting. Queuing systems – Meaning, Essential features of Queuing Systems.	10
4	Designing of Service Enterprise New service development – Meaning, Process cycle Service design elements, service blueprinting, Benchmarking Generic approaches to service system design Technology in services	12



	<p>4.5 Service quality – meaning, Scope of Service Quality, Service Quality Improvement –</p> <p>i) Quality and Productivity Improvement</p> <p>ii) Quality tools for Analysis and Problem solving – Check Sheet, Run Chart, Histogram, Pareto Chart, Flowchart, Cause and Effect Diagram, Scatter Diagram, Control Chart etc.</p> <p>iii) Programs for organizational quality improvement – Personnel Programs for Quality Assurance, Quality-Improvement Program to Achieve Zero Defects, Deming’s 14-Point Program, ISO 9000 and Six-Sigma.</p>	
5	<p>Globalization of Services</p> <p>Meaning and importance of globalization of services</p> <p>Globalization and Indian services</p> <p>Domestic growth and expansion strategies – focused service, focused network, clustered service and diversified network</p> <p>Franchising – meaning, nature, benefits and issues</p> <p>Global service strategies – Multi country expansion, importing customers, following your customers, service off-shoring and Beating the Clock.</p>	8
	Total	48

Reference Books:

1. *Service Management – Operations, Strategy, information Technology*, James A. Fitzsimmons & Mona J. Fitzsimmons, Tata McGRAW-Hill.
2. *Services Management*, Sanjay V. Patankar, Himalaya Publishing House, Mumbai.
3. *Services Marketing – M. G. Mulla*, Success Publications, Pune.
4. *Marketing Management – B. R. Sangale*, Success Publications, Pune.
5. *Services Management*, Dr. K.Ramachandra, B. Chandrashekara and S. Shivakumar, Himalaya Publishing House, Mumbai.
6. *Services Marketing –Text and cases*, Rajendra Nargoundkar, Tata McGRAW-Hills.
7. *Services Marketing – Govind Apte*, Oxford University Press 2004.



Agri Business Management Special Paper I

Subject Name -: Agricultural and Rural Development

Course Code -: 505 – E

Objectives:

1. To study the importance of rural economy of India
2. To understand the role of agribusiness management in development of economy

Unit Number	Particulars	No. of lectures
1	Introduction to Agribusiness Management Indian Agricultural Economy – Characteristics, importance and Economic Planning, Meaning, Scope and Importance of Agribusiness Management Basic Infrastructural Facilities for Agribusiness Linkages of Agro Industries to Indian Economy	8
2	Rural Credit Role of Commercial Banks in Agricultural Sector Role of National Bank for Agriculture and Rural Development (NABARD) Role of cooperative institutions Role of Regional Rural Banks (RRBs) Introduction to Microfinance and concept of Self help Group	12
3	Reforms in Indian Agriculture Land Reforms: Abolition of Zamindari Act, Tenancy reforms Government Schemes/ programmes in Agriculture Sector: National Food Security Mission (NFSM); Rashtriya Krishi Vikas Mission (RKVM); National Rural Employment Guarantee Act (NREGA) Irrigation	12
4	Agricultural Taxation in India Importance of agricultural taxation for a developing country like India Agricultural Income Tax	6
5	Role of Corporate Sector and Agri Export Management Decisions Export of Agricultural Products – Export Potential of Agro Based Products Agricultural Export Zones New Export Promotion Scheme (NEPS) Role of NGOs in promotion of export of Agricultural produce	10
	Total	48



Reference Books:

1. *Indian Economy : Dutt and Sundaram.*
2. *Indian Economy : A.N. Agarwal.*
3. *Agri. Business Management : Smita Diwase*
4. *Agricultural Business Management: Prof. H. L. Nagaraja Muthy; Himalaya Publishing House*



Finance Special Paper II

Subject Name -: Long Term Finance

Course Code -: 506 – A

Objectives:

1. To make the study of long-term financing
2. To make the student well-acquainted regarding current financial structure

Unit Number	Particulars	No. of lectures
1	Sources of Finance: Owned and Borrowed funds Equity Shares, Preference Shares Debentures, Term Loan, Lease Financing, Hire Purchasing	10
2	Capital Structure: Meaning, factors affecting Capital Structure – Internal factors, External factors and General factors Cost of Capital, Trading on Equity, Capital Gearing and Leverages	14
3	Capital Budgeting: Meaning Techniques of Capital Budgeting Mutually Exclusive Proposals	8
4	Specialized Private Financial Institutions- objectives and functions of IFCI IDBI ICICI SFCs UTI	10
5	Dividend Decisions: Dividend policy, determinants of dividend policy Types of dividend policy Forms of dividend	6
	Total	48

Topic for practical problems:

1. Leverages
2. Cost of Capital and Capital Structure

Reference Books:

1. I.M.Pandey – Financial Management – Vikas Publishing House
2. Ravi M.Kishore – Financial Management



3. *G. M. Dumbre – Modern Banking, Success Publications, Pune.*
4. *P.C.Pardeshi – Business Finance*
5. *Khan and Jain – Financial Management – Tata McGraw Hill*
6. *Prasanna Chandra – Financial Management – Tata McGraw hill*
7. *Appannaiah, Reddy, Satyaprakash – Financial Management – Himalaya Publishing Pvt. Ltd*
8. *Satish Inamdar – Financial Statement and Analysis*



Marketing Special Paper II

Subject Name :- Retail Management

Course Code :- 506 – B

Objectives:

1. To provide insights into all functional areas of retailing.
2. To give a perspective of the Indian retail scenario.
3. To identify the paradigm shifts in retailing business with increasing scope of technology and e-business.

Unit Number	Particulars	No. of lectures
1	<p>Retailing:</p> <p>1.1 Overview of retailing: Definition, Scope , Role and Functions of retailers, Advantages of Retailing, Organized and Unorganized Retailing, Indian Retail Scenario Vs. Global Retail Scenario , Drivers of retail change in India, Emerging Trends in Retailing in India , Role of Retail in Nation’s Economy.</p> <p>1.2.Classification of Retailers:</p> <p>a. Traditional Retail Formats : (Store Based Retail Formats) Independent stores, chain stores, Franchisee, Discount Stores, Cooperatives, Specialty stores, supermarkets, departmental stores, hypermarkets, convenience stores, chain stores, off price retailers etc.</p> <p>b. Modern Retail Formats: (Non Store Based Retail Formats) Direct Selling, Direct Marketing, Catalog Marketing, Tele Marketing, Automatic Vending Machines, Airport Retailing, Kiosks, Electronic Shopping</p>	12
2	<p>Retail Location and site selection, store layout & design and visual merchandising, category management:</p> <p>Retail Location and Site Selection: Concept of location and site, factors to be considered in retail locations, important retail locations- central business district-destination locations-stand alone locations-convenience locations, process of retail location and site selection- selection of a city, deciding about trade location in the city, analysis of alternative sites</p> <p>Store Design and Store Layout: The concept of store design, element of store design(interior and exterior), Store layout- Types of layout , factors affecting store</p>	11



	<p>layout, store facade</p> <p>2.3 Visual Merchandising: Concept, Need and importance, tools used for visual merchandising and store atmospherics</p>	
3	<p>Retail Merchandising, Merchandise Planning and Category Management: Retail Merchandising: Concept and principles of merchandising, Merchandise Planning: Concept of merchandise planning, types of merchandise, process of merchandise planning , introduction of Private label brands Category Management: Definition and process</p>	08
4	<p>Promotion mix in retailing and Retail Strategies Promotion Mix in Retailing: Concept, need and objectives of promotion mix, elements of promotion mix, tool of promotion mix in store advertisements, outdoor advertisement, online advertising, Retail Strategies: Differentiation strategy, growth strategy, expansion strategy, pricing strategy</p>	09
5	<p>Current trends in retailing: Role of IT in retailing: Electronic Data Interchange(EDI), Database Management, Data Warehousing, Data Mining, Radio Frequency Identification(RFID), E-tailing, Bar Coding Rural Marketing -Retail: Concept of rural marketing, Emerging models in rural markets Opportunities and Challenges in rural retail marketing. Mall Management: Nature and concept of a mall, growth of malls globally and in India, Indian Malls Vs. Western countries Malls.</p>	08
	Total	48

Reference Books:

1. *Retailing Management : Michael Levy and Barton Weitz, TMGH,5th Edition*
2. *Retail Management: Swapna Pradhan, TTMGH*
3. *Retail Management : Gibson Vedamani, Jaico Books*
4. *Fundamentals of Retailing: K V S Madaan, McGraw Hill*
5. *Retail Marketing Management: David Gilbert, Pearson Publication*
6. *Retail Management : Arif Sheikh, Himalaya Publishing*

Supplementary Reading Material

1. *It happened in India by Kishor Biyani, Rupa and Company*
2. *Business Today , November 1999, Mall Management , pp. 7-22*

Websites

1. www.indiaretailing.com
2. www.imageretail.com



Human Resource Management Special Paper II

Subject Name :- Human Resource Practices

Course Code :- 506 – C

Objectives:

To familiarize the students with it & practices

Unit Number	Particulars	No. of lectures
1	A Introduction to Strategic HRM What is Strategy & Strategic Management? Functional Level strategies 1.3.Challenges of Strategic HRM B Job Analysis – Job Description & Job Specification Work Scheduling Job stress	
2	A Executive Compensation Introduction Methods/ Techniques Importance B. Working Conditions & Welfare Importance Working Condition Employee welfare- Importance, Types. Industrial Accidents- causes and prevention, Accidents reports & records.	
3	Organizational Development Concept & objectives OD programme OD Process and OD Culture Ethics- organizational	
4	A. Employee Grievance & Discipline Meaning & Need for Discipline Objectives Causes of Indiscipline & its Actions Essentials of a good Disciplinary System B. Grievance causes & its Procedure	
5	E- Human Resource E- Job Design E- Human Resource Planning E- Recruitment & E- Selection E-Compensation E- HR Records & E- HR Information E-HR Audit	
	Total	48



Reference Books:

1. *Human Resource Management- V S P Rao (Excel Books)*
2. *Personnel & Human Resource Management- P. Subba Rao (Himalaya Publishing House)*
3. *Human Resource Management- Ashwathappa (McGraw-Hill)*
4. *Human Resource Management – S. S. Shete (Success Publications, Pune)*
5. *Fundamentals of Human Resource Management- Gary Dessler (Pearson Education; First edition (2010))*
6. *E-Human Resources Management: Managing knowledge people – Teresa Torres, Mario Arias, Oliva*
7. *Strategic Human Resource Management – A general Managerial Approach- Charlis R. Greer; second edition*



Service Sector Management Special Paper II

Subject Name -: Marketing Services

Course Code -: 506 – D

Objectives:

Unit Number	Particulars	No. of lectures
1	Introduction Meaning & Scope of Services Marketing, Nature and characteristics of services, Classification of services, Importance of services marketing,	8
2	Delivering quality services Services based components of quality, perceived quality, Gaps in quality, Bench marking, TQM and customer satisfaction measurement techniques, Strategies for improvement of service quality service guarantee.	10
3	Services Marketing Mix Concept and definition of Marketing Mix Four P's(Product, Price, Place and Promotion) Extended Ps of Marketing (People, Process and Physical evidence)	10
4	Managing service competition Guidelines for managing service competition, Approaches to service competition, Promotional planning and marketing strategy for services	10
5	Recent Trends of Services Marketing In India Role of IT services. Types of E- Services – E- services–Financial services, Hospitality services, Education services, IT services, Hotel & Tourism services, Event management services, Consultancy services	10
	Total	48

Reference Books:

1. *Services Marketing – (Concepts, Practices and Case from Indian Environment)*
Dr. S. Shajahan, Himalaya Publication House
2. *Services Marketing – Vasanti Vanugopal Raghu V.N. Himalaya Publications House*



3. *Services Marketing – Text and cases Hansh V. Varma Parsons Educations*
4. *Services Marketing – M. G. Mulla, Success Publications, Pune.*
5. *Services Marketing Text and Cases - Harsh V Varma*
6. *Principles of Marketing - Phillip Kotler and Gary Armstrong*
7. *Marketing - V.S. Ramaswamy and S Namankumari*



Agri Business Management Special Paper II

Subject Name -: International Agricultural Systems

Course Code -: 506 – E

Objectives:

1. To study of farming system and recent issues in agriculture sector.
2. To understand export potential of Agri. Business

Unit Number	Particulars	No. of lectures
1.	Study of Farming System in various countries of the world. Israeli System Chinese System American System	12
2.	Recent Issues in Agriculture. Genetically modified crops. Ecological farming and sustainable agriculture	10
3	WTO and Agriculture. Agreement on Agriculture(AoA) Controversy regarding Agricultural Subsidies India's New Patent Regime	12
4.	Export potential of Agri Business Agricultural SEZs Agro Processing Zones (APZs) Agro Export Zones (AEZs) Initiatives for Export Promotions	08
5.	Foreign Direct Investment Meaning, Significance FDI Vs Exports in relation to Agriculture	06
	Total	48

Reference Books:

1. *Indian Economy : Dutt and Sundaram*
2. *Agri.Business Management : Smita Diwase*
3. *Agri.Business Management: A.C. Broadway and Broadway*
4. *Indian Economy : A.N. Agarwal*
5. *Indian Economy : Mishra Puri*



**T.Y. B.B.A.
Semester VI**

Compulsory Paper

Subject Name :- Business Planning and Project Management

Course Code :- 601

Objectives:

To acquaint the students with the planning process in business and familiarize them with the function and techniques of project management

Unit Number	Particulars	No. of lectures
1	<p>Planning: Introduction, Meaning, Definition, Characteristic, objective, nature of Planning Advantages and limitations of planning Steps in planning process Methods of planning Essentials of a good planning Obstacles in planning, Planning Premises and Classification of Planning Premises Plan and Planning, Business Planning</p> <p>Planning and Forecasting : Introduction, Meaning, Definition, Characteristics, Process, Importance of forecasting Areas of forecasting Forecasting Techniques- Types, Methods Advantages of forecasting, Limitations of forecasting Difference between forecasting and planning</p>	10
2	<p>Project Management – Definition of a “Project” Why project Management, The project Life-Cycle, Project Management Maturity Project Selection and Criteria of Choice The Nature of Project Selection Models, Types of Project Selection Models Project Portfolio Process, Project Proposals. The Project Manager – Qualities , Project Management and the Project Manager, Special Demands on the Project Manager Problems of Cultural Differences, Impact of Institutional Environments, Project Organization, The project as Part of the Functional Organization, Pure Project Organization, The Matrix organization Choosing an Organizational form The Project Team.</p>	10



3	Initial Project Coordination The Nature of Negotiation, Partnering, Chartering and change, Conflict and the project life cycle. Estimating Project Budgets, Improving the Process of Cost Estimation.	10
4	Network Techniques PERT and CPM Risk Analysis Using Simulation with Crystal Ball 2000 Critical Path Method- Crashing a Project, The Resource Allocation Problem, Resource Loading, Resource Leveling, Constrained Resource Allocation The Planning-Monitoring-Controlling Cycle, Information Needs and the Reporting Process, Earned Value Analysis The Fundamental Purposes of Control, Three Types of Control Processes, Comments on the Design of Control Systems, Control as a Function of Management.	10
5	Purposes of Evaluation Goals of the System The Project Audit, Construction and Use of the Audit Report, The Project Audit Life Cycle, some essentials of an Audit/Evolution The Varieties of Project Termination, when to Terminate a Project, The Termination Process.	8
	Total	48

Reference Books:

1. *Production and Operation Management:K. Ashwathappa and Siddharth Bhat, Himalaya Publishing House,2010 editions*
2. *Project Management- Samule J Mantel, Jr, Jack R. Meredith, Scott M. Shafer, Margaret M, Sutton with M.R. Gopalan, Wiley India Pvt. Ltd.*
3. *Business Administration with G. M. Dumbre, Success Publications, Pune.*
4. *Successful Project Management- Milton D. Rosenau, Jr., Cregory D. Githens, Wiley India Pvt. Ltd*
5. *Project Management- Vasant Desai, Himalaya Publishing House*
6. *Project Management : A Managerial Approach, Jack R. Meredith, Samuel J. Mantel Jr. Wiley India Pvt. Ltd.*
7. *Principles of Management – T. Ramasamy, Himalaya Publishing House*
8. *The McGraw-Hill 36-Hour Project Management Course -McGraw-Hill*



Compulsory Paper

Subject Name :- Event Management

Course Code :- 602

Objectives: To acquaint the students with concepts, issues and various aspects of event management.

Unit Number	Particulars	No. of lectures
1	<p><u>Introduction to Event and Event Management</u> Introduction and Definition of Event. Event Designing, 5 C's of Events. 5 W's of Event. Types of Events. Categories of Event and its characteristics. Objectives of Event Management. Problems associated with traditional media.</p>	08
2	<p><u>Facets of Event Management</u> <u>Event Infrastructure:</u> Core Concept, Core People, Core Talent, Core Structure. <u>Clients:</u> Set Objectives for the Event, Negotiating Contracts with Event Organizers, Locating Interaction Points, Banners , Displays etc., at the Event, Preparing the Company's Staff for the Event, Post-event Follow-up. <u>Event Organizers:</u> Role of Event Organizer, Qualities of an Event Organizer, Steps in Organizing an event. <u>Venue:</u> In-house Venue, External Venue.</p>	10
3	<p><u>Execution of Event:</u> <u>Networking Components:</u> Print Media, Radio Television, The Internet, Cable Network, Outdoor Media, Direct Media. <u>Types of promotion methods used in events:</u> Sales Promotions, Audience Interaction, Public Relations, Merchandising, In-venue Publicity, Direct Marketing, Advertising, Public relations. <u>Activities in Event Management:</u> Pre-event Activities, During- event Activities, Post-event Activities. <u>Functions of Event Management:</u> Planning, Organizing, Staffing, Leading and Coordination, Controlling. <u>Event Management Information System.</u> <u>Technology in Event Management.-</u> Role and Importance.</p>	10
4	<p><u>Marketing of Event</u> <u>Concept of Market in Events</u> *Revenue Generating Customers. *Nonrevenue Generating Customers. Segmentation for Events, Niche marketing in events. Targeting.</p>	10



	Positioning of Events. Branding in Events. Reach Interaction Matrix. Concept of Pricing in Events. Legislation and Tax Laws. Marketing Communication Tool. Implementation of Marketing Plan. Relationship Building. <u>The Diverse Marketing Needs Addressed by Events:</u> Brand Building, Focusing the Target Market, Creating Opportunities for Better Deals with Different Media, Events and the Economy. Concept of Ambush Marketing.	
5	<u>Strategies of Event Management</u> Strategic Approach. Critical Success Factor Analysis. <u>Strategic Alternatives Arising From Environmental Analysis:</u> Maintenance Strategy, Developmental Strategy, Preemptive Strategy, Survival Strategy. <u>Strategic Alternatives Arising from Competitive Analysis:</u> Sustenance Strategy, Rebuttal Strategy, Accomplishment Strategy, Venture Strategy. Strategic Alternatives Arising from Defined Objectives. PREP Model. Risk versus Return Matrix. Forms of Revenue Generation. <u>The Basic Evaluation Process:</u> Establishing Tangible Objectives and Sensitivity in Evaluation, Measuring Performance, Correcting deviations, Critical Evaluation Points in Events.	10
	Total	48

Reference Books:

1. *Event Management: Wagen, Lynn Van Der, Pearson Education, 2012*
2. *Event Marketing and Management: Gaur, Sanjaya Singh, Vikas Publishing House Pvt Ltd. 2003*
3. *Business Management : G. M. Dumbre, Success Publications, Pune.*
4. *Event Planning And Management: Sharma, Diwakar, Deep & Deep Publication Pvt Ltd. 2005*
5. *Events Management: Raj, Razaq, SAGE Publication India Pvt. Ltd. 2009*



Compulsory Paper

Subject Name :- Management Control System

Course Code :- 603

Objectives:

To introduce to the students the function of management control, its nature, functional areas, and techniques.

Unit Number	Particulars	No. of lectures
1	<p>Introduction To Management Control System The control function- Elements of Control- Nature of Control – Problems in control Management Control – Characteristics, Principles & Types of Management Control Factors Affecting Managerial Philosophy Management Control Systems - Elements of MCS – Designing of MCS – 10 commandments of Effective Control System</p>	10
2	<p>Management Controls In Functional Areas Production Control: Need – Procedure – Techniques Of Production Control Inventory Control: Classification Of Inventories – Motives For Holding Inventories- Determination Of Stock Levels Marketing Control: Process Of Marketing Control- Importance Of Marketing Control System- Tools And Techniques Of Marketing Control Control In Personnel Area: Reasons For Workers Resistance To Controls- Kind Of Control Devices IT Measures And Control – Installation Of Management Information & Control System, Structured & unstructured Decision</p>	12
3	<p>Computers Systems Computer for Management Control Purposes- Are Computers essential for MIS? Computers and Information System – Manual Systems – Mechanical Systems- MIS – Decision Support Systems- Characteristics of DSS- Where to apply DSS- Expert Systems.</p>	8
4	<p>Management Control Of Projects Meaning of project – Aspects of Project – Factors affecting Project - Project Planning – Time Dimension – Cost Dimension- Quality Dimension Project Control- Reports Costs and Time- Reports on output- Revisions.</p>	10



5	Implementing MCS for small & medium size companies Methodology of implementing Management Controls - Roles and responsibilities in implementing Management Control. Management Control Structure - Responsibility centre, cost centre, profit centre, investment centre. MCS in service & non-profit organizations.	8
	Total	48

Reference Books:

1. Anthony R. N. and John Dearden: *Management Control Systems*
2. 3. Bhattacharya S. K.: *Managerial Planning & Control System*
4. Mark G. Simkin : *Computer information systems for Business*
5. Robert J. Mockler: *Readings in Management Control*
6. Subhash Das : *Management Control Systems.*
7. P. Saravanavel : *MCS – H.P. House*
8. Arora Ashok & Akshay Bhatia, *Excel Books, New Delhi: Information Systems for Managers*



Compulsory Paper

Subject Name :- E- Commerce

Course Code :- 604

Objectives:

1. To know the concept of electronic commerce
2. To know the concept of Cyber Law & Cyber Jurisprudence
3. To know Internet marketing techniques

Unit Number	Particulars	No. of lectures
1	E- Commerce and Business Model Concepts Main Activities of E Commerce Definition Goals Technical Components Functions Status Prospects Significance Advantages Disadvantages E-Commerce Business Models Major Business to Consumer (B2C)Business Model Portal, E-tailor Major Business to Business (B2B) Business Model E Distributor, E-Procurement, Exchanges Business models in Emerging E-Commerce Areas - C2C, P2P, and B2G.	11
2	E-Money Real World Cash E-Money Requirements Types of Electronic Payment Media B2B E-Payment Systems Viruses Types of Viruses Spyware & Adware Virus Characteristics Protection against Fraud & Viruses	10
3	E-Marketing 3.1 Identifying Goals	11

	Browsing Behavior Model Online Marketing E Advertising Internet Marketing Trends Target Markets E-Branding Marketing Strategies Consumer Online: The Internet Audience and Consumer Behavior E-cycle of Internet Marketing.	
4	Cyber Law Concepts E Contract Jurisdiction Concept Choice of Law Minimum Contacts Internet Jurisdiction Contractual Obligation in cyberspace Active Vs Passive Websites E-mail Transactions	8
5	Cyber Jurisprudence Evolution of New System Legal Meaning of Software Legal Issues for Internet Commerce Cyber Attack –Trojan, Virus ,Worm, Spam Hacking – Phishing, IP Spoofing.	8
	Total	48

Reference Books:

1. *E – Commerce Concepts – Models – Strategies*, Himalaya Publishing House. ISBN : 978-81-8488-096-0; C.S.V. Murthy
2. *Electronic Commerce From Vision to Fulfillment*, 3rd Edition, PHI. ISBN : 81-203-3027-7; Elias M. Awad
3. *E – Commerce An Indian Approach*, 2nd Edition, PHI ISBN : 81-203-2788-8; P.T.Joseph, S.J.
4. *Laws Relating to Computers Internet & E-Commerce*, 4th Edition, Universal Law Publishing Company. ISBN : 978-81-7534-778-6; Nandan Kamath
5. *E-Commerce –The Cutting Edge of Business Second Edition*; Kamlesh K Bajaj, Debjani Nag
6. *E-Commerce –Business ,Technology, society*; Kenneth C.Laudon,Carol Guercio Traver
7. *Introduction to E-Commerce*; Zheng Qin



Finance Special Paper III

Subject Name :- Financial Services

Course Code :- 605 A

Objectives:

- 1) To study in detail various financial services in India
- 2) To make the students well acquainted regarding financial markets

Unit Number	Particulars	No. of lectures
1	Indian Financial System : An Overview Introduction to Financial System Structure of Financial System - Financial Institutions , Financial Markets, Financial Instruments and Financial Services Overview of Indian Financial System since 1991 Financial Intermediaries in Financial System: - Merchant Bankers, Underwriters, Depositories, Brokers, Sub brokers, Bankers etc.	9
2	Introduction to Financial Markets Capital Market- Primary Market – Management of IPO, Secondary Market – Stock Exchanges in India – Introduction , NSE , BSE , OTCEI Role of SEBI as a regulatory authority Introduction to Derivatives, Futures and Options Money Market – Introduction , Money Market instruments – Call and Notice money market , Treasury Bill , Commercial Papers , Certificate of Deposits , Money Market Mutual Fund , Inter corporate deposits Difference between Money Market and Capital Market	14
3	Financial Services in India Mutual Fund Factoring and Forfeiting Credit Rating Venture Capital	9
4	Banking and Insurance Sector in India :- 4.1 Introduction Structure of Banking and Insurance Sector in India Role of RBI and IRDA as a regulatory authority	5
5	Recent Trends in Accounting and Finance Zero Base Budgeting Inflation Accounting Human Resource Accounting Activity Based Costing Mergers and Acquisition	11
Total		48



Reference Books:

1. Kohak MA :- *Financial Services*
2. L M Bhole and Jitendra Mahakut – *Financial Institutions and Markets*
3. G. M. Dumbre – *Modern Banking, Success Publications, Pune.*
4. S. S. Shete – *Financial Marketing and Institutions in India, Success Publications, Pune.*
5. Dr. S Gurusamy :- *Essentials of Financial Services*
6. M Y Khan :- *Indian Financial System*
7. Rajesh Kothari :- *Financial Services in India , Concept and Application*



Marketing Special Paper III

Subject Name :- Advertising and Sales Promotion

Course Code :- 605 B

Objectives:

1. To develop knowledge and understanding of importance and functions of advertising.
2. To understand Key features of Sales Promotion

Unit Number	Particulars	No. of lectures
1	<p>Introduction and Measurement of Effective Advertising Advertising – Evolution, Meaning, Definition, Classification, Benefits, Functions, Criticism, Ethics, Social issues Strategic Advertising Decision - Setting Advertising Objectives, Deciding Advertising Budget, Advertising Framework planning and Organization. Advertising Campaign – Meaning, Basis of Campaign, Length of Campaign, Parameters governing advertising Campaign, Planning of advertising of Campaign Advertising Agency – Meaning, Definition, Functions, Types, Advantages, Structure, Advertiser and Advertising Interface Advertising Effectiveness – Objective of measuring Advertising Effectiveness, Difficulties and Evaluation of Advertising Effectiveness Advertising Control – Control of Advertising by Practitioners</p>	12
2	<p>Copy Decisions Advertising Copy --Meaning, Objectives, Elements, Features, Types of Copy Advertising Layout – Principles, Components, Visualization of Layout, Layout Format, Copy Creation – Approaches, Principles, Styles of Copy creation, Verbal Versus Visual Thinking, Pre Testing methods and Measurements.</p>	10
3	<p>Media Decisions Advertising Media – Meaning, Definition, Functions, Types of Media Media Planning – Importance, Process, Difficulties, Basics of Reach, Frequency, Continuity in Media Planning Media Research – Meaning, Importance, Functions, Process of Media Research Media Selection – Approaches and factors affecting Media Selection</p>	10
4	<p>Sales Promotion And Brand Equity 4.1 Sales Promotion – Meaning, Definition, Objectives of sales</p>	10



	<p>promotion, Factors affecting Sales Promotion Growth, Techniques of Sales Promotion</p> <p>Strategic Sales Promotion -- Strategies and Practices in Sales Promotion, Cross Promotions, Surrogate Selling, Bait and Switch advertising issues.</p> <p>Brand Equity – Concepts and Criteria, Building, Measuring and Managing Brand Equity, Linking Advertising and sales promotion to achieve “Brand standing”, Leveraging Brand values for business and non-business contexts.</p>	
5	<p>Role of Information Technology in Advertising and Sales Promotion</p> <p>Comparison of Traditional and Modern Advertising</p> <p>Internet Advertising – Purpose, Types, Advantages, disadvantages of internet Advertising</p> <p>Pre-Requisites of Online Advertising</p> <p>E – Advertising Guidelines</p> <p>Internet Advertising today</p>	6
	Total	48

Reference Books:

1. *Advertising and Promotions - Belch & Belch, Tata McGraw Hill 2001*
2. *Advertising Management - Rajeev Batra, John G. Myers & David A Aaker-PHI*
3. *Otto Kleepner's Advertising Procedure – PH*
4. *Advertising Management – Rawal C. N., Success Publications, Pune.*
5. *International Edition - Contemporary Advertising Irwin/McGraw –Hill*
6. *Integrated Marketing Communications - Duncon- TMH*
7. *Foundations of Advertising Theory & Practice- S.A.Chunawalla & K.C.Sethia- Himalaya Publishing*
8. *Integrated Advertising, Promotion and Marketing Communication- By Clow Baack*
9. *Advertising Management- Manendra Mohan*
10. *Advertising Management- Batra, Myers & Aaker*
11. *Sales Promotion: M.N.Mishra*
12. *Advertising and Promotion- George Belch and Michael Belch*
13. *Marketing Management – Philip Kotler, Keller Jha- Pearson Education, 11th Edition*



Human Resource Management Special Paper III

Subject Name :- Labour Laws

Course Code :- 605 C

Objective:

To acquaint the students with important legal provisions governing the industrial employees

Unit Number	Particulars	No. of lectures
1	<p>An Introduction to Labour Laws in India History and Evolution of Labour Laws in India Labour Policy of India 1.3. Classification of Labour Laws and an overview of labour laws. Unfair Labour Practices Labour Laws in the unorganized sector Authorities under the Labour Laws in India (Ministry of Labour & Employment –Government of India, Chief Labour Commissioner Labour Courts / Industrial Tribunals, (Appointment, Qualification, Disqualification, Rights & duties) International Labour Organization</p>	10
2	<p>The Employees Provident Funds And Miscellaneous Provisions Act,1952 Scope, Application and Definitions Schemes under the Act Chapter II of the Act(Employee Provident Fund Scheme, State Board, appointment of Officers, Employees Pension Scheme and Fund, Employee Deposit Linked insurance Scheme, Inspectors.) Membership of the Fund.</p>	10
3	<p>The Employees State Insurance Act,1948 Scope, Application and Definitions Chapter II of the Act(ESI Corporation, Standing Committee, Medical Benefit Council, Principle Officers) Chapter III of the Act(Finance & Audit) Chapter IV-(Contributions, Recovery of Contribution,) Chapter V(Benefits) Chapter VI(Adjudication of Disputes & Claims) Chapter VII(Punishment)</p>	10
4	<p>The Child Labour (Prohibition and Regulation) Act,1986 Part I (Preliminary) Part II (prohibition of Employment of Children in Certain Occupations and Processes) Part III (Regulation of Conditions of Work of Children) Part IV (Miscellaneous- Penalties)</p>	08



	4.5 IPEC(International Programme on Elimination of Child Labour)	
5	Maternity Benefits Act,1961 Extent, Application and Definitions Employment or work prohibited by women in certain periods Right to Payment of Maternity Benefits Payment of Maternity benefits in case of death of women 5.5. Payment of Medical Bonus Leave for Miscarriage and wages for Tubectomy Operation Leave for Pregnancy illness, delivery, premature birth of a child, Medical Termination of Pregnancy, Nursing Breaks Appointment of Inspectors, Powers and Duties	10
	Total	48

Reference Books:

1. *Bare Acts*
2. *Business Law – G. M. Dumbre, Success Publications, Pune.*
3. *Industrial and Labour Laws-S.P.Jain*
4. *Industrial Law - P.L. Malik*
5. *Labour Laws- Taxman*
6. *Labour & Industrial Laws-S.K.Puri*
7. *Labour & Industrial Laws-Goswami V.G.*
8. *Labour & Industrial Laws- Mishra S.N.*
9. *Labour & Industrial Laws- K.M.Pillai*



Service Sector Management Special Paper III

Subject Name :- Special Services of Marketing in India

Course Code :- 605 D

Objective:

1. To create a right understanding about nature of services in India.
2. To develop a right approach towards marketing of services in India.
3. To make students aware about upcoming areas of services in India.

Unit Number	Particulars	No. of lectures
1	Introduction:- Introduction Concept and objectives of Services Marketing Reasons of growth of Service Sector Role of Services in Indian Economy Challenges of Service Marketing	8
2	Marketing of Bank Services and Insurance Services:- Introduction to banking services, Concepts and objectives, Bank Marketing in Indian prospective, Application of Indian concepts in Indian Banking. Introduction to Life insurance services, Concepts and objectives, Marketing of Life Insurance in India, Marketing approach of Life Insurance (Study of 4P's of Marketing Mix)	10
3	Tourism, Hospitality and Health Care Services:- Tourism marketing concept - Market segmentation for tourism, Special Characteristics of Indian Tourism Marketing. Uses of hospitality services, Health care marketing, Study of 7p's of marketing mix. Introduction to Health Care Services, Consumer buying behaviour in health care services.	10
4	Marketing of Other Services:- Emerging trends and its features : Marketing of Higher Education, Political Marketing, Airline Marketing, Cellular and Entertainment Services, Internet services	10
5	Technology in Services:- Technology in services The emergence of self service Automation in services Technological innovations in services: Challenges of adopting new technology in service Managing the new technology adoption process	10
	Total	48



Reference Books:

1. *Services Marketing* - S.M.Jha, Himalaya Publication House
2. *Services Marketing* - P.K.Sinha, S.C.Sahoo, Himalaya Publication House
3. *Services Marketing* – M. G. Mulla, Success Publications, Pune.
4. *Services Marketing* – Vasanti Venugopal, Raghu V.N., Himalaya Publication House
5. *Service Management* – James A. Fitzsimmons, Mona J. Fitzsimmons, TATA McGraw Hill
6. *Marketing of Services - An Indian Perspective – Text and Cases*, Dr. S. L. Gupta, V.V. Ratna, Wisdom Publications, Delhi.



Agri Business Management Special Paper III

Subject Name :- Recent Trends in Agri business

Course Code :- 605 E

Objectives:

1. To study the agro base industries in Indian economy
2. To understand services associated with Agriculture Business.

Unit Number	Particulars	No. of lectures
1	Introduction Agro based industries and their linkages to the Indian Economy. Impact of International Agri. Business on Indian Economy. Contract Framing.	10
2	Inputs in Agriculture Agricultural Research and Education. Agricultural Insurance.	8
3	Agro based Industries. Food Processing Industries – Meaning, Future prospects of Processed food industry, constraints in export of processed food Poultry Industries. Dairy Industry – Characteristics, product range, future growth Sugar Industry Cotton Textiles Industry	12
4	Services Associated with agriculture. Processing of Agricultural Products. Agricultural Marketing Agricultural Retailing. Agricultural Finance. HRM in agri business	10
5	Standardization and legislation : Co-operative Management Co-operative Marketing Cooperative Institutions. Grading and Standardization, Bureau of Indian Standards (BIS) Business Legislation – Essential Commodities Act, Food Adulteration Act, Food safety and standards, Consumer Protection Act.	8
	Total	48



Reference Books:

1. *Indian Economy : Dutt and Sundaram*
2. *Agri.Business Management : Smita Diwase*
3. *Agri.Business Management: A.C. Broadway and Broadway*
4. *Indian Economy : A.N. Agarwal*
5. *Indian Economy : Mishra Puri*



Finance Special Paper IV

Subject Name :- Cases in Finance/ Project

Course Code :- 606 A

The student shall write a project report on the topics selected under the guidance of a faculty and submit one hard binding copy and one soft copy of the same to the Principal of the college before 31st March. Soft copy should be conserved at college level. The project shall be assessed both internally (20 marks) and externally (30 marks). For external evaluation there will be a viva voce. Such viva-voce shall be conducted by a panel of two referees appointed by the University.

Total Lectures: 24 Project + 24 Cases in Finance = 48

Topics for Project:

1. Projected financial statements to be submitted to the bank for loan proposal.
2. Analysis & interpretations of financial statement with the help of Techniques like Ratio analysis, Fund flow Analysis, Cash flow Analysis.
3. Project related Insurance sector.
4. Working Capital Management.

The students can select any other topic related to finance, for their project in consultation with their respective teacher. At least ten cases covering the following aspects should be studied.

- A. Capital Budgeting
- B. Working Capital
- C. Cost of Capital

Total Lectures: 24 Project + 24 Cases in Marketing = 48

NOTE: Scheme of marking for this paper will be as follows:

Project work	30
Viva voce (conducted by internal as well as external to be appointed by University)	20
Theory Paper on cases in finance	50

Total 100 marks	

Project report should be evaluated by both internal and external examiner. Each examiner will allot marks out of 50 i.e. project work 30 marks and viva voce 20 marks. The total marks given by both internal and external examiner will be out of 100 and will be converted into marks out of 50.



Sample Case No 1:

Jay Industries Ltd. is considering purchasing a new machine. Two alternative models are under consideration. The comparative data of the two machines are as follows:

Particulars	Machine X	Machine Y
Cost of Machine	3,00,000	5,00,000
Estimated Life	10 years	10 years
Estimated Saving is Scrap p.a.	20,000	30,000
Additional Cost of Supervision p.a	24,000	32,000
Additional Cost of Maintenance p.a.	14,000	22,000
Cost of Indirect Material p.a.	12,000	16,000
Additional Savings in Wages p.a	1,80,000	2,40,000

Rate of Taxation: 50% of the Profits. Assume Targeted Cost of Capital @ 10%. As a Finance Executive advice Management regarding which machine may be a profitable investment by calculating Annual Cash Flow, Payback Period, NPV and PL. Total PV @ 10% for 10 years = 6.144

Sample Case No 2:

The following information is related to Parekh Industries Pvt. Ltd., Pune. Budgeted Sales (78,000 units) Rs. 46.80 lakhs. 25% Sales are Cash Sales

Analysis of Selling Price

Raw Material	60% of Selling Price
Direct Labour	6.00 per unit
Variable Overheads	1.00 per unit
Fixed Overheads	5 Lakhs (Including Rs. 1, 10,000 as depreciation)

It is estimated that:

- (a) Holding Period of:
 - Raw Materials – 3 weeks
 - Work-in-Process – 1 week
 - Finished Goods – 2 week
- (b) Suppliers will give 4 weeks credit.
- (c) Customers are allowed 4 weeks credit.
- (d) Wages are paid after 4 weeks.
- (e) Lag in payment of overheads will be 2 weeks.
- (f) Cash in Hand Rs. 50,000.



Prepare a statement showing working capital requirement for a year using cash cost approach. Year = 52 weeks

Marketing Special Paper IV

Subject Name :- Cases in Marketing / Project

Course Code :- 606 B

Objectives:

To understand of application of theory into practice

The student shall write a project report on the topics selected under the guidance of a faculty and submit one hard binding copy and one soft copy of the same to the Principal of the college before 31st March. Soft copy should be conserved at college level. The project shall be assessed both internally (20 marks) and externally (30 marks). For external evaluation there will be a viva voce. Such viva-voce shall be conducted by a panel of two referees appointed by the University.

Total Lectures: 24 Project + 24 Cases in Marketing = 48

CASES STUDIES :- (50 Marks)

1. Introduction to Case Studies:-

Case – Meaning – Objectives of Case Studies –
Characteristics & Importance of Case Studies –
Guidelines for Case Studies & Cases Discussion.

2. Topics for Case Studies:-

- Advertising & Sales Promotions
- Consumer Behavior
- Buyer Behavior
- Industrial Marketing
- Service Marketing
- Brand Marketing
- Retail Marketing
- Rural Marketing
- Sales and Distribution Management
- International Marketing
- Marketing Research
- New & Existing Products
- E-Commerce / On-line Marketing

Sample Case No-1

Computer Consumables Ltd. (CCL) is a small scale company with a product portfolio consisting of printer Ribbons, Cartridges and Ink Jet refill packs. The company's turnover in its first year (i.e. year ending March 2014) is Rs. 2-5 crores. It has a marketing department consisting of one G.M. (Mktg.), one Sales Manager, one Dispatch Assistant and Five Sales Engineers covering Maharashtra and Gujarat. Next year's sales turnover target is Rs. 5 Crore. The G.M. (Mktg.) has proposed addition of two



Product/Brand Executives and twenty Sales Engineers. The Managing Director is not convinced of the utility of product/brand executives to his company. He also has hesitation about the return on investment (ROI) of additional Rs. 25 lakh towards salary of additional staff in marketing department.

- 1) Identify and allot new territories for Sales Engineers and the Sales Targets.
- 2) Develop an advertising plan for CCL.

Sample Case No-2

For unless the consumer walked into a retailer and specially asked for Frooti, the retailer might choose to push any other product, including those on which the retailer margins were higher or those that were then undertaking a major promotional activity. Indeed, the sales of Frooti had been falling over the years. Besides just competition from products in other categories, its market shares in the 'tetra pack' category was also gradually falling, as new players had entered the segment and were using the same packaging technique. Clearly, something needed to be done. Frooti had acquired an 'old boy' image, as a 'kids-only' product, perhaps due its 'tetra pack' packaging as opposed to the glass and PET bottles used by other beverage manufacturers. Consumers typically consumed the product using a straw, something seen as 'for kids'.

- (1) How could the brand re-position itself in the market? In particular, it needed to drop the perception of being only for kids.
- (2) What should Frooti have done when its market share was falling consistently?

Sample Case No -3

Jack and Jill of Goa, are two partners, engaged in the business of manufacturing and selling sports equipments under the brand name 'J2'. They cater to the needs of indoor and outdoor sports and recreation activities.

Recently they have acquired an imported sewing machine, which can stitch cotton as well as synthetic fabrics. The machine is being used to stitch anoraks, track-suits, tents, tent-covers, etc. The machine is so versatile, that it can stitch jackets, jerkins, rajais and quilts, which are so commonly used in central and northern states, in winter. Inspired by this impressive range of products, that they can create, Jack and Jill wish to chalk-out an elaborate marketing action-plan. Extend your advice for the following:

- (1) Analyze this case with suitable title.
- (2) Suggest Market Segmentation for their new non-sports products.

Reference Books:

1. Sales Management handbook – Forsyth P. Trick
2. Sales Management – Richard R Still Edward W. Cundiff
3. Retail Management – Gibson Vedamani
4. Channel Management & Retail Management – Minal Dhotre
5. Advertising and Promotions – Belch & Belch
6. Marketing Management – Rajan Saxena
7. Principles of Marketing 9th Edition – Philip Kotler and Garry Armstrong



Human Resource Management Special Paper IV

Subject Name -: Cases in Human Resource Management / Project

Course Code -: 606 C

Objectives:

To understand of application of theory into practice

Unit 1. Introduction to Case Studies:-

Case – Meaning – Objectives of Case Studies –Characteristics & Importance of Case Studies – Cases Discussion

Guidelines for Analyzing Case Studies on the following points

- Facts of the case
- Analysis
- Solution
- Action points
- Conclusion

Unit 2. Topics for Case studies:-

1. Recruitment and Selection
2. Training & Development
3. Working conditions
4. Salary and Wage Administration -Pay scales and Grades
5. Performance Management System
6. Grievance Handling
7. Settlement of Industrial disputes-Industrial Relations
8. Transfer- Promotion-Demotion
9. Labor Welfare
10. Retrenchment- Layoffs
11. VRS

Sample Case 1:

Sidhdheshwar Textile Ltd. is employing about 600 employees. During the last 6 to 7 years, the company is earning good profits. Due to general recessionary trends and other adverse factors, its profits are reduced beyond expectation. The internal unions of workers 'Solapur Majadur Sangh' and staff members (two separate unions) are insisting for 20% bonus, while the company is ready to give 15% bonus. Several rounds of negotiations were proved fruitless. Surprisingly, one day just before Diwali staff union decided to accept 15% bonus. The news was not welcomed by the Solapur Majadur Sangh. Some office-bearers of the Solapur Majadur Sangh charged the company to adopt 'divide and rule' policy. The company representatives refused to have done unfair labour practice. When the allegations were again made, company suspended six office-



bearers of Solapur Majadur Sangh, pending enquiry. The workers declared strike as a protest. The indefinite strike of workers deprived the other union's members 15% bonus, which was acceptable to them.

Questions:

- (a) Comment on the Industrial relations of the company in the context of bonus policy.*
- (b) What crucial role should the Personnel Manager play to ensure peace and harmony?*
- (c) Is the action of suspending union office-bearers correct? Examine pros and cons.*

Sample Case 2:

Mr. Patole is a Branch Manager of 'Janata Co-operative Bank Ltd.' at one of its village branches. His staff includes two clerks and one attender. Very often, Mr. Patole was left alone in the Bank after 5 p.m. to tally accounts, daybooks and complete all other formalities. On 30 December, Mr. Patole was working till past 2 a.m. tallying the accounts, since hardly one day was left for closing the accounts for the year. On this fateful night, the Branch Manager was attacked by a band of robbers, who looted the bank after brutally wounding Mr. Patole right hand, which had to be amputated, later. After his recovery, the Branch Manager applied for compensation. The Bank Management was of the opinion that Mr. Patole violated the job specifications by working beyond the stipulated hours of work. He, in its view, was not entitled to any compensation as the accident occurred during non employment hours. They also called for an explanation as to why the amount lost cannot be recovered from his salary and the provident fund.

Questions:

- (a) Analyze the case with suitable title.*
- (b) How do you justify the bank's stand in this case?*
- (c) What modifications do you suggest in job description to overcome such incidents in future?*



Service Sector Management Special Paper IV

Subject Name :- Cases in Service Sector Management / Project

Course Code :- 606 D

Objectives:

To understand of application of theory into practice

Unit 1. Introduction to Case Studies:-

Case – Meaning – Objectives of Case Studies –Characteristics & Importance of Case Studies – Cases Discussion

Guidelines for Analyzing Case Studies on the following points

Facts of the case

Theoretical implications: Market research: Methodologies of research.

SWOT

Analysis

Solution

Action points

Conclusion

Sample Case1:

Mr. Kishore runs a hotel in a populated residential area. This hotel was started by his grandfather 50 years back. Since then this hotel was their only family business. However over the past few years the hotel faced consistent losses as the popularity of the hotel had reduced and not many people visited their hotel. Mr. Kishore is very concerned about this issue and wants to conduct a research to find the causes.

Q1. Frame a strategy to conduct a research to find the reasons for reduction in the customer walk-in's of the restaurant.

Q2. Design a questionnaire to collect customer feedback regarding food quality, service, ambience, etc.

Sample Case2:

Mr. Joshi, had just retired as a primary school teacher. He has opened an account with a private sector bank. He used to pay his house rent by cheque every month. He had dropped a new cheque book request slip in the ATM drop box and was expecting the same to reach him in a week's time. However he did not receive the cheque book even after ten days. He required cheques urgently and hence went to the bank to complain about the issue, after waiting for 45 minutes he was called by a customer care officer. The officer told him that he can be issued a emergency cheque book for which he will have to pay a charge of Rs. 250/- The officer did not agree to the fact that Mr. Joshi had applied for the cheque book and did not receive one, hence he should not be charged for this cheque book. Mr. Joshi was not happy with the service he received.



Q1. What should have been the officials approach towards Mr. Joshi as a senior citizen?

Q2. What should Mr. Joshi do to safeguard his interest as a customer of this bank?

Sample Case no.3:

Using a mobile today has become a necessity rather than luxury, everyone, irrespective of income class can now afford a mobile phone. The telecom service providing companies are providing SIM cards at very low prices to target the masses. However the users consistently complain about services issues of these companies. One of such issues is pop up's that are recurrently appearing on the mobile screens and for people who are not aware about it, are unknowingly subscribing for unwanted services, like dialer tone, daily astrology, act. It becomes very difficult for a common man to disable the services. All the more they have to pay for the service they did not even want.

Q1. Is this activity of the telecom service providers Ethical? Explain with justification.

Sample Case no.4:

“Pretty Lady” is a reputed ladies wellness centre being run in a residential locality for almost a decade. The proprietors wish to conduct a survey to find out the perception of the customers about the quality of service being offered.

Q1. State the importance of quality in service sector

Q2. Prepare a questionnaire to collect the feedback of customers on quality of the service being provided.

Sample Case no.5:

Digital Marketing has evolved as a new channel of distribution in the retail sector. Hundreds of websites have started selling multiple products and brands online.

Many people are finding this option as a convenient one, due to their hectic schedules. However there is no face to face interaction between the seller and the buyer, making good service all the more important. The growth of this channel of distribution has also increased the demand for logistic services which would deliver these products to the door step of the customers. It is very important for this sector to provide good service to make sure the customer doesn't switch over to the competitors.

Q1. Analyse this case and suggest how the service factors can be improved by this channel of distribution.



Agri Business Management Special Paper IV

Subject Name :- Cases in Agri Business Management / Project

Course Code :- 606 E

Objectives:

To understand of application of theory into practice

Unit 1. Introduction to Case Studies:-

Case – Meaning – Objectives of Case Studies –Characteristics & Importance of Case Studies – Cases Discussion

Guidelines for Analyzing Case Studies on the following points

- Introduction to case
- Facts of the case
- Actual Practical Solution for case with alternate if applicable
- Conclusion about the case

Unit 2. Topics for Case studies

- a. Rural Credit System.
- b. Role of Corporate Sector & Agri Export
- c. Reforms in Indian Agriculture
- d. Agro Based Industries
- e. Services Associated with Agriculture

Sample Case 1:

The distraught farmers of Maharashtra are at loss to understand the measures to protect their agricultural income. Severe drought conditions have destroyed their crop, 80 of the farmers are not aware of the schemes like Crop Insurance and relief aid from the Government.

Advise them on following points:

- i. Information regarding Insuring Crops.
- ii. The Crops that could be covered under Crop Insurance Scheme.
- iii. The agencies that provide Crop Insurance Scheme.
- iv. The procedure to get the relief aid from the Government and the rules and regulation.

Sample Case 2:

Kisan is a young farmer in the draught prone Marathwada. He wishes to develop a Horticulture Farm.



- i. What suggestions will you give?
- ii. Suggest the types of crops he could grow in the land where water is scarce.
- iii. Suggest water conservation techniques that are more suitable

Sample Case 3:

A group of people in Maharashtra decide to develop a dairy plant on co-operative basis, (Amul Model), give advice on following points:

- i. Procedure to establish co-operative dairy.
- ii. Resources required for development.
- iii. Various avenues of business except milk (Milk By-products)

Sample Case 4:

Suresh has a limited cultivable agricultural land. He is totally dependent on the agricultural income which is very less. Advise him on following points:

- i. A small side business which complements his agricultural land.
- ii. The procedure to open such business.
- iii. The resources that are required.

Support your answers with suitable examples

Sample Case 5:

Ram is a farmer from Marathwada, which is facing server drought conditions and scarcity of water. He suffered heavy losses but decides to do proper planning next year.

Suggest:

- (i) Water Conservation Methods
- (ii) Rain Harvesting
- (iii) Maximum Yield with minimum use of water



Third Year Bachelor of Business Administration (T.Y.B.B.A.)

Pattern of Question paper of Theory papers

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat and well labeled diagrams wherever necessary.

Theory question (15)

OR

Theory Question

Theory question (15)

OR

Theory Question

Theory question (15)

OR

Theory Question

Theory question (15)

OR

Theory Question

Write Short Notes (Any **four** out of **six**) (20)



Third Year Bachelor of Business Administration (B.B.A.) Semester VI

Pattern of Question paper of 606- Project/ Cases

Time: 2 Hours

Total Marks: 50

Instructions:

1. **Q1.is compulsory.**
2. **Attempt any two** from the remaining.
3. Figures to the right indicate full marks.

Q1.	Case study	20
Q2.	Case study	15
Q3.	Case study	15
Q4.	Case study	15



Third Year Bachelor of Business Administration (B.B.A.) Semester VI

Pattern of Question paper of 505 (A) – Analysis of Financial Statements

Time: 3 Hours

Total Marks: 80

Instructions:

1. All Questions are Compulsory.
2. Figures to the right indicate full marks.
3. Use of calculator is allowed.

Theory question (16)

OR

Theory Question

Theory question (16)

OR

Theory Question

Q3. Write Short Notes (Any **two** out of **four**) (8)

Q4. (A) Practical Problem (10)

(B) Practical Problem (10)

Q5. Practical Problem (20)



Third Year Bachelor of Business Administration (B.B.A.) Semester VI

Pattern of Question paper of 506 (A) – Long Term Finance

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of calculator is allowed.

Q1. Practical Problem (15)

Q2. Theory Question (15)

OR

Theory Question

Q3. Theory Question (15)

OR

Theory Question

Q4. Theory Question (15)

OR

Theory Question

Q5. Write Short Notes (Any four out of six) (20)

