UNIVERSITY OF MUMBAI
No. UG/210 of 2016-17

CIRCULAR:-

The Principals of the affiliated Colleges in Arts, Science and Commerce and the Heads of recognized Institutions concerned are hereby informed that the recommendation made by Ad-hoc Board of Studies in Lifelong Learning & Extension under Faculty of Arts, Science and Commerce at its meeting held on 29th June, 2016 has been accepted by the Academic Council at its meeting held on 14th July, 2016 vide item No. 4.84 and that in accordance therewith, the revised syllabus as per the Choice Based Credit System for Extension Work Subject for F.Y.B.A/B.Com./B.Sc. & other Professional Courses for Foundation Course approved by the Board of Studies in Extension Work for academic year 2016-17, which is available on the University's web site (www.mu.ac.in) and that the same has been brought into force with effect from the academic year 2016-17.

21/12/16
(Dr.M.A.Khan)
REGISTRAR

MUMBAI – 400 032
21 December, 2016
To

The Principals of the affiliated Colleges in Arts, Science and Commerce and the Heads of recognized Institutions concerned.

A.C/4.84/14/07/2016

****

No. UG/210-A of 2016 MUMBAI-400 032 21 December, 2016

Copy forwarded with Compliments for information to:-

1) The Co-ordinator, Faculty of Arts, Science and Commerce,
2) The Director, Board of College and University Development,
3) The Co-Ordinator, University Computerization Centre,
4) The Controller of Examinations.

21/12/16
(Dr.M.A.Khan)
REGISTRAR

....PTO

PRINCIPAL
S.I.E.S. (NERUL) COLLEGE OF
ARTS, SCIENCE & COMMERCE
Sri Chandrasekarendra Saraswathy
Vidyapuram, Plot No. 1-C, Sector-V,
Nerul, Navi Mumbai - 400 706.

Plot 1-C, Sector-V, Nerul

Revised Syllabus
Foundation Course for F. Y. B.Com
Semester I

Semester I **Lectures 45** **Marks 60**

Unit 1

Overview of Indian Society:

Understand the multi-cultural diversity of Indian society through its demographic composition: population distribution according to religion, caste, and gender;
Appreciate the concept of linguistic diversity in relation to the Indian situation;
Understand regional variations according to rural, urban and tribal characteristics; Understanding the concept of diversity as difference. (5 lectures)

Unit 2

Concept of Disparity- 1:

Understand the concept of disparity as arising out of stratification and inequality;
Explore the disparities arising out of gender with special reference to violence against women, female foeticide (declining sex ratio), and portrayal of women in media;
Appreciate the inequalities faced by people with disabilities and understand the issues of people with physical and mental disabilities. (10 lectures)

Unit 3

Concept of Disparity-2:

Examine inequalities manifested due to the caste system and inter-group conflicts arising thereof;
Understand inter-group conflicts arising out of communalism;
Examine the causes and effects of conflicts arising out of regionalism and linguistic differences.
(10 lectures)

Unit 4

The Indian Constitution:

Philosophy of the Constitution as set out in the Preamble;
The structure of the Constitution-the Preamble, Main Body and Schedules;
Fundamental Duties of the Indian Citizen; tolerance, peace and communal harmony as crucial values in strengthening the social fabric of Indian society;
Basic features of the Constitution. (10 lectures)

Unit 5

Significant Aspects of Political Processes:

The party system in Indian politics;
Local self-government in urban and rural areas; the 73rd and 74th Amendments and their implications for inclusive politics;
Role and significance of women in politics. (10 lectures)

Topics for Project Guidance: Growing Social Problems in India:

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Navi Mumbai 400706

Revised Syllabus
Foundation Course for F. Y. B Com
Semester II

Semester II **Lectures 45**
Marks 60

Unit 1
Globalisation and Indian Society:
Understanding the concepts of liberalization, privatization and globalization;
Growth of information technology and communication and its impact manifested in everyday life;
Impact of globalization on industry: changes in employment and increasing migration;
Changes in agrarian sector due to globalization; rise in corporate farming and increase in farmers' suicides. (7 lectures)

Unit 2
Human Rights
Concept of Human Rights; origin and evolution of the concept;
The Universal Declaration of Human Rights;
Human Rights constituents with special reference to Fundamental Rights stated in the Constitution;
(10 lectures)

Unit 3
Ecology
Importance of Environment Studies in the current developmental context;
Understanding concepts of Environment, Ecology and their interconnectedness;
Environment as natural capital and connection to quality of human life;
Environmental Degradation- causes and impact on human life;
Sustainable development- concept and components; poverty and environment
(10 lectures)

Unit 4
Understanding Stress and Conflict:
Causes of stress and conflict in individuals and society;
Agents of socialization and the role played by them in developing the individual;
Significance of values, ethics and prejudices in developing the individual;
Stereotyping and prejudice as significant factors in causing conflicts in society.
Aggression and violence as the public expression of conflict; (10 lectures)

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University of Mumbai

Revised Syllabus
and
Question Paper Pattern
of Courses of
Bachelor of Commerce Programme
Second Year
Semester III and IV

Under Choice Based Credit, Grading and Semester System

To be implemented from Academic Year 2017-2018

Faculty of Commerce

S.Y.B.Com

(To be implemented from Academic Year- 2017-2018)

No. of Courses	Semester III	Credits	No. of Courses	Semester IV	Credits
1	***Elective Courses (EC)***		*1*	***Elective Courses (EC)***	
1A	***Discipline Specific Elective(DSE) Courses***		*1A*	***Discipline Specific Elective(DSE) Courses***	
1Aa	***Discipline Specific Elective(DSE) Courses***		*1Aa*	***Discipline Specific Elective(DSE) Courses***	
1	Accountancy and Financial Management III	**03**	1	Accountancy and Financial Management IV	**03**
1Ab	***Discipline Specific Elective(DSE) Courses***		*1Ab*	***Discipline Specific Elective(DSE) Courses***	
2	*Any one course from the following list of the courses	**03**	2	*Any one course from the following list of the courses	**03**
1B	***Discipline Related Elective(DRE) Courses***		*1B*	***Discipline Related Elective(DRE) Courses***	
3	Commerce III	**03**	3	Commerce IV	**03**
4	Business Economics III	**03**	4	Business Economics IV	**03**
2	***Ability Enhancement Courses (AEC)***		*2*	***Ability Enhancement Courses (AEC)***	
2A	****Skill Enhancement Courses (SEC) Group A***		*2A*	*****Skill Enhancement Courses (SEC) Group A***	
5	*Any one course from the following list of the courses	**03**	5	*Any one course from the following list of the courses	**03**
2B	****Skill Enhancement Courses (SEC) Group B***		*2B*	*****Skill Enhancement Courses (SEC) Group B***	
6	Any one course from the following list of the courses	**02**	6	Any one course from the following list of the courses	**02**
3	***Core Courses (CC)***		*3*	***Core Courses (CC)***	
7	Business Law I	**03**	7	Business Law II	**03**
	Total Credits	**20**		**Total Credits**	**20**

*1Ab *List of Discipline Specific Elective (DSE) Courses for Semester III (Any One)*		*1Ab *List of Discipline Specific Elective(DSE) Courses for Semester IV (Any One)*	
1	Financial Accounting and Auditing - Introduction to Management Accounting	1	Financial Accounting and Auditing - Auditing
2	Business Management - Marketing Management	2	Business Management- Marketing Management
3	Banking & Finance- Introduction to Banking in India	3	Banking & Finance- Introduction to Banking in India
4	Commerce- International Business Relations	4	Commerce- International Business Relations

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*List of Skill Enhancement Courses (SEC) Group A for Semester III (Any One)		*List of Skill Enhancement Courses (SEC) Group A for Semester IV (Any One)	
1	Advertising I	1	Advertising II
2	Field Sales Management I	2	Field Sales Management II
3	Public Relations I	3	Public Relations II
4	Mass Communication I	4	Mass Communication II
5	Travel & Tourism Management Paper I	5	Travel & Tourism Management II
6	Journalism I	6	Journalism II
7	Company Secretarial Practice I	7	Company Secretarial Practice II
8	Rural Development I	8	Rural Development II
9	Co-operation I	9	Co-operation II
10	Mercantile Shipping I	10	Mercantile Shipping II
11	Indian Economic Problem I	11	Indian Economic Problem II
12	Computer Programming I	12	Computer Programming II
13	Logistic and Supply Chain Management I	13	Logistic and Supply Chain Management I
14	Economic System I	14	Economic System II
Note: Course selected in Semester III will continue in Semester IV			

*List of Skill Enhancement Courses (SEC) Group B for Semester III (Any One)		** List of Skill Enhancement Courses (SEC) Group B for Semester IV (Any One)	
1	Foundation Course- Contemporary Issues - III	1	Foundation Course- Contemporary Issues - IV
2	Foundation Course in NSS - III	2	Foundation Course in NSS - IV
3	Foundation Course in NCC - III	3	Foundation Course in NCC - IV
4	Foundation Course in Physical Education - III	4	Foundation Course in Physical Education - IV
Note: Course selected in Semester III will continue in Semester IV			

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UNIVERSITY OF MUMBAI
No. UG/21 of 2018-19

CIRCULAR:-

Attention of the Principals of the affiliated Colleges and Directors of the recognized Institutions in Commerce & Management Faculty is invited to this office Circular No.UG/105 of 2016-17, dated 25th October, 2016 relating to syllabus of Bachelor of Commerce (B.Com.) degree course.

They are informed that the recommendations made by the Board of Studies in Commerce at its meeting held on 28th February, 2018 have been accepted by the Academic Council at its meeting held on 5th May, 2018 **vide** item No. 4.48 and that in accordance therewith, the revised syllabus as per the (CBCS) for the T.Y.B.Com. (Sem. V & VI), has been brought into force with effect from the academic year 2018-19, accordingly. (The same is available on the University's website www.mu.ac.in).

(Dr. Dinesh Kamble)
I/c REGISTRAR

MUMBAI – 400 032
14th June, 2018

To

The Principals of the affiliated Colleges and Directors of the recognized Institutions in Commerce & Management Faculty. (Circular No. UG/334 of 2017-18 dated 9th January, 2018.)

A.C./4.48/05/05/2018

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No. UG/21 -A of 2018 MUMBAI-400 032 14th June, 2018

Copy forwarded with Compliments for information to:-

1) The I/c Dean, Faculty of Commerce & Management,
2) The Chairman, Board of Studies in Commerce,
3) The Director, Board of Examinations and Evaluation,
4) The Director, Board of Students Development,
5) The Professor-cum-Director, Institute of Distance and Open Learning (IDOL),
6) The Co-Ordinator, University Computerization Centre,

(Dr. Dinesh Kamble)
I/c REGISTRAR

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PRINCIPAL
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Vidyapuram, Plot No. 1-C, Sector-V,
Nerul, Navi Mumbai - 400 706.

University of Mumbai

Revised Syllabus
and
Question Paper Pattern
of Courses of
Bachelor of Commerce Programme
at
Third Year
Semester V and VI

Under Choice Based Credit, Grading and Semester System

To be implemented from Academic Year 2018-2019

Faculty of Commerce

Bachelor of Commerce (B.Com) Programme

Under Choice Based Credit, Grading and Semester System

T.Y.B.Com

(To be implemented from Academic Year- 2018-2019)

No. of Courses	Semester V	Credits	No. of Courses	Semester VI	Credits
1	***Elective Courses (EC)***		***1***	***Elective Courses (EC)***	
1A	***Discipline Specific Elective(DSE) Courses***		***1A***	***Discipline Specific Elective(DSE) Courses***	
1 & 2	*Any one group of courses from the following list of the Groups (A/B/C/D/E/F)	**04+04**	1 & 2	*Any one group of courses from the following list of the Groups (A/B/C/D/E/F)	**04+04**
1B	***Discipline Related Elective(DRE) Courses***		***1B***	***Discipline Related Elective(DRE) Courses***	
3	Commerce V	**03**	3	Commerce VI	**03**
4	Business Economics V	**03**	4	Business Economics VI	**03**
2	***Ability Enhancement Courses (AEC)***		***2***	***Ability Enhancement Courses (AEC)***	
5 & 6	**Any two courses from the following list of the courses	**03+03**	5 & 6	**Any two courses from the following list of the courses	**03+03**
	Total Credits	**20**		**Total Credits**	**20**

List of groups of Discipline Specific Elective(DSE) Courses for Semester V (Any One Group)		***List of groups of Discipline Specific Elective(DSE) Courses for Semester VI (Any One Group)***	
Group A: Advanced Accountancy			
1	Financial Accounting and Auditing VII - Financial Accounting	1	Financial Accounting and Auditing IX - Financial Accounting
2	Financial Accounting and Auditing VIII - Cost Accounting	2	Financial Accounting and Auditing X - Cost Accounting
Group B: Business Management			
1	Business Management Paper - I	1	Business Management Paper - III
2	Business Management Paper - II	2	Business Management Paper - IV
Group C: Banking and Finance			
1	Banking and Finance Paper - I	1	Banking and Finance Paper - III
2	Banking and Finance Paper - II	2	Banking and Finance Paper - IV
Group D: Commerce			
1	Commerce Paper - I	1	Commerce Paper - III
2	Commerce Paper - II	2	Commerce Paper - IV
Group E: Quantitative Techniques			
1	Quantitative Techniques Paper - I	1	Quantitative Techniques Paper - III
2	Quantitative Techniques Paper - II	2	Quantitative Techniques Paper - IV
Group F: Economics			
1	Economics Paper - I	1	Economics Paper - III
2	Economics Paper - II	2	Economics Paper - IV

Note: Group selected in Semester V will continue in Semester VI

**List of Ability Enhancement Courses (AEC) for Semester V (Any Two)		**List of Ability Enhancement Courses (AEC) for Semester VI (Any Two)	
1	Trade Unionism and Industrial Relations Paper - I	1	Trade Unionism and Industrial Relations. Paper - II
2	Computer systems & Applications Paper -I	2	Computer systems & Applications Paper - II
3	Export Marketing Paper - I	3	Export Marketing Paper - II
4	Marketing Research Paper - I	4	Marketing Research Paper - II
5	Investment Analysis and Portfolio Management Paper - I	5	Investment Analysis and Portfolio Management Paper - II
6	Transport Management Paper - I	6	Transport Management Paper - II
7	Entrepreneurship& M.S.S.I. Paper - I	7	Entrepreneurship& M.S.S.I. Paper - II
8	International Marketing Paper - I	8	International Marketing Paper - II
9	Merchant Banking Paper - I	9	Merchant Banking Paper - II
10	Direct & Indirect Taxation Paper - I	10	Direct & Indirect Taxation Paper - II
11	Labour Welfare & Practice Paper - I	11	Labour Welfare & Practice Paper - II
12	Purchasing & Store keeping Paper - I	12	Purchasing & Store keeping Paper - II
13	Insurance Paper - I	13	Insurance Paper - II
14	Banking Law & Practice Paper - I	14	Banking Law & Practice Paper - II
15	Regional Planning Paper - I	15	Regional Planning Paper - II
16	Rural Marketing Paper - I	16	Rural Marketing Paper - II
17	Elements of Operational Research Paper- I	17	Elements of Operational Research Paper - II
18	Psychology of Human Behaviour at work Paper - I	18	Psychology of Human Behaviour at work Paper - II
Note: Course selected in Semester V will continue in Semester VI			

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Nerul
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SYLLABUS – SEMESTER V

Unit I Data Communication, Networking and Internet (18 L)

(a) Data Communication Component, Data representation, Distributed processing. (Concepts only)

(b) Network Basics and Infrastructure
- i) Definition, Types (LAN, MAN, WAN) Advantages.
- ii) Network Structures – Server Based, Client server, Peer to Peer.
- iii) Topologies – Star, Bus, Ring.
- iv) Network Media, Wired and Wireless.
- v) Network Hardware: Hubs, Bridges, Switches, Routers.
- vi) Network Protocols – TCP/IP, OSI Model.

(c) Internet
- i) Definition, Types of connections, sharing internet connection.
- ii) Services on net- WWW, Email-Blogs.
- iii) IP addresses, Domain names, URLs.
- iv) Searching Directories, Search engines, Boolean search (AND, OR, NOT), Advanced search, Meta Search Engines.
- v) Email – POP/SMTP accounts in Email, Different parts of an Email address. Receiving and sending emails with attachments by scanning attachments for viruses.

Unit II Database and SQL (18 Lectures)

a) Introduction : To Databases, Relational and Non-relational database system MySQL as a Non-procedural Language. View of data.

b) SQL Basics : Statements (Schema Statements, Data statements, Transaction statements, names (table & column names), data types (Char, Varchar, Text, Mediumtext, Longtext, Smallint, Bigint, Boolean, Decimal, Float, Double, Date, Date Time, Timestamp, Year, Time, Creating Database, inserting data, Updating data, Deleting data, expressions, built-in-functions, missing data(NULL and NOT NULL DEFAULT values) CREATE,USE, ALTER (Add, Remove, Change columns), RENAME, SHOW, DESCRIBE (CREATE TABLE, COLUMNS, STATUS and DATABASES only) and DROP (TABLE, COLUMN, DATABASES statements), PRIMARY KEY FOREIGN KEY (One and more columns) Simple Validity checking using CONSTRAINTS.

c) Simple queries: The SELECT statement (From, Where, Group By, Having, Order By, Distinct, Filtering Data by using conditions. Simple and complex conditions using logical, arithmetic and relational operators (=, !,=, <, >, <>, AND, OR, NOT, LIKE, BETWEEN).

d) Multi-table queries: Simple joins (INNER JOIN), SQL considerations for multi table queries (table aliases, qualified column names, all column selections self joins).

e) Nested Queries (Only up to two levels) : Using sub queries, sub query search conditions, sub queries & joins, nested sub queries, correlated sub queries, sub queries in the HAVING clause.

Simple Transaction illustrating START, COMMIT, and ROLLBACK.

Unit III Spreadsheet (9 Lectures)

a) Multiple Spreadsheets

i) Creating and using templates.
ii) Creating and Linking Multiple Spreadsheets.
iii) Using formulas and logical operators.
iv) Creating and using named ranges.

b) Functions

i) Database Functions LOOKUP, VLOOKUP, HLOOKUP
ii) Conditional Logic functions IF, COUNTIF, SUMIF
iii) String functions LEFT, RIGHT, MID, LEN, UPPER, LOWER, PROPER, TRIM.
iv) Date functions TODAY, NOW, DATE, TIME, DAY, MONTH, YEAR, WEEKDAY, DAYS360

c) Data Analysis

i) Filter with customized condition.
ii) The Graphical representation of data.

Note :

a) Theory 3 lectures per week.
b) Practical batch size 20-25, 1 practical = 3 theory lectures per week.
c) 10 Practical's are to be completed in each semester.

SEMESTER V

Topic	Number of Practical's
Word processing	1
Spreadsheet	3
SQL	6

Minimum 6 practical's are to be recorded in the journal in the Semester V [Minimum 4 on SQL, 2 on spreadsheet)

SEMESTER VI

Topic	Number of Practical's
Presentation skills	1
Spreadsheet	3
Introduction to C Programming/Visual Basic	6

Minimum 6 practical's are to be recorded in the journal in the Semester VI [Minimum 4 on C/VB, 2 on spreadsheet)

d) Scheme of Examination

Type	Marks	Duration
Theory	60	2 hours
Practical	20	1 hour per batch of 10
Assignment & Presentation	10	
Active Participation and Class conduct	10	

University of Mumbai

B.Com. (Accounting and Finance) Programme
Guidelines for Project Work
at
Third Year
Semester VI

Under Choice Based Credit, Grading and Semester System

(To be implemented from Academic Year 2018-2019)

Board of Studies-in-Accountancy

Introduction

Inclusion of project work in the course curriculum of the B.Com. (Accounting & Finance) programme is one of the ambitious aspects in the programme structure. The main objective of inclusion of project work is to inculcate the element of research analyse and scientific temperament challenging the potential of learner as regards to his/ her eager to enquire and ability to interpret particular aspect of the study. It is expected that the guiding teacher should undertake the counselling sessions and make the awareness among the learners about the methodology of formulation, preparation and evaluation pattern of the project work.

- There are two modes of preparation of project work
  1. Project work based on research methodology in the study area
  2. Project work based on internship in the study area

Guidelines for preparation of Project Work

1. General guidelines for preparation of project work based on Research Methodology

- The project topic may be undertaken in any area of Elective Courses.
- Each of the learner has to undertake a Project individually under the supervision of a teacher-guide.
- The learner shall decide the topic and title which should be specific, clear and with definite scope in consultation with the teacher-guide concerned.
- University/college shall allot a guiding teacher for guidance to the students based ~~on her/~~ his specialization.
- The project report shall be prepared as per the broad guidelines given below:
  - Font type: Times New Roman
  - Font size: 12-For content, 14-for Title
  - Line Space : 1.5-for content and 1-for in table work
  - Paper Size: A4
  - Margin : in Left-1.5, Up-Down-Right-1
  - The Project Report shall be bounded.
  - The project report should be 80 to 100 pages

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Format

1st page (Main Page)

Title of the problem of the Project

A Project Submitted to

University of Mumbai for partial completion of the degree of

Bachelor in Commerce (Accounting and Finance)

Under the Faculty of Commerce

By

Name of the Learner

Under the Guidance of

Name of the Guiding Teacher

Name and address of the College

Month and Year

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2nd Page

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University of Mumbai

Revised Syllabus
and
Question Paper Pattern
of Courses of
B.Com. (Accounting and Finance)
Programme
Second Year
Semester III and IV

Under Choice Based Credit, Grading and Semester *System*

(To be implemented from Academic Year 2017-2018)

Board of Studies-in-Accountancy

Revised Syllabus of Courses of B.Com. (Accounting and Finance)
Programme at Semester III
with Effect from the Academic Year 2017-2018

2A. Ability Enhancement Courses (AEC)

Information Technology in Accountancy - I

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Computers	10
2	Office Productivity Tools	20
3	Web	10
4	Introduction to Internet and other emerging technologies	10
5	Electronic Commerce	10
	Total	**60**

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S.I.E.S. (NERUL) COLLEGE OF ARTS SCIENCE & COMMERCE
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Nerul
Navi Mumbai-400706

Title of the Programme - Bachelor of Commerce – Banking & Insurance

(B.Com.-Banking & Insurance) Degree Course

Structure of the Programme with Credit System

Year	Semester	Course	Code	Title of the Course	Lectures /Tutorials	Credit
I	I	**Core Courses**				
		1	UBIFSI.1	Environment and Management of Financial Services	04	03
		2	UBIFSI.2	Principles of Management	04	03
		3	UBIFSI.3	Economics-I (Micro)	04	03
		Allied Courses				
		4	UBIFSI.4	Effective Communication-I	04	03
		5	UBIFSI.5	Qualitative Methods-I	04	03
		6	UBIFSI.6	Introduction to Computer Systems	04	03
I	II	**Core Courses**				
		1	UBIFSII.1	Principles and Practices of Banking and Insurance	04	03
		2	UBIFSII.2	Financial Accounting	04	03
		3	UBIFSII.3	Economics-II (Micro)	04	03
		Allied Courses				
		4	UBIFSII.4	Effective Communication-II	04	03
		5	UBIFSII.5	Qualitative Methods-II	04	03
		6	UBIFSII.6	Business Law	04	03

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Plot 1-C, Sector-V, Nerul

111

Enclosure to Item No. 4.77
A.C. 25/05/2011

UNIVERSITY OF MUMBAI

Manual for the

(1) B.Com.
(2) B.Com-Accounting & Finance,
(3) B.Com-Financial Markets
(4) B.Com- Banking & Insurance &
(5) Bachelor of Management Studies (BMS)

Programs : B.Com/ B.Com(A&F)/ B.Com(FM)/ B.Com(BI) & BMS

Credit Based Semester and Grading System with

effect from the academic year 2011-2012)

Revised Syllabus of Courses of B.Com. (Financial Markets) Programme at Semester I with Effect from the Academic Year 2016-2017

Skill Enhancement Courses (SEC)

5. Foundation Course - I

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Overview of Indian Society	05
2	Concept of Disparity- 1	10
3	Concept of Disparity-2	10
4	The Indian Constitution	10
5	Significant Aspects of Political Processes	10
	Total	**45**

Revised Syllabus of Courses of B.Com. (Financial Markets) Programme at Semester II with Effect from the Academic Year 2016-2017

Skill Enhancement Courses (SEC)

5. Foundation Course – II

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Globalisation and Indian Society	07
2	Human Rights	10
3	Ecology	10
4	Understanding Stress and Conflict	10
5	Managing Stress and Conflict in Contemporary Society	08
	Total	**45**

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Title of the Programme - Bachelor of Commerce – Financial Markets (B.Com.-FM) Degree Course

Structure of the Programme with Credit System

Year	Semester	Course	Code	Title of the Course	Lectures / Tutorials	Credit
I	I	**Core Courses**				
		1	UFMFSI.1	Principles of Investment	04	03
		2	UFMFSI.2	Micro-Economics	04	03
		3	UFMFSI.3	Financial Accounting	04	03
		4	UFMFSI.4	Business Environment	04	03
		Allied Courses				
		5	UFMFSI.5	Basic Statistics	04	03
		6	UFMFSI.6	Basic Computer Skills	04	03
I	II	**Core Courses**				
		1	UFMFSII.1	Environment of Financial System	04	03
		2	UFMFSII.2	Macro-Economics	04	03
		3	UFMFSII.3	Management Accounting	04	03
		4	UFMFSII.4	Principles of Business Management	04	03
		Allied Courses				
		5	UFMFSII.5	Statistical Applications	04	03
		6	UFMFSII.6	Communication Skills	04	03

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Year	Semester	Course	Code	Title of the Course	Lectures / Tutorials	Credit
III	V	**Core Courses**				
		1	UFMFSV.1	Global Capital Markets	04	03
		2	UFMFSV.2	Regulations of Securities Markets	04	03
		3	UFMFSV.3	Insurance (Fund) Management	04	03
		4	UFMFSV.4	Derivative Markets	04	03
		5	UFMFSV.5	Foreign Exchange Markets	04	03
		6	UFMFSV.6	Portfolio Management	04	03
		Allied Course				
		7	UFMFSV.7	Project -I	04	03
III	VI	**Core Subjects**				
		1	UFMFSVI.1	Risk Management	04	03
		2	UFMFSVI.2	Corporate Governance	04	03
		3	UFMFSVI.3	Computer Applications in Financial Services	04	03
		4	UFMFSVI.4	Marketing of Financial Services	04	03
		5	UFMFSVI.5	Mutual Fund Management	04	03
		6	UFMFSVI.6	Customer Relationship Management in Financial Services	04	03
		Allied Course				
		7	UFMFSVI.7	Project -II	04	03

University of Mumbai

Bachelor of Management Studies Programme
Guidelines for Project Work
at
Third Year
Semester VI

Under Choice Based Credit, Grading and Semester System

(To be implemented from Academic Year 2018-2019)

Board of Studies-in-Business Management

Introduction

Inclusion of project work in the course curriculum of the Bachelor of Management Studies programme is one of the ambitious aspects in the programme structure. The main objective of inclusion of project work is to inculcate the element of research analyse and scientific temperament challenging the potential of learner as regards to his/ her eager to enquire and ability to interpret particular aspect of the study. It is expected that the guiding teacher should undertake the counselling sessions and make the awareness among the learners about the methodology of formulation, preparation and evaluation pattern of the project work.

- There are two modes of preparation of project work
  1. Project work based on research methodology in the study area
  2. Project work based on internship in the study area

Guidelines for preparation of Project Work

1. General guidelines for preparation of project work based on Research Methodology

- The project topic may be undertaken in any area of Elective Courses.
- Each of the learner has to undertake a Project individually under the supervision of a teacher-guide.
- The learner shall decide the topic and title which should be specific, clear and with definite scope in consultation with the teacher-guide concerned.
- University/college shall allot a guiding teacher for guidance to the students based on her / his specialization.
- The project report shall be prepared as per the broad guidelines given below:
  - Font type: Times New Roman
  - Font size: 12-For content, 14-for Title
  - Line Space : 1.5-for content and 1-for in table work
  - Paper Size: A4
  - Margin : in Left-1.5, Up-Down-Right-1
  - The Project Report shall be bounded.
  - The project report should be 80 to 100 pages

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TYBMM (2016-17)
(Advertising)

AC 26/6/2015
Item No. 4.19 (A)

a. **Scrap book:** Ads collected from newspaper & magazines & analysis based in design context. (guidelines on separate paper)

b. **Sketch book:** Explanation with examples & practical assignment based on the topic in sketch book.
a. Class-work on graphic principles. (Balance, Contrast, rhythm, harmony, word expression, negative space, colour behavior etc.

b. Rough design of Final Logo (development stages) & Stages of Layout of final Ad.
Ad Design SEM 5 TYBMM Ad Rough draft Ad Design Syllabus Prof: Arvind Parulekar 95610 95105 | 98215 95105

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150

AC 26/6/2015
Item No. 4.19 (A)

Elements of External Campaign:

1. **Logo** Design with design philosophy (manual)
2. **Stationary:** Letterhead, Envelope, Visiting card with common theme
3. **Newspaper ads: Set of 3 ads** with layout similarity (common theme)
4. **Magazine ads:** Set of 3 ads with layout similarity (considering size, print Q, Paper Q, life & frequency of reading
5. **Outdoor Ad:** Poster/ Hoarding
6. **Innovative/ Ambient/ Transit** (Any one)
7. **Point of Sale ad:** Danglers/ Standees/ Show-cards etc
8. **Merchandise:** Branding/ recall instrument (cap/ keychain etc
9. **TVC:** Story board of 12 to 16 frames with character detail, OSD, VO, VFX, SFX, Product flash
10. **Website:** Pop up/ Banner/ scroll ad & home page (Note: Home page is not the ad)

Reference books:

1. **Advertising Art & Ideas G. M. Rege**
2. **Art & Production N. N. Sarkar**
3. **Brand Positioning Subroto Sengupta**
4. **Ogilvy on Advertising David Ogilvy**
5. **The Advertising Handbook Dell Denison**
6. **Advertising by Design Robin Landa**

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TYBMM (16-17)
Journalism

- Content
- Ownership
- Political patronage

12. Increasing ownership and dominance of families with political connections over regional newspapers. (2)

Reference

1. Jeffery Robin: India's Newspaper Revolution, Oxford union publication, 2000
2. RangaswamiParthasarathy: Journalism in India, Sterling Publication
3. P.K Ravindrnath : Indian Regional Journalism, Authorpress

Sem. V

Newspaper & Magazine Making

Max. Marks: 100 (Theory:75, Internals: 25)

Objective:

- To study the design, elements of the newspaper and magazine
- To study space distribution
- To get exposure to design software such as Quark Express
- To study the process of planning and production of newspaper and magazine

Module :

1. Why & How we read. The need of updates & favorite topics 2

2. Analyzing the newspaper from layout point of view 4
a. Understanding parts of newspaper; Style Book
b. Total Page Concept (TPC)
c. Terminology, Regulars, Weekly columns, Supplements,
d. Headline, Deck, Kicker –Over line, Quote, Pull quote, sidebar etc. Introduce about logic behind each part
e. Errors: Orphan, Widow, Dog legging etc

3. Grid structure: Introduction about space distribution in the news paper by way of column & grid pattern. These are latitude & longitude of the paper 2

4. Comparison between various newspaper layouts/ distinguishing factors 2

5. Types of Newspapers: Introducing to prime differences between Tabloid & Broadsheet in terms of stories, presentation, structural difference 2

6. Introduction to Typography: **2**
a. Typefaces, Fonts; Measures, leading, kerning, tracking, units etc.
b. Classification of typefaces: Serif/Sans Serif/ Decorative etc
c. Combination of Typefaces/ To achieve contrast & harmony/ Alignment

7. Introduction to Quark Express: **16**
a. Runaround, Inset, Box colour & Tone, Frame, Linking
b. Shortcuts & keys,
c. Style Sheets, Colour palate, Measurement bar

8. Introduction to Graphic Principles: **2**
a. Introducing how Contrast, Balance, Harmony work in overall organized look of a paper.
b. Visual path in a picture & Visual syntax
Newspaper Magazine Making Syllabus: TYBMM sem-V Prof Arvind Parulekar

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9. Introduction to the Types of Layout: 2
a. Modular/ Brace/ Contrast & Balance
b. Adaption of one layout over other for a purpose

10. Final project: (Rest of the lectures in guidance on the project to completion) 4
a. Discussing ideas to improve visual appeal as well as organized layout
b. Introduction to Content plan (Magazine)
c. Introduction to Flat plan (Magazine)
d. Working of Rough Layout on paper (Sketch)

11. Introduction to print production: Taking the project towards finishing 4
a. Pagination & page set up, Guiding on print ready copy/ cut marks etc
b. Types of paper/ Surface nature/ Weight/ Std sizes
c. Collating/Gathering/ staple binding & Saddle stitch

12. Preparation for Viva Voce 2
a. Mock Viva/ Rectifying mistaken ideas

The above paper is based on extensive practical & project to be done on Quark Express as prime software & Photoshop as supportive only.

1. Introduction to In Design 4

a. Industry is fast shifting towards **Adobe In Design**. The students passing out ought to know both the soft-wares. Since next year onwards we will have to focus more on In Design.

b. Suggestion:

>Broadsheet & Tabloid on Quark Express
>Magazine on In Design

Internal: (25 marks)

1. Content Plan (Magazine): Working of page distribution
2. Flat Plan (Magazine): Working on page-wise space distribution
3. Rough Layout (Magazine): Dummy magazine on paper(pencil work on layout)

External Project: (75 marks)

1. Broadsheet (35cmX55cm) Number of pages 6
2. Tabloid (28cmX35cm) Number of pages 6
3. Magazine (A-4) Number of pages 32 (or more in multiple of 4)

Reference Books:

Newspaper Layout & Design: Darylr & Moen Surjeet publication
Visual Journalism: Rajesh Pandey Adhyayan publication
Editorial Art & Design Randy Stano Miyami Herald
The Magazine Handbook: NcKay J. Routledge

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F4 IT New

B. Sc. (Information Technology)		Semester – II	
Course Name: Green Computing Practical		Course Code: USIT2P5	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	2½	50
	Internal	--	--

Project and Viva Voce	
1.	A project should be done based on the objectives of Green Computing. A report of minimum 50 pages should be prepared. The report should have a font size of 12, Times new roman and 1.5 line spacing. The headings should have font size 14. The report should be hard bound.
2.	The project can be done individually or a group of two students.
3.	The students will have to present the project during the examination.
4.	A certified copy of the project report is essential to appear for the examination.

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Semester – 1			
Course Code	**Course Type**	**Course Title**	**Credits**
USIT101	Core Subject	Imperative Programming	2
USIT102	Core Subject	Digital Electronics	2
USIT103	Core Subject	Operating Systems	2
USIT104	Core Subject	Discrete Mathematics	2
USIT105	Ability Enhancement Skill Course	Communication Skills	2
USIT1P1	Core Subject Practical	Imperative Programming Practical	2
USIT1P2	Core Subject Practical	Digital Electronics Practical	2
USIT1P3	Core Subject Practical	Operating Systems Practical	2
USIT1P4	Core Subject Practical	Discrete Mathematics Practical	2
USIT1P5	Ability Enhancement Skill Course Practical	Communication Skills Practical	2
		Total Credits	**20**

Semester – 2			
Course Code	**Course Type**	**Course Title**	**Credits**
USIT201	Core Subject	Object oriented Programming	2
USIT202	Core Subject	Microprocessor Architecture	2
USIT203	Core Subject	Web Programming	2
USIT204	Core Subject	Numerical and Statistical Methods	2
USIT205	Ability Enhancement Skill Course	Green Computing	2
USIT2P1	Core Subject Practical	Object Oriented Programming Practical	2
USIT2P2	Core Subject Practical	Microprocessor Architecture Practical	2
USIT2P3	Core Subject Practical	Web Programming Practical	2
USIT2P4	Core Subject Practical	Numerical and Statistical Methods Practical	2
USIT2P5	Ability Enhancement Skill Course Practical	Green Computing Practical	2
		Total Credits	**20**

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TYIT New

B. Sc. (Information Technology)		Semester – V	
Course Name: Project Dissertation		Course Code: USIT5P1	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	2½	50
	Internal	--	--

The details are given in Appendix – I

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Project Dissertation Semester V and Project Implementation Semester VI

Chapter 1 to 4 should be submitted in Semester V in spiral binding. These chapter have also to be included in Semester VI report. Semester VI report has to be hard bound with golden embossing. Students will be evaluated based on the dissertation in semester V and dissertation and viva voce in Semester VI.

I. OBJECTIVES

- Describe the Systems Development Life Cycle (SDLC).
- Evaluate systems requirements.
- Complete a problem definition.
- Evaluate a problem definition.
- Determine how to collect information to determine requirements.

110

- Generate various reports.
- Be able to prepare and evaluate a final report.
- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.
- Decide the various processing systems to include distributed, client/server, online and others.
- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts.
- Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques/strategies to include the phases of testing.
- Systems implementation and its key problems.
- Generate various reports.
- Be able to prepare and evaluate a final report.
- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.
- Work effectively as an individual or as a team member to produce correct, efficient, well-organized and documented programs in a reasonable time.
- Recognize problems that are amenable to computer solutions, and knowledge of the tool necessary for solving such problems.
- Develop of the ability to assess the implications of work performed.
- Get good exposure and command in one or more application areas and on the software
- Develop quality software using the software engineering principles
- Develop of the ability to communicate effectively.

II. Type of the Project

The majority of the students are expected to work on a real-life project preferably in some industry/ Research and Development Laboratories/Educational Institution/Software Company. Students are encouraged to work in the areas listedbelow . However, it is ***not mandatory*** for a

TY IT old

PROGRAMME : B. Sc (Information Technology)		Semester – VI	
COURSE: PROJECT REPORT		COURSE CODE – USIT607	
Periods per week 1 Period is 50 minutes	Lecture	5	
	Practical	3	
		Hours	Marks
Evaluation System	Project Report (External)	--	60
	Project Report (Internal)	–	40

PROGRAMME : B. Sc (Information Technology)		Semester – VI	
COURSE: PROJECT VIVA VOCE		COURSE CODE – USIT608	
Periods per week 1 Period is 50 minutes	Lecture	--	
	Practical	--	
		Hours	Marks
Evaluation System	Viva Voce (External)	–	60
	Viva Voce (Internal)	–	40

The project should be undertaken preferably individually or by the group of maximum 4 students who will jointly work and implement the project. The candidate/group will select a project with the approval of the Guide (staff member) and submit the name of the project with a synopsis of the proposed work of not more than 02 to 08 pages within one month of the starting of the semester. The candidate/ group is expected to complete detailed system design, analysis, data flow design, procurement of hardware and/or software, implementation of a few modules of the proposed work during the semester VI as a part of the term work submission in the form of a joint report.
Candidate/group will submit the completed project work to the department at the end of semester VI as mentioned below.

1. The workable project.
2. The project report in the bound journal complete in all respect with the following : -
   a. Problem specifications.
   b. System definition – requirement analysis.
   c. System design – dataflow diagrams, database design
   d. System implementation – algorithm, code documentation
   e. Test results and test report.
   f. In case of object oriented approach – appropriate process be followed.

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The project report should contain a full and coherent account of your work. Although there will be an opportunity to present the work verbally, and demonstrate the software, the major part of the assessment will be based on the written material in the project report. One can expect help and feedback from the project guide, but ultimately it's the candidates own responsibility. The suggestive structure of a project report should be guided by your guide in selecting the most appropriate format for your project.

The oral examination will be conducted by an internal and external examiner as appointed by the University.

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Academic Council 14/07/2016
Item No: 4.76

UNIVERSITY OF MUMBAI

Syllabus for F.Y.B.Sc.

Programme: B.Sc.

Course: Information Technology

with effect from the academic year

2016 – 2017

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Semester – 1			
Course Code	**Course Type**	**Course Title**	**Credits**
USIT101	Core Subject	Imperative Programming	2
USIT102	Core Subject	Digital Electronics	2
USIT103	Core Subject	Operating Systems	2
USIT104	Core Subject	Discrete Mathematics	2
USIT105	Ability Enhancement Skill Course	Communication Skills	2
USIT1P1	Core Subject Practical	Imperative Programming Practical	2
USIT1P2	Core Subject Practical	Digital Electronics Practical	2
USIT1P3	Core Subject Practical	Operating Systems Practical	2
USIT1P4	Core Subject Practical	Discrete Mathematics Practical	2
USIT1P5	Ability Enhancement Skill Course Practical	Communication Skills Practical	2
		Total Credits	**20**

Semester – 2			
Course Code	**Course Type**	**Course Title**	**Credits**
USIT201	Core Subject	Object oriented Programming	2
USIT202	Core Subject	Microprocessor Architecture	2
USIT203	Core Subject	Web Programming	2
USIT204	Core Subject	Numerical and Statistical Methods	2
USIT205	Ability Enhancement Skill Course	Green Computing	2
USIT2P1	Core Subject Practical	Object Oriented Programming Practical	2
USIT2P2	Core Subject Practical	Microprocessor Architecture Practical	2
USIT2P3	Core Subject Practical	Web Programming Practical	2
USIT2P4	Core Subject Practical	Numerical and Statistical Methods Practical	2
USIT2P5	Ability Enhancement Skill Course Practical	Green Computing Practical	2
		Total Credits	**20**

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Academic Council 11/05/2017
Item No:

UNIVERSITY OF MUMBAI

Syllabus for S.Y.B.Sc.

Programme: B.Sc.

Course: Information Technology

with effect from the academic year

2017 – 2018

Semester – 3			
Course Code	**Course Type**	**Course Title**	**Credits**
USIT301	Skill Enhancement Course	Python Programming	2
USIT302	Core Subject	Data Structures	2
USIT303	Core Subject	Computer Networks	2
USIT304	Core Subject	Database Management Systems	2
USIT305	Core Subject	Applied Mathematics	2
USIT3P1	Skill Enhancement Course Practical	Python Programming Practical	2
USIT3P2	Core Subject Practical	Data Structures Practical	2
USIT3P3	Core Subject Practical	Computer Networks Practical	2
USIT3P4	Core Subject Practical	Database Management Systems Practical	2
USIT3P5	Core Subject Practical	Mobile Programming Practical	2
		Total Credits	**20**

Semester – 4			
Course Code	**Course Type**	**Course Title**	**Credits**
USIT401	Skill Enhancement Course	Core Java	2
USIT402	Core Subject	Introduction to Embedded Systems	2
USIT403	Core Subject	Computer Oriented Statistical Techniques	2
USIT404	Core Subject	Software Engineering	2
USIT405	Core Subject	Computer Graphics and Animation	2
USIT4P1	Skill Enhancement Course Practical	Core Java Practical	2
USIT4P2	Core Subject Practical	Introduction to Embedded Systems Practical	2
USIT4P3	Core Subject Practical	Computer Oriented Statistical Techniques Practical	2
USIT4P4	Core Subject Practical	Software Engineering Practical	2
USIT4P5	Core Subject Practical	Computer Graphics and Animation Practical	2
		Total Credits	**20**

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103

TYCS New

T.Y.B.Sc. (Semester V and VI)
Computer Science Syllabus
Choice Based Credit System
To be implemented from the Academic year 2018-2019

SEMESTER V			
Course	**TOPICS**	**Credits**	**L / Week**
	Elective-I (Select Any Two)		
USCS501	Artificial Intelligence	3	3
USCS502	Linux Server Administration	3	3
USCS503	Software Testing and Quality Assurance	3	3
	Elective-II (Select Any Two)		
USCS504	Information and Network Security	3	3
USCS505	Architecting of IoT	3	3
USCS506	Web Services	3	3
	Skill Enhancement		
USCS507	Game Programming	2	3
	Practical		
USCSP501	Practical of Elective-I	2	6
USCSP502	Practical of Elective-II	2	6
USCSP503	Project Implementation	1	3
USCSP504	Practical of Skill Enhancement : USCS507	1	3

SEMESTER VI			
Course	**TOPICS**	**Credits**	**L / Week**
	Elective-I (Select Any Two)		
USCS601	Wireless Sensor Networks and Mobile Communication	3	3
USCS602	Cloud Computing	3	3
USCS603	Cyber Forensics	3	3
	Elective-II (Select Any Two)		

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107

USCS604	Information Retrieval	3	3
USCS605	Digital Image Processing	3	3
USCS606	Data Science	3	3
	Skill Enhancement		
USCS607	Ethical Hacking	2	3
	Practical		
USCSP601	Practical of Elective-I	2	6
USCSP602	Practical of Elective-II	2	6
USCSP603	Project Implementation	1	3
USCSP604	Practical of Skill Enhancement : USCS607	1	3

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TYCS old

T.Y.B.Sc. Computer Science Syllabus
Credit Based Semester and Grading System
To be implemented from the Academic year 2013-2014

SEMESTER VI

Course	TOPICS	Credits	L / Week
USCS601	Data Communication, Networking & Security-II	2.5	4
USCS602	Advanced Java - II	2.5	4
USCS603	Linux	2.5	4
USCS604	Software Engineering	2.5	4
USCSP07	Practicals of USCS601 + USCS602	3	8
USCSP08	Practicals of USCS603 + USCS604	3	8

Theory

Course: USCS601	TOPICS (Credits : 2.5 Lectures/Week: 4) Data Communication, Networking & Security-II	
Unit I	**Network Layer** –Logical addressing, IPv4 Addresses, Classful & Classless addresses, NAT, IPv6 Addressing, **Network layer protocol –** Internetworking, IPv4, IPv4 protocol packet format, IPv6 Protocol & Packet format, IPv4 VS IPv6, Transition from IPv4 to IPv6, Address Resolution protocols(ARP, RARP), BOOTP, DHCP, **Routing Protocols -** Delivery, forwarding, routing, types of routing, routing tables, Unicast Routing, Unicast Routing protocols, RIP, Concepts of OSPF, BGP & Multicast Routing	15 L
Unit II	**Transport Layer** - Process to process delivery, UDP, TCP **Congestion Control & Quality of Service-** Data traffic, Congestion, Congestion Control(Open Loop, Closed Loop & Congestion control in TCP), QoS and Flow Characteristics **Application Layer** - DNS, Remote Logging(Telnet), SMTP, FTP, WWW, HTTP	15 L
Unit III	**Introduction:** Introduction to system and network security, security attacks, security services and mechanisms. **Malicious software and Internet Security:** viruses and related threats, virus countermeasures, denial of service attacks, *Hacking,* Security policies and plan, Strategies for a secure network.	15 L

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102

Practicals

USCSP07	**Practicals of USCS601 + USCS602 (Credits: 3, Pract/Week: 8)**
	1. Basic Linux commands such as file and directory manipulation, redirection and piping 2. Basic filter commands such as head, tail, more, cat, sort, cut, grep 3. Advanced filters such as egrep, fgrep, tr, sed, awk 4. File operation commands such as – split, tar, find, zip, ln, chmod 5. Basic shell scripting such as – defining variables, reading user input, conditions, loops, string operations, arithmetic operations 6. Advanced shell scripting such as - environment variables, shell features, command line arguments, file tests, using backticks, 7. Process management such as –ps, jobs, nice, fg, bg, at 8. Linux system administration such as – user management, mounting, job control(crontab), chown, chgrp etc
	1) Simple Server-Side Programming using Servlets 2) Advance Server-Side Programming using Servlets 3) Simple Server-side programming using JSP 4) Advance Server-side programming using JSP 5) Developing Simple Enterprise Java Beans 6) Developing Advance Enterprise Java Beans 7) Developing Simple Web services in Java 8) Developing Advance Web services in Java
USCSP08	**Practicals of USCS603 + USCS604 (Credits: 3, Pract/Week: 8)**
	Project Documentation 1) **Acknowledgement** 2) **Preliminary Investigation** - Organizational Overview, Description of System, Limitations of present system, Proposed system and its adv. [For web project, URL can be mentioned], Feasibility Study, Stakeholders, Technologies used, Gantt Chart 3) **System Analysis** - Fact Finding Techniques (Questionnaire, Sample Reports, Forms...), Prototypes(if any), Event Table, Use Case Diagram, Scenarios & Use Case Description, ERD, Activity Diagram, Class diagram, Object Diagram, Sequence diagram/Collaboration Diagram, State diagram 4) **System Design** - Converting ERD to Tables, Design Class diagram[with UI classes, Persistent classes etc…], Component Diagram, Package Diagram, Deployment Diagram 5) **System Coding**- Menu Tree / Sitemap, List of tables with attributes and constraints, Design Patterns used (if any), Program Descr[Programs /Classes and their responsibilities in brief] with Naming Conventions, Validations, Test Cases, Test Data and Test Results [Write test cases for all important programs], Screen Layouts & Report Layouts, Program Listing[for dummy project] 6) **System Implementation / Uploading** 7) **Future Enhancements** 8) **References and Bibliography**

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Academic Council 24/06/2016
Item No: _____

UNIVERSITY OF MUMBAI

Syllabus for

Program: Bachelor of Science

Course: Computer Science

With effect from

Academic Year 2016-2017

F.Y.B.Sc. Computer Science Syllabus
Credit Based System and Grading System
Academic year 2016-2017

Semester – I				
Course Code	**Course Type**	**Course Title**	**Credits**	**Lectures/Week**
USCS101	Core Subject	Computer Organization and Design	2	3
USCS102	Core Subject	Programming with Python- I	2	3
USCS103	Core Subject	Free and Open Source Software	2	3
USCS104	Core Subject	Database Systems	2	3
USCS105	Core Subject	Discrete Mathematics	2	3
USCS106	Core Subject	Descriptive Statistics and Introduction to Probability	2	3
USCS107	Ability Enhancement Course 1	Soft Skills Development	2	3
USCSP01	Core Subject Practical	Practical of USCS101 + USCS102 + USCS103+USCS104+USCS105+USCS106	6	18

Semester – II				
Course Code	**Course Type**	**Course Title**	**Credits**	**Lectures/Week**
USCS201	Core Subject	Programming with C	2	3
USCS202	Core Subject	Programming with Python– II	2	3
USCS203	Core Subject	Linux	2	3
USCS204	Core Subject	Data Structures	2	3
USCS205	Core Subject	Calculus	2	3
USCS206	Core Subject	Statistical Methods and Testing of Hypothesis	2	3
USCS207	Ability Enhancement Course 2	Green Technologies	2	3
USCSP02	Core Subject Practical	Practical of USCS201 + USCS202 + USCS203+USCS204+USCS205+USCS206	6	18

Academic Council 25/05/2011
Item No. 4.90

UNIVERSITY OF MUMBAI

Syllabus for the F.Y.B.Sc.
Program: B.Sc.
Course : Computer Science

(Credit Based Semester and Grading System with effect from the academic year 2011–2012)

F.Y. B.Sc. Syllabus
(Credit, Grade and Semester System)
To be introduced from the Academic Year 2011 – 2012

Computer Science – Single Major Course

The credits earned by the learner in the duration of the three year undergraduate programme in Computer Science is shown in the following Table, assuming that the student has taken Computer Science, Physics, Mathematics and Foundation courses in the first year, Computer Science, Mathematics, and Foundation courses in the second year and Computer Science and Applied Component in the third year.

For Course per week 1 lecture/period is 48 minutes duration				**For subject per week** 1 lecture/period is 48 minutes duration			
	Theory	Practical	Tutorial		Theory	Practical	Tutorial
Actual Contact	3	3	-	Actual Contact	6	6	-
Credits	2	1	-	Credits	4	2	-

Year	Sem	Computer Science		Mathematics		Physics		FC	AC		Total
		Th	Pr	Th	Pr	Th	Pr	Th	Th	Pr	
	I	4	2	4	2	4	2	2			20
	II	4	2	4	2	4	2	2			20
	III	6	3	6	3			2			20
	IV	6	3	6	3			2			20
	V	10	6						2	2	20
	VI	10	6						2	2	20
Total		46		30		12		8	8		120

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Nerul
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Course Code	Title	Credits
USCSP1	**PRACTICALS**	**2 Credits**

SECTION – I

(A) Introduction to Operating system desktop, folders, files, shortcuts, popular menus, using notepad, word, excel, power point.
(B) Introduction to windows wildcard characters, absolute path, relative path and commands like md, cd, rd, copy, ren, del etc.
(1) Demo practical on various internal and external parts of computer and their interconnection/working.
(2) Demo hands on assembly of PC.
(3) Study of basic gates.
(4) Implementation of Boolean equations using basic gates.
(5) Study of flip-flops.
(6) Study of 4 to 1 multiplexer.
(7) Study of decoder
(8) Study of counters.
(9) Study of universal shift registers.
(10) Study of 4 bit adder/ Subtractor.

45 Lectures

Note: (1) (1) Practical A and B are compulsory. They are to be written in jjournal but should not be the part of practical examination.
(2) In all **Eight** practical (including A and B) from the list should be performed.

SECTION - II

Suggestions while writing programs in C:
(i) Use of comments at appropriate places is necessary.
(ii) Use appropriate indentation while nesting the loops, if-else statements.
(iii) Do not ignore warnings after the compilation.
(iv) Optimize the codes as far as possible, by using optimization techniques.

Following is the list of suggested practical in C:

(1) Convert the following algorithms using C: Exchange the values of two variables with and without temporary variable.
(2) Convert the following algorithms using C: Counting positive numbers from a set of integers.
(3) Convert the following algorithms using C: Summation of set of numbers.
(4) Convert the following algorithms using C : Reversing the digits of an integer.
(5) Convert following algorithms using C: Find smallest positive divisor of an integer other than 1.
(6) Convert the following algorithms using C: Find G.C.D. and L.C.M. of two as well as three positive integers.
(7) Convert the following algorithms using C: Generating prime numbers.
(8) Write a program to find the **(a)** sum of two matrices of order $m \times n$ and transpose of order $m \times n$ where $m, n \leq 3$. **(b)** multiplication of two matrices of order m, where $m \leq 3$, finding square and cube of a square matrix. **(c)** Inverse of a matrix**(d)** $|A|$, $|B|$ and verify the identity $|A\,B| = |B\,A| = |A|\,|B|$, where $|\ |$ denote determinant of the matrix and A and B of size 2×2.
(9) Write a program to **(a)** input a sentence **(b)** count the number of occurrences of the given pattern of letters (for instance 'est or 'ed') **(c)** find the position of the rightmost or leftmost character occurred from the pattern of letters
(10) Write a program which counts the number of **(a)** paragraphs occurred.**(b)** times the word "the" appears in a short story
Write a program to create structure to **(a)** find and print the average marks of five subjects along with the name of student. **(b)** store names of the states (within India) and their capital cities. Show the capital by inserting state from the keyboard.

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Course Code	Title	Credits
USCSP2	**PRACTICALS**	**2 Credits**

COMPUTER ORGANIZATION -2

45 Lectures

(1) Demo practical on working of 8085.
(2) Study of internal memory, I/O modules.
(3) Study of operating system.
(4) Study of networking of computers and other devices.
(5) Study of concepts of parallel processing.
(6) Study of 8086 architecture.
(7) Study of 8086 instruction set
(8) Writing programs with 8086 microprocessor for
  (a) Addition of 1 to n numbers
  (b) Finding largest/smallest from n given numbers.
(9) Writing program with 8086 microprocessor for demonstration of use of JUMP instructions.
(10) Writing programs with 8086 microprocessor for
  (a) Use of I/O ports.
  (b) Block transfer of memory.

Note: (1) **Any five** experiments from 1 to 7 practical should be performed.

(2) Experiments from 8 to10 are compulsory.

ALGORITHMS AND PROGRAMMING IN C – 2

45 Lectures

(1) Write a program to create functions **(a)** to generate twin primes in a given range of numbers, **(b)** to find the prime factors of a given integer.
(2) Write a program to accept details of 5 customers that includes customer number, name and mobile number. Create a menu with options 'Modify', 'Display' and 'Exit'. Write functions modify(), which will allow modification of mobile number and function display(), which will display all the details of customers.
(3) Given an array S of n integers. Write a program to **(a)** sort the elements in S in ascending order by considering an array of n-2 elements by any sorting method, **(b)** find the median of elements of S
(4) Write a program using pointer notation **(a)** to write function to exchange two strings, **(b)** to determine whether the given string is a palindrome, **(c)** to find the average of each students in 3 tests. Number of students can be given from keyboard.
(5) Write a program that accepts a number from the user and passes a pointer to the number to a function for processing. This function passes a pointer to this pointer to another function for processing of the number. Both the functions should display the number.
(6) Write a function called increment that accepts a date structure with three fields. The first field contains the month (a pointer to string). The second field is an integer showing the day in month. The third field is an integer showing the year. The function should increments the date by 1 day and returns the new date. If the date is the last date in the month, the month field must be changed. If the month is December, the value of year must be changed when day is 31. A year is leap year if **(a)** It is evenly divisible by 4 but not with 100 **(b)** It is evenly divisible by 400
(7) Write a program to crate a dynamic one and two dimension array by accepting number of rows and/or columns from the user at runtime using pointer notation.
(8) Write a program to **(a)** read string from the user to check whether it exists in a given file or not. **(b)**to accept a file name and then accept contents that should be

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UNIVERSITY OF MUMBAI

Syllabus for SemIII& IV
Program: B.Sc.
Course: Computer Science

(Credit Based Semester and Grading System with effect from the academic year 2017-2018)

S.Y.B.Sc. (Semester III and IV)
Computer Science Syllabus
Credit Based Semester and Grading System
To be implemented from the Academic year 2017-2018

SEMESTER III			
Course	**TOPICS**	**Credits**	**L / Week**
USCS301	Theory of Computation	2	3
USCS302	Core JAVA	2	3
USCS303	Operating System	2	3
USCS304	Database Management Systems	2	3
USCS305	Combinatorics and Graph Theory	2	3
USCS306	Physical Computing and IoT Programming	2	3
USCS307	Skill Enhancement: Web Programming	2	3
USCSP301	USCS302+USCS303+USCS304	3	9
USCSP302	USCS305+USCS306+USCS307	3	9

SEMESTER IV			
Course	**TOPICS**	**Credits**	**L / Week**
USCS401	Fundamentals of Algorithms	2	3
USCS402	Advanced JAVA	2	3
USCS403	Computer Networks	2	3
USCS404	Software Engineering	2	3
USCS405	Linear Algebra using Python	2	3
USCS406	.NET Technologies	2	3
USCS407	Skill Enhancement: Android Developer Fundamentals	2	3
USCSP401	USCS401+ USCS402+ USCS403	3	9
USCSP402	USCS405+ USCS406+ USCS407	3	9

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AC. 10/02/2012
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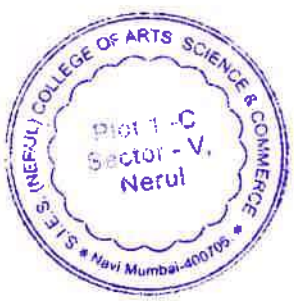
UNIVERSITY OF MUMBAI

Syllabus for S.Y.B.Sc.
Program: S.Y.B.Sc.
Course: Computer Science

(Credit Based Semester and Grading System with effect from the academic year 2012–2013)



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S.Y.B.Sc. Computer Science Syllabus

Restructured for Credit Based Semester and Grading System

To be implemented from the Academic year 2012-2013

Semester I

COURSE CODE	COURSE/PAPER	LECTURES /WEEK	CREDITS
USCS101	Discrete Mathematics	3	2
USCS102	C++ Programming	3	2
USCS103	Data Base Management Systems -I	3	2
USCSPG1	Practical - I	9	3

Practical- I: 3 lecture periods per course per week per batch. All three lecture periods of the practical shall be conducted in succession together on a single day.

SEMESTER I		
Course Code	**Title**	**Credits**
	THEORY	
USCS 101	**DISCRETE MATHEMATICS**	**2 Credits (45 lectures)**
Unit I	**UNIT I: Relations:** **Relations:** Definition and examples. Properties of relations, Partial Ordering sets, Linear ordering Hasse Daigrams , Maximum and Minimum elements, Lattices **Recurrence Relation:** Definition of recurrence relations, Formulating recurrence relations, Solving recurrence relations- Back tracking method, Linear homogeneous recurrence relations with constant coefficients. Solving linear homogeneous recurrence relations with constant coefficients of degree two when characteristic equation has distinct roots and only one root, Particular solutions of non linear homogeneous recurrence relation, Solution of recurrence relation by the method of generation functions, Applications- Formulate and solve recurrence relation for Fibonacci numbers, Tower of Hanoi, Intersection of lines in a plane, Sorting Algorithms.	15 lectures

SEMESTER II

COURSE CODE	COURSE/PAPER	LECTURES /WEEK	CREDITS
USCS201	Computer Graphics	3	2
USCS202	Java Programming	3	2
USCS203	Data Base Management Systems -I	3	2
USCSPG2	Practical - II	9	3

Practical- II: 3 lecture periods per course per week per batch. All three lecture periods of the practical shall be conducted in succession together on a single day.

USCS 201	Computer Graphics	2 Credits (45 lectures)
UNIT I	**Introduction to Computer Graphics** **(a)** Introduction to Computer graphics and its applications, Elements of graphics Displays. **(b) Scan Conversion of lines:** Digital Differential Analyzer(DDA) algorithm, Bresenhams' Line drawing algorithm **(c) Scan Conversion of a circle:** Bresenhams' method of Circle drawing, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm. **(d)** Introduction to Computer Graphics libraries in C.	15 lectures
Unit II	**Design and Visualization** **(a) Viewing and Clipping** Introduction to Viewing and Clipping, Window to Viewport mapping **2D Clipping system:** Point clipping, Inside-Outside Test, Introduction to Line Clipping- Mid-Point Subdivision Clipping Algorithm, Cohen-Sutherland Clipping algorithm. **Introduction to Polygon Clipping:** Sutherland-Hodgeman Algorithm. Character Clipping **(b) Curves and Object design** Introduction to Modeling of object primitives, Space Curve representation Cubic Splines, Bezier curves, Properties of Bezier curves, B-Spline curves, comparison of Bezier curves and B-Spline curves **Surface Generation and Object Design**: Wire frame model, Surface of Revolution, Sweep surface design, Quadric Curved surfaces.	15 lectures

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UNIVERSITY OF MUMBAI

Syllabus for Sem V&VI
Program: Bachelor of Science
Course: Computer Science

Choice Based Credit System with effect from
Academic Year 2018-2019

T.Y.B.Sc. (Semester V and VI)
Computer Science Syllabus
Choice Based Credit System
To be implemented from the Academic year 2018-2019

SEMESTER V			
Course	**TOPICS**	**Credits**	**L / Week**
	Elective-I (Select Any Two)		
USCS501	Artificial Intelligence	3	3
USCS502	Linux Server Administration	3	3
USCS503	Software Testing and Quality Assurance	3	3
	Elective-II (Select Any Two)		
USCS504	Information and Network Security	3	3
USCS505	Architecting of IoT	3	3
USCS506	Web Services	3	3
	Skill Enhancement		
USCS507	Game Programming	2	3
	Practical		
USCSP501	Practical of Elective-I	2	6
USCSP502	Practical of Elective-II	2	6
USCSP503	Project Implementation	1	3
USCSP504	Practical of Skill Enhancement : USCS507	1	3

SEMESTER VI			
Course	**TOPICS**	**Credits**	**L / Week**
	Elective-I (Select Any Two)		
USCS601	Wireless Sensor Networks and Mobile Communication	3	3
USCS602	Cloud Computing	3	3
USCS603	Cyber Forensics	3	3
	Elective-II (Select Any Two)		

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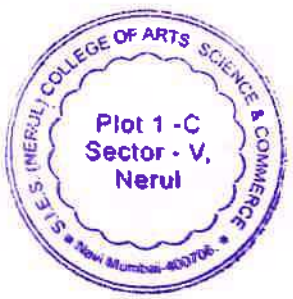
USCS604	Information Retrieval	3	3
USCS605	Digital Image Processing	3	3
USCS606	Data Science	3	3
	Skill Enhancement		
USCS607	Ethical Hacking	2	3
	Practical		
USCSP601	Practical of Elective-I	2	6
USCSP602	Practical of Elective-II	2	6
USCSP603	Project Implementation	1	3
USCSP604	Practical of Skill Enhancement : USCS607	1	3



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AC 27/2/13
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UNIVERSITY OF MUMBAI

Syllabus for Sem V & VI
Program: B.Sc.
Course: Computer Science

(Credit Based Semester and Grading System with effect from the academic year 2013–2014)

T.Y.B.Sc. Computer Science Syllabus
Credit Based Semester and Grading System
To be implemented from the Academic year 2013-2014

SEMESTER V

Course	TOPICS	Credits	L / Week
USCS501	Data Communication, Networking & Security-I	2.5	4
USCS502	Advanced Java – I	2.5	4
USCS503	Operating Systems	2.5	4
USCS504	Database Management System - II	2.5	4
USCSP05	Practicals of USCS501 + USCS502	3	8
USCSP06	Practicals of USCS503 + USCS504	3	8

Theory

Course: USCS501	TOPICS (Credits : 2.5 Lectures/Week: 4) Data Communication, Networking & Security-I	
Unit I	**Introduction** - Data Communication, Networks, Internet, Intranet, Protocols, OSI & TCP/IP Models, Addressing **Physical Layer** – Signals, Analog, Digital, Analog VS Digital, Transmission Impairment, Data Rate Limits, Performance **Digital Transmission** – Line Coding (Unipolar, Polar, Biphase), Block Coding(4B/5B Encoding), Analog to digital conversion, PCM, Transmission Modes, **Analog Transmission** – Digital to analog conversion(ASK,FSK,PSK, QAM), Analog to Analog conversion	15 L
Unit II	**Multiplexing** – FDM, WDM, Synchronous TDM(time slots & frames, interleaving, data rate management), **Spread Spectrum** – FHSS, DSSS **Transmission Media** – Guided & Unguided **Switching** – Switching, Circuit-Switched Networks, Datagram networks, Concept of Virtual circuit networks, structure of circuit switch & packet switch, Concepts of DSL & ADSL	15 L
Unit III	**Data Link Layer** –Error correction & detection, Types of errors, Detection	15 L

T.Y.B.Sc. Computer Science Syllabus
Credit Based Semester and Grading System
To be implemented from the Academic year 2013-2014

SEMESTER VI

Course	TOPICS	Credits	L / Week
USCS601	Data Communication, Networking & Security-II	2.5	4
USCS602	Advanced Java - II	2.5	4
USCS603	Linux	2.5	4
USCS604	Software Engineering	2.5	4
USCSP07	Practicals of USCS601 + USCS602	3	8
USCSP08	Practicals of USCS603 + USCS604	3	8

Theory

Course: USCS601	TOPICS (Credits : 2.5 Lectures/Week: 4) Data Communication, Networking & Security-II	
Unit I	**Network Layer** –Logical addressing, IPv4 Addresses, Classful & Classless addresses, NAT, IPv6 Addressing, **Network layer protocol** – Internetworking, IPv4, IPv4 protocol packet format, IPv6 Protocol & Packet format, IPv4 VS IPv6, Transition from IPv4 to IPv6, Address Resolution protocols(ARP, RARP), BOOTP, DHCP, **Routing Protocols** - Delivery, forwarding, routing, types of routing, routing tables, Unicast Routing, Unicast Routing protocols, RIP, Concepts of OSPF, BGP & Multicast Routing	15 L
Unit II	**Transport Layer** - Process to process delivery, UDP, TCP **Congestion Control & Quality of Service**- Data traffic, Congestion, Congestion Control(Open Loop, Closed Loop & Congestion control in TCP), QoS and Flow Characteristics **Application Layer** - DNS, Remote Logging(Telnet), SMTP, FTP, WWW, HTTP	15 L
Unit III	**Introduction:** Introduction to system and network security, security attacks, security services and mechanisms. **Malicious software and Internet Security:** viruses and related threats, virus countermeasures, denial of service attacks, *Hacking,* Security policies and plan, Strategies for a secure network.	15 L

AC 10/02/12
Item No. 4.33

UNIVERSITY OF MUMBAI

Syllabus for the M.Com. (Part-I)
Program: M.Com
Course: Business Economics

(Credit Based Semester and Grading System with effect from the academic year 2012–2013)

89

Internal and External Semester Examination for Semester I and II.

Internal Examination: Project Work. Topics will be based on the syllabus. (Total 40 Marks)

20 Marks for the Documentation

10 Marks for Presentation

10 Marks Viva.

External Examination: Question Paper Pattern for Semesters I and II. (Total Marks 60)

There will be four questions in all. All the questions are **COMPULSORY** and will have internal choice.The question paper will be of 60 marks and 2 hours duration.

Q1. **Module I** (Total marks 14)

Q1 - A **OR** B Attempt any one. (In case of sub questions 7 marks each.)

Q2. **Module II** (Total marks 14)

A **OR** B Attempt any one. (In case of sub questions 7 marks each.)

Q3. **Module III** (Total marks 14)

A **OR** B Attempt any one. (In case of sub questions 7 marks each.)

Q4. Write explanatory notes – **Attempt Any Two:** (Total -18 marks)

Three explanatory notes: A , B **and** C (One on each module – 9 marks each).

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Nerul

Evaluation System
Semester-III

A Internal Assessment – 40% 40 Marks

Project 40 Marks Allocation of 40 marks is as under

a. Documentation	20 marks
b. Presentation	10 marks
c. Viva and Interaction	10 marks

B Semester End Examinations – 60% 60 Marks

I. Duration – These examinations shall be of **2 Hours** duration.

II. Question Paper Pattern

1) There shall be four questions each of 15 marks.
2) All questions shall be compulsory with internal choice within the questions.
3) Question may be subdivided into sub-questions A and B the allocation of marks depends on the weightage of the topic.

MARKS: 60 **TIMES: 2 HRS.**

Note: 1) **All the questions are COMPULSORY.**
2) Figures to the right indicate full marks.

Q. 1 A) Module-I (15)

OR

B) Module-I (15)

Q. 2 Attempt **Any Two**: From Module-II (15)
A)
B)
C)

Q. 3 Attempt **Any Two**: From Module-III (15)
A)
B)
C)

Q. 4 Attempt **Any Two**: From Module-IV (15)
A)
B)
C)

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Evaluation System

Semester-IV

A Internal Assessment – 40% 40 Marks

Project 40 Marks Allocation of 40 marks is as under

a. Documentation	20 marks
b. Presentation	10 marks
c. Viva and Interaction	10 marks

B Semester End Examinations – 60% 60 Marks

I. Duration – These examinations shall be of **2 Hours** duration.

II. Question Paper Pattern

1) There shall be four questions each of 15 marks.
2) All questions shall be compulsory with internal choice within the questions.
3) Question may be subdivided into sub-questions A and B the allocation of marks depends on the weightage of the topic.

MARKS: 60 **TIMES: 2 HRS.**

Note: 1) **All the questions are COMPULSORY.**
2) Figures to the right indicate full marks.

Q. 1 A) Module-I (15)

OR

B) Module-I (15)

Q. 2 Attempt **Any Two**: From Module-II (15)

A)
B)
C)

Q. 3 Attempt **Any Two**: From Module-III (15)

A)
B)
C)

Q. 4 Attempt **Any Two**: From Module-IV (15)

A)
B)
C)

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Master of Commerce (M.Com) Programme

Under Choice Based Credit, Grading and Semester System

Course Structure

M.Com II

(To be implemented from Academic Year- 2017-2018)

No. of Courses	Semester III	Credits	No. of Courses	Semester IV	Credits
1	*Elective Courses (EC)*		*1*	*Elective Courses (EC)*	
1,2 and 3	*Any one group of courses from the following list of the courses (Group – A/B/C/D/E)	18	1,2 and 3	**Any one group of courses from the following list of the courses (Group – A/B/C/D/E)	18
2	✓ *Project Work*		*2*	✓ *Project Work*	
4	Project Work - I	06	4	Project Work - II	06
	Total Credits	24		Total Credits	24

✓ ***Note:*** *Project work is considered as a special course involving application of knowledge in solving/ analyzing/ exploring a real life situation/ difficult problem. Project work would be of 06 credits. A project work may be undertaken in any area of Elective Courses*

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AC 19/3/2012

Item No. 4.77

UNIVERSITY OF MUMBAI

Syllabus for the M.Sc. Sem. I & II
Program: M.Sc.
Course: Information Technology

(Credit Based Semester and Grading System with effect from the academic year 2012–2013)

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Nerul, Navi Mumbai - 400 706.

M.Sc. Information Technology
(Based on Credit and grading system)

Semester I

Paper code	Paper Nomenclature	Lectures	Credit	Practical Paper	Hrs	Credit	Total Credit
PSIT101	Computer Simulation and Modeling	60	04	PSITP101	60	02	06
PSIT102	Mobile Computing	60	04	PSITP102	60	02	06
PSIT103	Digital Image Processing	60	04	PSITP103	60	02	06
PSIT104	Data Warehousing and DataMining	60	04	PSITP104	60	02	06
	Total						24

Semester II

Paper code	Paper Nomenclature	Lectures	Credit	Practical Paper	Hrs	Credit	Total Credit
PSIT201	Programming with Components	60	04	PSITP201	60	02	06
PSIT202	Advanced Computer Networks	60	04	PSITP202	60	02	06
PSIT203	Speech Recognition	60	04	PSITP203	60	02	06
PSIT204	Advanced Database Management Systems	60	04	PSITP204	60	02	06
	Total						24

Total credits for M.Sc. Part I =(Sem I- 24 and sem II-24) =48

Evaluation: The students will be evaluated externally. The external evaluation will be done by the committee appointed by the University norms. Standard of passing and scale as per the university norms.

Academic Council: 26/07/2019

Item No: 4.76

UNIVERSITY OF MUMBAI

Syllabus for M.Sc. Part I
(Semester I and II)
Programme: M.Sc.
Subject: Information Technology

(Choice Based Credit System with effect from the academic year 2019 – 2020)

Semester – I		
Course Code	**Course Title**	**Credits**
PSIT101	Research in Computing	4
PSIT102	Data Science	4
PSIT103	Cloud Computing	4
PSIT104	Soft Computing Techniques	4
PSIT1P1	Research in Computing Practical	2
PSIT1P2	Data Science Practical	2
PSIT1P3	Cloud Computing Practical	2
PSIT1P4	Soft Computing Techniques Practical	2
	Total Credits	**24**

Semester – II		
Course Code	**Course Title**	**Credits**
PSIT201	Big Data Analytics	4
PSIT202	Modern Networking	4
PSIT203	Microservices Architecture	4
PSIT204	Image Processing	4
PSIT2P1	Big Data Analytics Practical	2
PSIT2P2	Modern Networking Practical	2
PSIT2P3	Microservices Architecture Practical	2
PSIT2P4	Image Processing Practical	2
	Total Credits	**24**

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Sem - III

AC 07/04/2014
Item No. 4.39

Revised syllabus of M.Sc. Information Technology Semester III and IV
(Based on Credit and grading system)

Semester III

Course Code	Course Nomenclature	Lectures	Credits	Practical Course	Hours	Credits	Total Credits
PSIT301	Embedded Systems	60	4	PSIT3P1	60	2	6
PSIT302	Information Security Management	60	4	PSIT3P2	60	2	6
Elective 1		60	4	Elective 1	60	2	6
PSIT303a	Virtualization			PSIT3P3a			
PSIT303b	Artificial Neural Networks			PSIT3P3b			
Elective 2		60	4	Elective 2	60	2	6
PSIT304a	Digital Image Processing			PSIT3P4a			
PSIT304b	Ethical Hacking			PSIT3P4b			

Semester IV

Course Code	Course Nomenclature	Lectures	Credits	Practical Course	Hours	Credits	Total Credits
PSIT401	Artificial Intelligence	60	4				4
PSIT402	IT Infrastructure Management	60	4				4
Elective 1		60	4	Elective 1	60	2	6
PSIT403a	Intelligent Systems			PSIT4P3a			
PSIT403b	Real Time Embedded Systems			PSIT4P3b			
PSIT403c	Computer Forensics			PSIT4P3c			
Elective 2		60	4	Elective 2	60	2	6
PSIT404a	Design of Embedded Control Systems			PSIT4P4a			
PSIT404b	Advanced Image Processing			PSIT4P4b			
PSIT404c	Cloud Management			PSIT4P4c			
PSIT405	Project		2	PSIT4P5		2	4

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AC 27-2-13
Item no. 4.133

UNIVERSITY OF MUMBAI

Syllabus for Semester I and II
Program: M.Sc.
Course: Information Technology

(Credit Based Semester and Grading System with effect from the academic year 2013–2014)

Revised syllabus of M.Sc. Information Technology
(Based on Credit and grading system)

Semester I

Course code	Course Nomenclature	Lectures	Credit	Practical Course	Hrs	Credit	Total Credit
PSIT101	Data Mining	60	04	PSIT1P1	60	02	06
PSIT102	Distributed System	60	04	PSIT1P2	60	02	06
PSIT103	Data Analysis Tools	60	04	PSIT1P3	60	02	06
PSIT104	Software Testing	60	04	PSIT1P4	60	02	06
	Total						24

Semester II

Course code	Course Nomenclature	Lectures	Credit	Practical Course	Hrs	Credit	Total Credit
PSIT201	Mobile Computing	60	04	PSIT2P1	60	02	06
PSIT202	Advanced Computer Networks	60	04	PSIT2P2	60	02	06
PSIT203	Cloud Computing and Ubiquitous System	60	04	PSIT2P3	60	02	06
PSIT204	Advanced Database Systems	60	04	PSIT2P4	60	02	06
	Total						24

Total credits for M.Sc. Sem I and II Sem I- 24 and sem II-24 = 48

Evaluation: The students will be evaluated externally. The external evaluation will be done by the committee appointed by the University norms. Standard of passing and scale as per the university norms.

Information Technology Syllabus
Restructured for Credit Based and Grading System

SEM: I

Course I:	Data Mining	**PSIT101**
Course II:	Distributed System	**PSIT102**
Course III:	Data Analysis Tools	**PSIT103**
Course IV:	Software Testing	**PSIT104**

SEM: IV

Course IV:	Mobile Computing	**PSIT201**
Course V:	Advanced Computer Networks	**PSIT202**
Course VI:	Cloud Computing and Ubiquitous System	**PSIT203**
Course VIII:	Advanced Database Systems	**PSIT204**

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AC 27/2/13 Item no. 4.123

University of Mumbai

Program: M. Sc.

Course: Computer Science

Semester – III and IV

(Credit Based Semester and Grading System

with effect from the academic year 2013 - 14)

1. Course Structure & Distribution of Credits.

This CBGS MSc Computer Science syllabus of Semester III and IV is an extension of the existing syllabus CBGS MSc Part I (Semester I and II) syllabus implemented from the academic year 2012 – 13. It is currently being taught at MSc Computer Science Semester III and IV of University of Mumbai for the last few years, but modified to be placed within the credit based grading system to be implemented from the academic year 2013 – 2014. However, there are few changes incorporated in the existing syllabus based on the feedback of the teaching and student community as well as to incorporate recent trends.

The syllabus proposes **four papers and Project Based Learning Component consisting of a project to be done in Semester IV.** Each Paper in Semester III and IV has theory as well as practical component consisting of 4 credits for theory and 2 credits practical.
Thus, Semester III is of 24 credits. Semester IV has an additional Component of project having 6 credits. Thus Semester IV has in all 30(24+6) credits. Each of the theory courses has four units and is expected to cover in 60 lectures period. Each of the practical courses is of 60 hours.

Revised Syllabus of M.Sc. Computer Science
(Based on Credit and Grading System)

Semester III							
		Theory Course			Practical Course		
Theory Paper Code	Paper Nomenclature	Lectures	Credits	Practical Paper Code	Hours	Credits	To
PSCS301	Artificial Intelligence	60	04	PSCSP301	60	02	
PSCS302	Distributed Computing	60	04	PSCSP302	60	02	
	Elective I (Select ONE	60	04		60	02	0
PSCS3031	Parallel Processing			PSCSP3031			
PSCS3032	System Security			PSCSP3032			
PSCS3033	Enterprise Networking			PSCSP3033			
PSCS3034	Fuzzy Logic and Neural			PSCSP3034			
PSCS3035	Natural Language			PSCSP3035			
	Elective II (Select ONE	60	04		60	02	0
PSCS3041	Pattern Recognition			PSCSP3041			
PSCS3042	Virtual Reality and Virtual Environment			PSCSP3042			
PSCS3043	Bio Informatics			PSCSP3043			
PSCS3044	Optimization Techniques			PSCSP3044			
PSCS3045	Principles of Robotics Programming – I			PSCSP3045			
	Total	16		**Total**	08		2

Semester IV

		Theory Course			Practical Course		
Theory Paper Code	**Paper Nomenclature**	**Lectures**	**Credits**	**Practical Paper Code**	**Hours**	**Credits**	**Total**
PSCS401	Image Processing	60	04	PSCSP401	60	02	06
PSCS402	Embedded Systems	60	04	PSCSP402	60	02	06
	Elective I (Select ONE from)	60	04		60	02	06
PSCS4031	Embedded Systems			PSCSP4031			
PSCS4032	Information Security			PSCSP4032			
PSCS4033	Satellite Communication			PSCSP4033			
PSCS4034	Multimedia Systems and convergence to technologies			PSCSP4034			
PSCS4035	Natural Language Processing-II			PSCSP4035			
	Elective II (Select ONE from)	60	04		60	02	06
PSCS4041	Computer Vision			PSCSP4041			
PSCS4042	Java Technology			PSCSP4042			
PSCS4043	Intelligent System			PSCSP4043			
PSCS4044	Customer Relationship Management			PSCSP4044			
PSCS4045	Principles of Robotics Programming – II			PSCSP4045			
PSCSPR405	Project Work				100	06	06
		Total	**16**		**Total**	**14**	**30**

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Academic Council 26/02/2015

Item No. 4.42

UNIVERSITY OF MUMBAI

Syllabus for Semester-I and Semester -II
Program: M.Sc.
Course: Computer Science

(Credit Based Semester and Grading System with effect from the academic year 2015–2016)

PSCS102	Advanced Networking Concepts	60	04
PSCS103	Advanced Database Systems	60	04
PSCS104	Robotics and Artificial Intelligence	60	04
Total Credits for Theory courses in Semester -I			16

Semester –I: Practical Lab courses

The syllabus proposes two laboratory courses of 4 credits each. The laboratory experiments from first two theory courses (PSCS101 and PSCS102) are combined together and are proposed as the first practical course (PSCSP101). Similarly, the laboratory experiments from the last two theory courses (PSCS103 and PSCS104) are combined together and called as the second practical course (PSCSP102). As far as the practical are concerned, equal weightage similar to that of theory courses has been given in terms of the number of hours. The following table summarizes the details of the practical courses in the semester I.

Semester I – Practical Laboratory courses

Course code	Course Title	No of hours	Credits
PSCSP101	Analysis of Algorithms & Researching Computing and Advanced Networking Concepts	60+60= 120	04
PSCSP102	Advanced Database Systems and Robotics & Artificial Intelligence	60+60= 120	04
Total Credits for Practical Laboratory courses in Semester –I			08

Semester –II

The syllabus proposes four subjects in semester –II also. As in the case of semester –I, each subject has theory and practical components.

Semester II- Theory courses

The four theory courses offered in semester II are

(i) Advanced Operating Systems

Semester –II: Practical Laboratory courses

The syllabus proposes two laboratory courses of 4 credits each. The laboratory experiments from the first two theory courses (PSCS201 and PSCS202) are combined together and are proposed as the first practical course (PSCSP201). Similarly, the laboratory experiments from the elective courses are combined together and taken as the second practical course (PSCSP202). The following table summarizes the details of the practical courses in the semester –II.

Semester II – Practical Laboratory courses

Course code	Course Title	No of hours	Credits
PSCSP201	Analysis of Algorithms &Researching Computing and Advanced Networking Concepts	60+60= 120	04
PSCSP202	Elective I and Elective II	60+60= 120	04
Total Credits for Practical Laboratory courses in Semester –II			08

Case study: The syllabus proposes a case study under the lab course on Elective -I and Elective - II (PSCSP202). A student is expected to select a topic related to his or her chosen track belonging to either Elective -I or Elective- II and make a case study report. It is expected that the student refers at least five research papers in the process of making the case study. By introducing the case study in the second semester, the syllabus prepares a student to take up a research project in the semester III and semester IV.

AC 23-05-2016
Item No.4.12-A

UNIVERSITY OF MUMBAI

Syllabus for Semester-III and Semester -IV
Program: M.Sc.
Course: Computer Science

(Credit Based Semester and Grading System with effect from the academic year 2016–2017)

Semester III – Theory courses

Course Code	Course Nomenclature	Lecture In Hours	Credits
PSCS 301	Ubiquitous Computing	60	4
PSCS 302	Social Network Analysis	60	4
PSCS 3031	Elective I - Track A: Cloud Computing –II (Cloud Computing Technologies)	60	4
PSCS 3032	Elective I - Track B: Cyber and Information Security- II (Cyber Forensics)		
PSCS 3033	Elective II - Track C: Business Intelligence and Big Data Analytics –II (Mining Massive Data sets)	60	4
PSCS 3034	Elective II - Track D: Machine Learning –II (Advanced Machine Learning)		
Total Credits for Theory courses in Semester III			16

Semester–III: Practical Laboratory Courses

The syllabus proposes two laboratory courses of 4 credits each. The laboratory experiments from the first two theory courses (PSCS301 and PSCS302) are combined together and are proposed as the first practical course (PSCSP5). Similarly, the laboratory experiments from the elective courses are combined together and taken as the second practical course (PSCSP6). The following table summarizes the details of the practical courses in the semester –III.

Semester-III: Practical Laboratory Courses

Course code	Course Title	No of hours	Credits
PSCSP5	Ubiquitous Computing and Social Network Analysis	60+60= 120	04
PSCSP6	Elective I and Elective II	60+60= 120	04
Total Credits for Practical Laboratory courses in Semester–III			08

Project Proposal: The syllabus introduces a project proposal in the semester-III under lab course PSCSP6. As per this, a student is expected to select a topic for project based on the specialization he or she is planning to take in the semester-IV. Needless to say, the project proposal will be based on a topic related to the elective the student has been pursuing in semester –II and semester-III and intends to continue in semester-IV as specialization.

The proposal will contain introduction, related works, objectives and methodology. The implementation, experimental results and analysis will be part of the Project implementation in the semester-IV.

Semester –IV

The syllabus proposes two subjects in semester-IV, each with theory and practical components. In addition, there will be internship with industry and a project implementation. The important feature of the semester-IV is the specialization a student can choose. A student can choose a specialization based on the electives one has been pursuing since semester–II. Since there are two electives in semester-III, a student can drop one and choose the other as the specialization in semester–IV.

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Semester–IV: Practical Laboratory courses

The syllabus proposes one laboratory course of 4 credits. The laboratory experiments from the two theory courses are combined together and are proposed as the first practical course (PSCSP7).

Semester-IV: Practical course

Course code	Course Title	No of hours	Credits
PSCSP7	Simulation & Modeling and Specialization	60+60= 120	04

Semester–IV: Internship with industry

The syllabus proposes an internship for about 8 weeks to 12 weeks to be done by a student. It is expected that a student chooses an IT or IT-related industry and formally works as a full time intern during the period. The student should subject oneself with an internship evaluation with proper documentation of the attendance and the type of work he or she has done in the chosen organization. Proper certification (as per the guidelines given in Appendix 1 and 2) by the person, to whom the student was reporting, with Organization's seal should be attached as part of the documentation.

Semester–IV: Internship

Course code	Course Title	No of hours	Credits
PSCSP8	Internship with industry	300	06

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PSEVSP403

Sustainable Management

Minor Experiments

1. To perform Water/Energy audit in the house/college building /society/laboratory
2. To study sustainability report of major business groups/environment compliance report for a company.
3. Report on Visit to NGO/Biomedical waste management site/hazardous waste Management/Pollution control facility of any industry.
4. Report on Seminar/Conference attended.

Major Experiments

1. Report on study tour to the following places
    - Lakes/rivers/estuary/marine ecosystem.
    - National Park/Sanctuary
    - Mangrove Ecosystem/Open Cast Mining/Agricultural field.
    - Pollution Control Board/Research Institute/Meterology Department.

PSEVSP404
Environmental Management

Project work : 50 MARKS
Student will submit their independent project work at the end of semester IV. Assessment of the project and internship will be based on the submitted M. Sc. project report, seminar and viva-voice examination.

Report on Project work : 30 MARKS
The Internship/project report submitted by the student and the evaluation report by the externalexaminer.

Project Evaluations:20 MARKS
(Viva-voice + Presentation)

Texts/References:

1. Standard methods for examination of water and waste water , American Public Health Association.
2. A comprehensive laboratory manual for Environmental Sciences and Engineering By P.R. SreemahadevanPillai.New Age International Publishers.
3. Chemical and biological methods for water pollution studies By R.K. Trivedi
4. Handbook of water and waste water analysis By S.K. Maiti.
5. Soil and air analysis by S.K. Maiti.

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AC 29/4/13
Item no, 4.92

UNIVERSITY OF MUMBAI

Syllabus for M.Sc. Semester III &IV

Program: M.Sc.

Course: Environmental Sciences

(Credit Based Semester and Grading System with effect from the academic year 2012–2013)

M. Sc. Environmental Sciences Syllabus

Credit Based and Grading System

To be implemented from the Academic year 2012-2013

Semester –III

Theory				
Course	Unit	TOPIC	Credits	L / Week
PSEVS301	I	Water and Wastewater Pollution Control	4	1
	II	Air Pollution Control		1
	III	Hazardous and Radioactive Waste Management		1
	IV	Biomedical Waste and Electronic (E-Waste Management)		1
PSEVS302	I	Environmental Monitoring and sampling	4	1
	II	Instrumental methods of environmental analysis-I		1
	III	Instrumental methods of environmental analysis-II		1
	IV	Statistical Aspects		1
PSEVS303	I	Basic concepts of Eco-toxicology	4	1
	II	Toxicants in the Environment		1
	III	Evaluation of toxicity		1
	IV	Organ toxicity		1
PSEVS304	I	Industrial Hygiene	4	1
	II	Industrial Work Environment		1
	III	Disaster Management and Risk Assessment		1
	IV	Safety		1
			16	**16**
Practicals				
PSEVS3P1		Practicals based on PSEVS301	2	4
PSEVS3P2		Practicals based on PSEVS3O2	2	4
PSEVS3P3		Practicals based on PSEVS3O3	2	4
PSEVS3P4		Practicals based on PSEVS304	2	4
Total			**08**	**16**
TOTAL			**24**	**32**

SEMESTER –IV

Theory				
Course	Unit	TOPIC	Credits	L / Week
PSEVS401	I	Introduction to Ecotechnology	4	1
	II	Sanitation -PhytosanitationAnd Green Inhibitors		1
	III	Climate Change Mitigation And Carbon Sequestration		1
	IV	Restoration Ecology& Remediation Technology		1
PSEVS402	I	Environmental Biotechnology	4	1
	II	Biotechnology in Protection and Conservation of the Environment		1
	III	Organic Farming		1
	IV	Environmental Nanotechnology		1
PSEVS403	I	Understanding sustainable development	4	1
	II	Business strategies and sustainability		1
	III	Sustainable urban development		1
	IV	Sustainability in practice		1
PSEVS404	I	Introduction to principles of Environment Management	4	1
	II	Environment Management Systems and Life Cycle Assessment		1
	III	Environmental Audit and Environmental Economics		1
	IV	Environmental Design(ED) and Modeling		1
			16	16
Practicals				
PSEVS4P1		Practicals based on PSEVS401	2	4
PSEVS4P2		Practicals based on PSEVS402	2	4
PSEVS4P3		Practicals based on PSEVS403	2	4
PSEVS4P4		Practicals based on PSEVS404	2	4
Total			08	16
TOTAL			24	32

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AC-6-6-12

Item No. 4.121

UNIVERSITY OF MUMBAI

Syllabus for M.Sc. Semester I &II
Program: M.Sc.
Course: Environmental Sciences

(Credit Based Semester and Grading System with effect from the academic year 2012–2013)

SEMESTER I

PSEVSP101
ECOLOGY AND ECOSYSTEMS

A. Minor Experiments

1. Determination of diversity indices in plant communities.
2. To construct ecological pyramids of population sizes in ecosystem.
3. Determination of Chlorophyll content from plant species.
4. Determination of Harvest method from plant species.

B. Major Experiments

1. Determination of Importance value index of species in a plant community.
2. To compare two plant communities
3. Quantitative measurement of plankton in fresh and marine water samples.
4. Determination of primary productivity by light and dark bottle method.

PSEVSP102

Biodiversity

A. Minor Experiments

1. Prepare a map of India, showing bio-geographical zones and expanse of territorial waters.
2. Identification and description of plant species.
3. To plot biosphere reserve on a map of India.
4. Prepare a document of endemic and exotic species of plants and animals for a selected PAN.

B. Major Experiments

1. Indicate distribution range of a plant and animal species identified as endangered on an Indian map.
2. Prepare a map of. Maharashtra showing Protected Area Network (PAN) in it.
3. To study qualitative and quantitative characters of a plant community by quadrate method.
4. To study a plant community by using line transect method, using line, belt and profile transects.

PSEVSP103

Environment and Natural Resources

A. Minor Experiments

1. Determination of total organic matter in soil.
2. Determination of pH value of different types of soil.
3. Determination of water holding capacity of soil.
4. To quantify hydrological cycle in different land use types in or around specified premises.

B. Major Experiments

1. Determination of mechanical composition of soil by Pipette method.
2. To study the soil profiles for their height, color, texture and electrical conductivity.
3. Determination of total nitrogen value of the soil by Kjeldahl's method
4. Determination of SAR value of soil.(Sodium Absorption Ratio)

PSEVSP104

Environmental Pollution

A. Minor Experiments

1. Determination of Total Dissolved Solids from the lake water.
2. Determination of Total Hardness of well water.
3. Measurement of photo density flux by Luxmeter.
4. Measurement and classification of noise pollution.

B. Major Experiments

1. Determination of CO_2 in the atmosphere by volumetric method.
2. Determination of physical parameters of (I) Well water (ii) Industrial of given type effluent (iii) River water (iv) Sea water.
3. Determination of Dissolved Oxygen from Sea water by Winkler's method.
4. Determination of Chemical Oxygen Demand value for industrial waste effluent.

SEMESTER II

PSEVSP201

ENVIRONMENTAL MONITORING AND ASSESSMENT

A. Minor Experiments

1. Interpretation of Aerial photographs and preparing weather report based on it.
2. Determination of relative humidity from the atmosphere.
3. Determination of particulate matter from the industrial area by High Volume Sampler/Settling method.
4. Determination of Salinity of water by volhard's method.

B. Major Experiments

1. Determination of Cation-exchange capacity, moisture content, alkalinity/acidity of soil sample.
2. To prepare the station based wind rose for an area.
3. Determination of Residual Chlorine from drinking water using colorimetric method.
4. Determination of hydrocarbon from fuel gas using Orsat's apparatus.

PSEVSP202

POLLUTION CONTROL TECHNOLOGY

A. Minor Experiments

1. To isolate and study a pure culture of microorganism's from air, water and sewage.
2. Study the effect of pH on microbial growth.
3. Study the effect of heavy metals on the growth of bacteria.
4. Determination of MPN value of the drinking water and mineral water.

B. Major Experiments

1. Determination of K_2O value of soil by flame photometer.
2. Determination of P_2O_5 from soil by Olson's colorimetric method.

3. Determination of SO_2 by spectrophotometry using high volume sampler.
4. Determination of NO_2 from the atmosphere by Colorimetric method using high volume sampler.

PSEVSP203

GREEN CHEMISTRY

A. Minor Experiments

1. To study the Principle and application of Atomic absorption Spectrophotometry for analysis of metal ions from samples.

2. To study the Principle and application of Nephelometry and Turbidimetry: General discussion, Instruments for nephelometry and turbidimetry

3. To Study the chemical reactions involved in green nanotechnology: Nanoparticle production and characterization.

B. Major Experiments

1. Extraction and separation of organic compounds from soil and biological materials
   a. Ammonium sulphate method (Nichols method),
   b. TCA method,
   c. Acid digestion method,
   d. Wet washing for metals,
   e. Steam distillation for volatiles
2. To study different separation Techniques: Principle and process of solvent extraction,; Chromatography – principle and application of thin layer and ion exchange chromatography, Gas Chromatography and High Performance Liquid Chromatography.
3. Biofuel production methods and characterization for biodiesel and bioethanol.

PSEVSP204

ENVIRONMENTAL POLICIES AND REGULATIONS

A. Minor Experiments

1. Legal Case citation (one per student)
2. Reports on various study tours/academic visits.

B. Major Experiments

1. Preparation/drafting of EIA Report (Chemical Industry, Fertilizer Industry, hydropower station).
2. Report on Eco-tourism.

NOTE:-

Students should undertake field work and survey. The Students should visit different places to collect data to make survey and analyze. At least four places may be visited. The Places of visit could be: Lakes, rivers, estuary and marine, nature parks, water/ sewage/ Industrial effluent treatment plant, Solid waste dump, meteorological centre, mangrove vegetation, industries – food, pharmaceutical, petrochemical, fertilizer, paper, sugar, distillery etc. The students should also be encouraged to participate in the public lectures/ seminars/ workshops etc. on environment related issues.

Reports on each of visit/ activity undertaken must be included in the journal.

Texts/References:

1. Standard methods for examination of water and waste water , American Public Health Association.
2. A comprehensive laboratory manual for Environmental Sciences and Engineering By P.R. Sreemahadevan Pillai. New Age International Publishers.
3. Chemical and biological methods for water pollution studies By R.K. Trivedi
4. Handbook of water and waste water analysis By S.K. Maiti.
5. Soil and air analysis by S.K. Maiti.

M.Sc Environmental Sciences Semester I

Course Code No. & Title	Unit No.	Credits	Internal assessment Marks	External Assessment Marks
PSEVS 101Ecology and Ecosystem	I,II,III,IV	4	40	60
PSEVS102 Biodiversity	I,II,III,IV	4	40	60
PSEVS 103 Environment and Natural Resources	I,II,III,IV	4	40	60
PSEVS 104 Environmental Pollution	I,II,III,IV	4	40	60
PSEVSP 101		2	20	30
PSEVSP 102		2	20	30
PSEVSP103		2	20	30
PSEVSP104		2	20	30

M.Sc Environmental Sciences Semester II

Course Code No. & Title	Unit No.	Credits	Internal assessment Marks	External Assessment Marks
PSEVS201Environmental Monitoring and Assessment	I,II,III,IV	4	40	60
PSEVS202 Pollution Control and Technology	I,II,III,IV	4	40	60
PSEVS 203 Green Technology	I,II,III,IV	4	40	60
PSEVS 204 Environmental Policies and Regulations	I,II,III,IV	4	40	60
PSEVSP201		2	20	30
PSEVSP202		2	20	30
PSEVSP203		2	20	30
PSEVSP204		2	20	30