

University of Mumbai

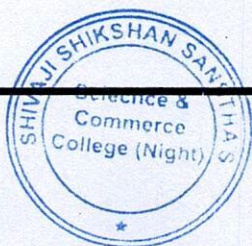


**Revised Syllabus
and
Question Paper Pattern
of Courses of
Bachelor of Commerce Programme
Second Year
Semester III and IV**

**Under Choice Based Credit, Grading and
Semester System**

To be implemented from Academic Year 2017-2018

Faculty of Commerce




Principal
Shivaji Shikshan Sanstha's
Science & Commerce College (Night)
Dr. Ankush Shankar Gawade Marg,
Pan Nagar, Ghatkopar (E), Mumbai-400 075.

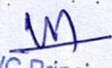
S.Y.B.Com

(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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B.Com. Programme
Under Choice Based Credit, Grading and Semester System
Course Structure

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

Semester III

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

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



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***List of Skill Enhancement Courses (SEC) Group A
for Semester III (Any One)**

1	Advertising I
2	Field Sales Management I
3	Public Relations I
4	Mass Communication I
5	Travel & Tourism Management Paper I
6	Journalism I
7	Company Secretarial Practice I
8	Rural Development I
9	Co-operation I
10	Mercantile Shipping I
11	Indian Economic Problem I
12	Computer Programming I
13	Logistic and Supply Chain Management I
14	Economic System I

Note: Course selected in Semester III will continue in Semester IV

**** List of Skill Enhancement Courses (SEC) Group B**

1	Foundation Course – Contemporary Issues- III
2	Foundation Course in NSS - III
3	Foundation Course in NCC - III
4	Foundation Course in Physical Education - III

Note: Course selected in Semester III will continue in Semester IV




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**Revised Syllabus of Courses of B.Com. Programme at Semester III
with Effect from the Academic Year 2017-2018**

Elective Courses (EC)

Discipline Specific Elective (DSE) Courses

1Aa. Accountancy and Financial Management III

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Partnership Final Accounts based on Adjustment of Admission or Retirement/Death of a Partner during the year	15
2	Piecemeal Distribution of Cash	15
3	Amalgamation of Firms	15
4	Conversion / Sale of a Partnership Firm into a Ltd. Company	15
Total		60



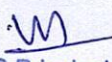

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Sr. No.	Modules / Units
1	Partnership Final Accounts based on Adjustment of Admission or Retirement/Death of a Partner during the year
	i) Simple final accounts questions to demonstrate the effect on final Accounts when a partner is admitted during the year or when partner Retires / dies during the year. ii) Allocation of gross profit prior to and after admission / retirement / death when stock on the date of admission / retirement is not given and apportionment of other expenses based on time / Sales/other given basis. iii) Ascertainment of gross profit prior to and after admission/retirement/death when stock on the date of admission/retirement is given and apportionment of other expenses based on time / Sales / other given basis Excluding Questions where admission / retirement / death takes place in the same year.
2	Piecemeal Distribution of Cash
	i) Excess Capital Method only ii) Asset taken over by a partner iii) Treatment of past profits or past losses in the Balance sheet iv) Contingent liabilities / Realization expenses / amount kept aside for expenses and adjustment of actual v) Treatment of secured liabilities vi) Treatment of preferential liabilities like Govt. dues / labour dues etc. Excluding : Insolvency of partner and Maximum Loss Method
3	Amalgamation of Firms
	i) Realization method only ii) Calculation of purchase consideration iii) Journal / ledger accounts of old firms iv) Preparing Balance sheet of new firm v) Adjustment of goodwill in the new firm vi) Realignment of capitals in the new firm by current accounts / cash or a combination thereof Excluding Common transactions between the amalgamating firms
4	Conversion / Sale of a Partnership Firm into a Ltd. Company
	(i) Realisation method only (ii) Calculation of New Purchase consideration, Journal / Ledger Accounts of old firms. Preparing Balance sheet of new company

Reference Text :

1. Ashish K. Bhattacharyya – “Financial Accounting for Business Managers”, Prentice Hall of India Pvt. Ltd.
2. Shashi K. Gupta – “Contemporary Issues in Accounting”, Kalyani Publishers.
3. R. Narayanaswamy – “Financial Accounting”, Prentice Hall of India, New Delhi
4. Ashok Sehgal – “Fundamentals of Financial Accounting”, Taxmann’s Publishers




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Question Paper Pattern (Theoretical Courses)

Maximum Marks: 100

Questions to be set: 06

Duration: 03 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 12 and to be answered any 10 B) Sub Questions to be asked 12 and to be answered any 10 (*Multiple choice / True or False / Match the columns/Fill in the blanks)	20 Marks
Q-2	Full Length Question OR	15 Marks
Q-2	Full Length Question	15 Marks
Q-3	Full Length Question OR	15 Marks
Q-3	Full Length Question	15 Marks
Q-4	Full Length Question OR	15 Marks
Q-4	Full Length Question	15 Marks
Q-5	Full Length Question OR	15 Marks
Q-5	Full Length Question	15 Marks
Q-6	A) Theory questions B) Theory questions OR	10 Marks 10 Marks
Q-6	Short Notes To be asked 06 To be answered 04	20 Marks

Note:

Theory question of 15 marks may be divided into two sub questions of 7/8 and 10/5 Marks.




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Elective Courses (EC)

Discipline Specific Elective (DSE) Courses

**1Ab. Financial Accounting and Auditing – Introduction
to Management Accounting**

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Management Accounting	10
2	Ratio Analysis and Interpretation	15
3	Working Capital Management	10
4	Capital Budgeting	10
Total		45




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Sr. No.	Modules / Units
1	Introduction to Management Accounting
	A. Introduction to Management Accounting – Meaning, Nature, Scope, Functions, Decision Making Process, Financial Accounting V/s Management Accounting B. Analysis and Interpretation of Financial Statements i) Study of Balance sheet and Income statement / Revenue statements in vertical form suitable for analysis ii) Relationship between items in Balance Sheet and Revenue statement iii) Tools of analysis of Financial Statements (i) Trend analysis (ii) Comparative Statement (iii) Common Size Statement Note : (i) Problems based on trend analysis (ii) Short Problems on Comparative and Common sized statements
2	Ratio Analysis and Interpretation
	(Based on Vertical Form of Financial statements) – Meaning, classification, Du Point Chart, advantages and Limitations) A. Balance Sheet Ratios : i) Current Ratio ii) Liquid Ratio iii) Stock Working Capital Ratio iv) Proprietary Ratio v) Debt Equity Ratio vi) Capital Gearing Ratio B. Revenue Statement Ratio: i) Gross Profit Ratio ii) Expenses Ratio iii) Operating Ratio iv) Net Profit Ratio v) Net Operating Profit Ratio vi) Stock Turnover Ratio A. Combined Ratio : i) Return on capital employed (Including Long Term Borrowings) ii) Return on proprietor's Fund (Shareholders Fund and Preference Capital) iii) Return on Equity Capital iv) Dividend Payout Ratio v) Debt Service Ratio vi) Debtors Turnover vii) Creditors Turnover (Practical Question on Ratio Analysis)
3	Working Capital Management : (Practical Questions)
	A. Concept, Nature of Working Capital , Planning of Working Capital B. Estimation / Projection of Working Capital Requirement in case of Trading and Manufacturing Organization C. Operating Cycle

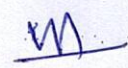


Sr. No.	Modules / Units
4	Capital Budgeting
	A. Introduction: B. The classification of capital budgeting projects C. Capital budgeting process D. Capital budgeting techniques - Payback Period, Accounting Rate of Return, Net Present Value, The Profitability Index, Discounted Payback. (Excluding calculation of cash flow)

Reference Text :

1. Cost and Management Accounting - Colinn Dury 7th Edition
2. Cost and Management Accounting- Dbarshi Bhattacharyya pearson Publications 2013 edition
3. Management Accounting - M.Y.Khan
4. Management Accounting - I.M.pandey




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Question Paper Pattern (Theoretical Courses)

Maximum Marks: 100

Questions to be set: 06

Duration: 03 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Objective Questions C) Sub Questions to be asked 12 and to be answered any 10 D) Sub Questions to be asked 12 and to be answered any 10 (*Multiple choice / True or False / Match the columns/Fill in the blanks)	20 Marks
Q-2	Full Length Question OR	15 Marks
Q-2	Full Length Question	15 Marks
Q-3	Full Length Question OR	15 Marks
Q-3	Full Length Question	15 Marks
Q-4	Full Length Question OR	15 Marks
Q-4	Full Length Question	15 Marks
Q-5	Full Length Question OR	15 Marks
Q-5	Full Length Question	15 Marks
Q-6	C) Theory questions D) Theory questions OR	10 Marks 10 Marks
Q-6	Short Notes To be asked 06 To be answered 04	20 Marks

Note:

Theory question of 15 marks may be divided into two sub questions of 7/8 and 10/5 Marks.



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**Elective Courses (EC)-
1B Discipline Related Elective (DRE) Courses**

3. Commerce –III

(Management: Functions and Challenges)

Course Objectives:

- To make the learners aware about conceptual knowledge and evolution of Management.
- To familiarize the learners with the functions in Management.

Sr. No.	Modules	No. of Lectures
1	Introduction To Management	11
2	Planning & Decision Making	10
3	Organising	12
4	Directing And Controlling	12
Total		45




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Sr. No.	Modules
1	Introduction To Management (11)
	• Management- Concept, Nature, Functions, Managerial Skills & Competencies • Evolution of Management Thoughts Classical Approach: Scientific Management – F.W.Taylor's Contribution Classical Organisation Theory: Henri Fayol's Principles Neo Classical: Human Relations Approach – Elton Mayo's Hawthorne experiments • Modern Management Approach- Peter Drucker's Dimensions of Management, Indian Management Thoughts: Origin & Significance of Indian Ethos to Management.
2	Planning & Decision Making (10)
	• Planning - Steps, Importance, Components, Coordination – Importance • M.B.O -Process, Advantages, Management By Exception- Advantages; Management Information System- Concept, Components • Decision Making - Techniques, Essentials of a Sound Decision Making, Impact of Technology on Decision Making.
3	Organising (12)
	• Organising-Steps, Organisation Structures – Features of Line & Staff Organisation, Matrix Organisation, Virtual Organisation, Formal v/s Informal Organisation. • Departmentation -Meaning -Bases, Span of Management- Factors Influencing Span of Management, Tall and Flat Organisation. • Delegation of Authority- Process, Barriers to Delegation, Principles of Effective Delegation. Decentralisation: Factors Influencing Decentralisation, Centralization v/s Decentralisation
4	Directing And Controlling (12)
	• Motivation – Concept, Importance, Influencing factors. Importance of Communication, Barriers to effective Communication. • Leadership- Concept, Functions, Styles, Qualities of a good leader. • Controlling – Concept, Steps, Essentials of good control system, Techniques of Controlling -PERT, CPM, Budgetary Control, Management Audit.




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SEMESTER – III REFERENCE BOOKS:

REFERENCES

1. Management Today Principles & Practice- Gene Burton, ManabThakur, Tata McGraw-Hill, Publishing Co. Ltd.
2. Management – James A. F. Stoner, Prentice Hall, Inc. U.S.A.
3. Management : Global Prospective – Heinz Wehrich & Harold Koontz, Tata McGraw- Hill, Publishing Co. Ltd.
4. Essential of Database Management Systems - Alexis Leon, Mathews Leon Vijay Nicole, Imprints Pvt Ltd.
5. Management – Task, Resp, Practices – PetaDruche "willian Heinemann LTD.




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PAPER PATTERN
COMMERCE PAPER I & II
SEMESTER - III & IV
W.E.F. 2017-2018

Q.1 Multiple Choice Questions

(A) Select the most appropriate answer from the option given below 10
(Any Ten out of Twelve)

(B) State whether the following statements are True or False 10
(Any Ten out of Twelve)

Q.2 Answer Any Two of the following Out of Three questions - Module - I 15

a.

b.

c.

Q.3 Answer Any Two of the following Out of Three questions - Module - II 15

a.

b.

c.

Q.4 Answer Any Two of the following Out of Three questions - Module - III 15

a.

b.

c.

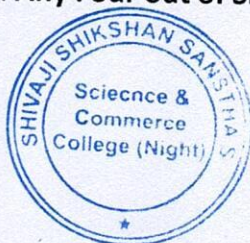
Q.5 Answer Any Two of the following Out of Three questions - Module - IV 15

a.

b.

c.

Q.6 Write notes on Any Four out of Six




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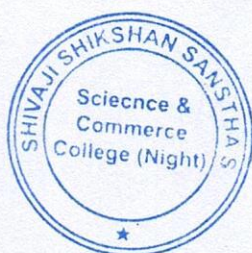
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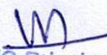
**Elective Courses (EC)-
1B Discipline Related Elective (DRE) Courses**

4.Business Economics III

Modules at a Glance

Sr. No.	Modules	No.of Lectures
1	Overview of Macroeconomics	10
2	Basic concepts of Keynesian Economics	10
3	Post Keynesian developments in Macro economics	10
4	Money, prices and Inflation	15
Total		45




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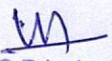
BUSINESS ECONOMICS III

ELEMENTS OF MACROECONOMICS

Preamble

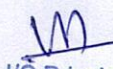
An overall approach to macroeconomics is to examine the economy as a whole. This course is an introduction to the basic analytical tools of macro economics to evaluate macro economic conditions such as inflation, unemployment and growth. It is designed to make system of overall economy understandable and relevant. The aim is to provide a clear explanation of many aspects of aggregate economic variables to inspire a consistent way of thinking about key macroeconomic phenomena. It intends to familiarize the commerce students with basic concepts of macroeconomics and with certain common features of economic occurrence in the real world.




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Sr. No.	Modules / Units
1	INTRODUCTION
	• Macroeconomics: Meaning, Scope and Importance. • Circular flow of aggregate income and expenditure and its Importance- closed and open economy models • The Measurement of National Product: Meaning and Importance of National Income Accounting- conventional and Green GNP and NNP concepts -National Income and Economic Welfare. • Trade Cycles: Features and Phases • Classical Macro economics : Say's law of Markets - Features, Implications and Criticism
2	BASIC CONCEPTS OF KEYNESIAN ECONOMICS
	• The Principle of Effective Demand: Aggregate Demand and Aggregate Supply • Consumption Function: Properties, Assumptions and Implications • Investment function and Marginal Efficiency of capital • Investment Multiplier effect on Income and Output: Assumptions, Working, Leakages, Criticism and Importance - paradox of thrift • Relevance of Keynesian theory tools to the developing countries Liquidity Preference Theory of Interest
3	POST KEYNESIAN DEVELOPMENTS IN MACRO ECONOMICS
	• The IS-LM model of integration of commodity and money markets • Inflation and unemployment : Philips curve • Stagflation : meaning, causes, and consequences • Supply side economics
4	MONEY, PRICES AND INFLATION
	• Money Supply: Determinants of Money Supply - Factors influencing Velocity of Circulation of Money • Demand for Money : Classical and Keynesian approaches and Keynes' liquidity preference theory of interest - Friedman's restatement of Demand for money • Money and prices : Quantity theory of money - Fisher's equation of exchange - Cambridge cash balance approach • Inflation : Demand Pull Inflation and Cost Push Inflation - Effects of Inflation- Nature of inflation in a developing economy - policy measures to curb inflation- monetary policy and inflation targeting




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Reference Books

Ackley.G (1976), *Macro Economic Theory and Policy*, Macmillan Publishing Co. New York

Ahuja. H.L., *Modern Economics* — S.Chand Company Ltd. New Delhi.

Blanchard Olivier (2000), *Macro Economics*, Englewood Elitt, Prentice Hall

Bouman John, *Principles of Macro Economics*

Dornbush , Rudiger, Fisher Stanley and Startz, Richards *Macroeconomics*, Nineth edition
2004 Tata-Mac Graw Hill, New Delhi.

Dwivedi, D.N. (2001), *Macro Economics: Theory and Policy*, Tata-Mac Graw Hill, New Delhi.

Friedman Hilton (1953) *Essays in Positive Economics*, University of Chicago Press, London.

Gregory .N. Mankiw, *Macroeconomics*, Fifth Edition (2002) New York:Worth Publishers

Jhingan, M.L., *Principles of Economics* — Vrinda Publications (P) Ltd.

Shapiro, E (1996), *Macro-Economic Analysis* , Galgotia Publication, New Delhi.

Vaish .M.C. (2010) *Macro Economic Theory* 14th edition, Vikas Publishing House(P)Ltd





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QUESTION PAPER PATTERN
Business Economics Semester III

Maximum Marks: 100 Marks

Time: 3 Hours

Note: 1) Attempt all Questions

2) All Questions carry equal marks

3) Attempt any two questions out of three in each of question 2, 3, 4 & 5

Question No	Particulars	Marks
Q-1	Objective Questions: A) Conceptual questions (Any Five out of Eight) (Two from each module) B) Multiple Choice Questions (10 questions at least two from each Module)	20Marks 10 Marks 10 Marks
Q-2 (from Module I)	A) Full Length Question B) Full Length Question C) Full Length Question	20Marks
Q-3 (from Module II)	A) Full Length Question B) Full Length Question C) Full Length Question	20Marks
Q-4 (from Module III)	A) Full Length Question B) Full Length Question C) Full Length Question	20Marks
Q-5 (from Module IV)	A) Full Length Question B) Full Length Question C) Full Length Question	20Marks




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**2 Ability Enhancement Courses (AEC)
2A * Skill Enhancement Courses (SEC) Group A**

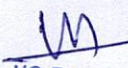
5. Advertising - I

Course Objective:

1. To highlight the role of advertising for the success of brands and its importance within the marketing function of a company.
2. It aims to orient learners towards the practical aspects and techniques of advertising.
3. It is expected that this course will prepare learners to lay down a foundation for advanced post-graduate courses in advertising

Sr. No.	Modules	No. of Lectures
1	Introduction to Advertising	12
2	Advertising Agency	11
3	Economic & Social Aspects of Advertising	11
4	Brand Building and Spécial Purpose Advertising	11
Total		45




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Sr. No.	Modules
1	Introduction to Advertising
	• Integrated Marketing Communications (IMC)- Concept, Features, Elements, Role of advertising in IMC • Advertising: Concept, Features, Evolution of Advertising, Active Participants, Benefits of advertising to Business firms and consumers. • Classification of advertising: Geographic, Media, Target audience and Functions.
2	Advertising Agency
	• Ad Agency: Features, Structure and services offered, Types of advertising agencies , Agency selection criteria • Agency and Client: Maintaining Agency-Client relationship, Reasons and ways of avoiding Client Turnover, Creative Pitch, Agency compensation • Careers in advertising: Skills required for a career in advertising, Various Career Options, Freelancing Career Options - Graphics, Animation, Modeling, Dubbing.
3	Economic & Social Aspects of Advertising
	• Economic Aspects: Effect of advertising on consumer demand, monopoly and competition, Price. • Social aspects: Ethical and social issues in advertising, positive and negative influence of advertising on Indian values and culture. • Pro Bono/Social advertising: Pro Bono Advertising, Social Advertising by Indian Government through Directorate of Advertising and Visual Publicity (DAVP), Self-Regulatory body- Role of ASCI (Advertising Standard Council of India)
4	Brand Building and Special Purpose Advertising
	• Brand Building: The Communication Process, AIDA Model, Role of advertising in developing Brand Image and Brand Equity, and managing Brand Crises. • Special purpose advertising: Rural advertising, Political advertising-, Advocacy advertising, Corporate Image advertising, Green Advertising – Features of all the above special purpose advertising. • Trends in Advertising: Media, Ad spends, Ad Agencies, Execution of advertisements



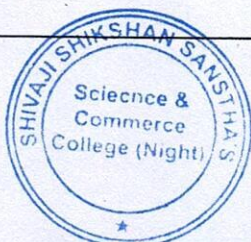

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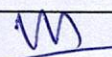
Revised Syllabus of Courses of SYB. Com
Programme at Semester III & IV
with effect from the Academic Year 2017-2018

Reference Books

Advertising

1. Advertising and Promotion : An Integrated Marketing Communications Perspective George Belch and Michael Belch, 2015, 10th Edition, McGraw Hill Education
2. Contemporary Advertising, 2017, 15th Edition, William Arens, Michael Weigold and Christian Arens, Hill Higher Education
3. Strategic Brand Management – Kevin Lane Keller, 4th Edition, 2013 – Pearson Education Limited
4. Kleppner's Advertising Procedure – Ron Lane and Karen King, 18th edition, 2011 – Pearson Education Limited
5. Advertising: Planning and Implementation, 2006 – Raghuvir Singh, Sangeeta Sharma –Prentice Hall
6. Advertising Management, 5th Edition, 2002 – Batra, Myers and Aaker – Pearson Education
7. Advertising Principles and Practice, 2012 - Ruchi Gupta – S.Chand Publishing
8. Brand Equity & Advertising- Advertising's role in building strong brands, 2013- David A. Aker, Alexander L. Biel, Psychology Press
9. Brand Positioning – Strategies for Competitive Advantage, Subroto Sengupta, 2005, Tata McGraw Hill Publication.
10. The Advertising Association Handbook - J. J. D. Bullmore, M. J. Waterson, 1983 - Holt Rinehart & Winston
11. Integrated Advertising, Promotion, and Marketing Communications, Kenneth E. Clow and Donald E. Baack, 5th Edition, 2012 – Pearson Education Limited
12. Kotler Philip and Eduardo Roberto, Social Marketing, Strategies for Changing Public Behaviour, 1989, The Free Press, New York.
13. Confessions of an Advertising Man, David Ogilvy, 2012, Southbank Publishing
14. Advertising, 10th Edition, 2010 - Sandra Moriarty, Nancy D Mitchell, William D. Wells, Pearson




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PAPER PATTERN
ADVERTISING PAPER I & II
SEMESTER - III & IV
W.E.F. 2017-2018

Q.1 Multiple Choice Questions

(A) Select the most appropriate answer from the option given below 10

(Any Ten out of Twelve)

(B) State whether the following statements are True or False 10

(Any Ten out of Twelve)

Q.2 Answer **Any Two** of the following **Out of Three** questions - Module - I 15

a.

b.

c.

Q.3 Answer **Any Two** of the following **Out of Three** questions - Module - II 15

a.

b.

c.

Q.4 Answer **Any Two** of the following **Out of Three** questions - Module - III 15

a.

b.

c.

Q.5 Answer **Any Two** of the following **Out of Three** questions - Module - IV 15

a.

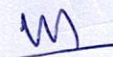
b.

c.

Q.6 Write notes on **Any Four out of Six**

20




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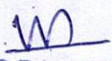
**2 Ability Enhancement Courses (AEC)
2B * Skill Enhancement Courses (SEC) Group B**

6. Foundation Course- Contemporary Issues- III

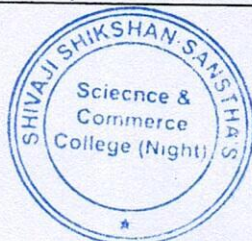
Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Human Rights Provisions, Violations and Redressal	12
2	Dealing With Environmental Concerns	11
3	Science and Technology I	11
4	Soft Skills for Effective Interpersonal Communication	11
Total		45




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Sr. No.	Modules / Units
1	Human Rights Violations and Redressal
	A. Scheduled Castes- Constitutional and legal rights, Forms of violations, Redressal mechanisms. (2 Lectures) B. Scheduled tribes- Constitutional and legal rights, Forms of violations, Redressal mechanisms. (2 Lectures) C. Women- Constitutional and legal rights, Forms of violations, Redressal mechanisms. (2 Lectures) D. Children- Constitutional and legal rights, Forms of violations, Redressal mechanisms. (2 Lectures) E. People with Disabilities, Minorities, and the Elderly population- Constitutional and legal rights, Forms of violations, Redressal mechanisms. (4 Lectures)
2	Dealing With Environmental Concerns
	A. Concept of Disaster and general effects of Disasters on human life- physical, psychological, economic and social effects. (3 Lectures) B. Some locally relevant case studies of environmental disasters. (2 Lectures) C. Dealing with Disasters - Factors to be considered in Prevention, Mitigation (Relief and Rehabilitation) and disaster Preparedness. (3 Lectures) D. Human Rights issues in addressing disasters- issues related to compensation, equitable and fair distribution of relief and humanitarian approach to resettlement and rehabilitation. (3 Lectures)
3	Science and Technology – I
	A. Development of Science- the ancient cultures, the Classical era, the Middle Ages, the Renaissance, the Age of Reason and Enlightenment. (3 Lectures) B. Nature of science- its principles and characteristics; Science as empirical, practical, theoretical, validated knowledge. (2 Lectures) C. Science and Superstition- the role of science in exploding myths, blind beliefs and prejudices; Science and scientific temper- scientific temper as a fundamental duty of the Indian citizen. (3 Lectures) D. Science in everyday life- technology, its meaning and role in development; Interrelation and distinction between science and technology. (3 Lectures)
4	Soft Skills for Effective Interpersonal Communication
	Part A (4 Lectures) I) Effective Listening - Importance and Features. II) Verbal and Non-Verbal Communication; Public-Speaking and Presentation Skills. III) Barriers to Effective Communication; Importance of Self-Awareness and Body Language. Part B (4 Lectures) I) Formal and Informal Communication - Purpose and Types. II) Writing Formal Applications, Statement of Purpose (SOP) and Resume. III) Preparing for Group Discussions, Interviews and Presentations. Part C (3 Lectures) I) Leadership Skills and Self-Improvement - Characteristics of Effective Leadership. II) Styles of Leadership and Team-Building.




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References

1. Asthana, D. K., and Asthana, Meera, *Environmental Problems and Solutions*, S. Chand, New Delhi, 2012.
2. Bajpai, Asha, *Child Rights in India*, Oxford University Press, New Delhi, 2010.
3. Bhatnagar Mamta and Bhatnagar Nitin, *Effective Communication and Soft Skills*, Pearson India, New Delhi, 2011.
4. G Subba Rao, *Writing Skills for Civil Services Examination*, Access Publishing, New Delhi, 2014
5. Kaushal, Rachana, *Women and Human Rights in India*, Kaveri Books, New Delhi, 2000.
6. Mohapatra, Gaur Krishna Das, *Environmental Ecology*, Vikas, Noida, 2008.
7. Motilal, Shashi, and Nanda, Bijoy Lakshmi, *Human Rights: Gender and Environment*, Allied Publishers, New Delhi, 2007.
8. Murthy, D. B. N., *Disaster Management: Text and Case Studies*, Deep and Deep Publications, New Delhi, 2013.
9. Parsuraman, S., and Unnikrishnan, ed., *India Disasters Report II*, Oxford, New Delhi, 2013
10. Reza, B. K., *Disaster Management*, Global Publications, New Delhi, 2010.
11. Sathe, Satyaranjan P., *Judicial Activism in India*, Oxford University Press, New Delhi, 2003.
12. Singh, Ashok Kumar, *Science and Technology for Civil Service Examination*, Tata McGraw Hill, New Delhi, 2012.
13. Thorpe, Edgar, *General Studies Paper I Volume V*, Pearson, New Delhi, 2017.




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Projects / Assignments (for Internal Assessment)

- i. Projects/Assignments should be drawn for the component on Internal Assessment *from the topics in Module 1 to Module 4.*
- ii. Students should be given a list of possible topics - at least 3 from each Module at the beginning of the semester.
- iii. The Project/Assignment can take the form of Street-Plays / Power-Point Presentations / Poster Exhibitions and similar other modes of presentation appropriate to the topic.
- iv. Students can work in groups of not more than 8 per topic.
- v. Students must submit a hard / soft copy of the Project / Assignment before appearing for the semester end examination.

QUESTION PAPER PATTERN (Semester III)

The Question Paper Pattern for Semester End Examination shall be as follows:

TOTAL MARKS: 75

DURATION: 150 MINUTES

QUESTION NUMBER	DESCRIPTION	MARKS ASSIGNED
1	i. Question 1 A will be asked on the meaning / definition of concepts / terms from all Modules. ii. Question 1 B will be asked on the topic of the Project / Assignment done by the student during the Semester iii. In all 8 Questions will be asked out of which 5 have to be attempted.	a) Total marks: 15 b) For 1 A, there will be 3 marks for each sub-question. c) For 1 B there will be 15 marks without any break-up.
2	Descriptive Question with internal option (A or B) on Module 1	15
3	Descriptive Question with internal option (A or B) on Module 2	15
4	Descriptive Question with internal option (A or B) on Module 3	15
5	Descriptive Question with internal option (A or B) on Module 4	15



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**2 Ability Enhancement Courses (AEC)
2B * Skill Enhancement Courses (SEC) Group B**

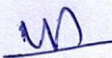
7. Business Law - I

Course Objective:

- To provide a conceptual study about the framework of Indian Business Laws.
- To orient students about the legal aspects of business
- To familiarize the students with case law studies related to Business Laws of Semester III and IV.

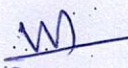
Sr. No.	Modules	No. of Lectures
1	Indian Contract Act – 1872 Part -I	12
2	Indian Contract Act – 1872 Part -II	12
3	Special Contracts	12
4	The Sale Of Goods Act - 1930	12
5	The Negotiable Instruments (Ammended) Act 2015	12
Total		60




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Sr. No.	Modules
1	Indian Contract Act – 1872 Part –I
	- Contract – Definition of Contract and Agreement, Essentials of Valid Contract, Classification of Contracts. - Offer and Acceptance – Rules of valid offer and acceptance, Counter offer, standing or open offer, distinguish between offer and invitation to offer. Concept of Communication and Revocation of offer and acceptance (sec. 3,5) - Capacity to Contract (S. 10-12) – Minor, Unsound Mind, Disqualified Persons. - Consideration (S. 2 & 25) – Concept and Importance of consideration, Legal rules of Consideration, Exceptions to the Rule, 'No Consideration No Contract'(Ss. 25) Unlawful Consideration (S 23)
2	Indian Contract Act – 1872 Part –II
	- Consent (Ss.13, 14-18, 39.53, 55, 66)-Agreements in which consent is not free - Coercion, Undue Influence, Misrepresentation Fraud, Mistake. - Void Agreements (S. 24-30) – Concept, Void Agreements under Indian Contract Act. - Contingent Contract (S. 31), Quasi Contract (S.68-72), Concept of E-Contract& Legal Issues in formation and discharge of E- Contract. Concept of Performance of Contract (S 37) - Modes of Discharge of Contract, Remedies on breach of Contract.(73-75)
3	Special Contracts
	- Law of Indemnity & Guarantee (Ss. 124-125, Ss. 126-129, 132-147) – Concept, Essentials elements of Indemnity and Guarantee, Contract of Indemnity vs. Guarantee, Modes of Discharge of Surety. - Law of Bailment (S. 148, 152-154, 162, 172, 178, 178A, 179) – Concept, Essentials of Bailment, Kinds of Bailment, Rights and Duties of Bailor and Bailee - Law of Pledge – Concept, Essentials of valid Pledge, Lien - concept, Difference between Pledge and Lien, Rights of Pawnor & Pawnee.(Ss.173, 174, 177) - Law of Agency (Ss. 182-185, 201-209) – Concept, Modes of creation of Agency, Modes of termination of Agency, Rights& Duties of Principal and Agent.




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4	The Sale Of Goods Act - 1930
	• Contract of Sale (S.2) – Concept, Essentials elements of contract of sale, Distinction between Sale and Agreement to sell (S.4) Distinguish between Sale and Hire Purchase Agreement, Types of Goods. Effects of destruction of Goods (Ss. 6,7.8), • Conditions & Warranties (Ss. 11-25 & 62, 63) – Concept, Distinguish between Conditions and Warranties, Implied Conditions & Warranties, Concept of Doctrine of Caveat Emptor –Exceptions. • Property – Concept, Rules of transfer of property (Ss. 18-26) • Unpaid Seller (Ss. 45-54, 55 & 56)- Concept, Rights of an unpaid seller, Remedies for Breach of contract of Sale (Ss. 55-61), Auction sale – Concept, Legal Provisions. (S. 64)
5	The Negotiable Instruments (Ammended) Act 2015
	• Negotiable Instruments – Concept (S13), Characteristics, Classification of Negotiable Instruments (Ss. 11, 12, 17-20, 42, 43, 104,134,135) Maturity of Instruments. • Promissory Note and Bill of Exchange (Ss. 4,5, 108-116)- Concept, Essentials of Promissory Note, Bill of Exchange (Ss. 4,5), Essential features of promissory note and Bill of exchange, Kinds Promissory note and Bill of exchange, Cheque (S.6)– Concept, Types & Crossing of Cheque, Distinguish between Bill of Exchange & Cheque, Dishonour of Cheque – Concept & Penalties (Ss. 138, 139,142) • Miscellaneous Provisions (S. 8-10, 22, 99-102, 118-122, 134-137) –Parties to Negotiable instruments Holder, Holder in due course, Rights & Privileges of Holder in due course, Payment in due course, Noting & Protest (99-104A)



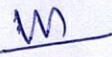

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SEMESTER – III REFERENCE BOOKS:

REFERENCES

1. Law of Contract: Avatar Singh, Eastern Book Company.
2. Merchantile Law: by M.C.Kucchal.
3. Business Law : N.D.Kapoor
4. The Law of Contract: An Outline by Dr. Nilima Chandiramani, Avinash Publications.
5. Law of Sale of Goods and Partnership: A Concise Study by Dr. Nilima Chandiramani, Shroff Publishers.
6. The Sale of Goods Act: P. Ramanatha Aiyar, University Book Agency.
7. The Negotiable Instruments Act: Bhashyam & Adiga, Bharat Law House.
8. The Negotiable Instruments Act: Avatar Singh, Eastern Book Company
9. Khergamvala on the Negotiable Instruments (Amendment) Act, 2015, Lexis Nexis




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PAPER PATTERN

S.Y.B.COM

SEMESTER III & IV

BUSINESS LAW PAPER I & II

(100 Marks Paper Per Semester)

- 1. Question paper to have Five Questions
(One from Each Module) 20 Marks Each**
- 2. All Questions to be Compulsory.**
- 3. Each Question to have Four Sub Questions of Ten Marks Each
(Students to answer any Two out of Four)**




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Question Paper Pattern (Practical Courses)

Maximum Marks: 100

Questions to be set: 06

Duration: 03 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 12 and to be answered any 10 B) Sub Questions to be asked 12 and to be answered any 10 (*Multiple choice / True or False / Match the columns/Fill in the blanks)	20 Marks
Q-2	Full Length Practical Question OR	15 Marks
Q-2	Full Length Practical Question	15 Marks
Q-3	Full Length Practical Question OR	15 Marks
Q-3	Full Length Practical Question	15 Marks
Q-4	Full Length Practical Question OR	15 Marks
Q-4	Full Length Practical Question	15 Marks
Q-5	Full Length Practical Question OR	15 Marks
Q-5	Full Length Practical Question	15 Marks
Q-6	A) Theory questions B) Theory questions OR	10 Marks 10 Marks
Q-6	Short Notes To be asked 06 To be answered 04	20 Marks



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Note:

Practical question of 15 marks may be divided into two sub questions of 7/8 and 10/5Marks.

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Question Paper Pattern (Theoretical Courses)

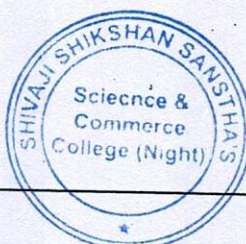
Maximum Marks: 100

Questions to be set: 06

Duration: 03 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Objective Questions G) Sub Questions to be asked 12 and to be answered any 10 H) Sub Questions to be asked 12 and to be answered any 10 (*Multiple choice / True or False / Match the columns/Fill in the blanks)	20 Marks
Q-2	Full Length Question OR	15 Marks
Q-2	Full Length Question	15 Marks
Q-3	Full Length Question OR	15 Marks
Q-3	Full Length Question	15 Marks
Q-4	Full Length Question OR	15 Marks
Q-4	Full Length Question	15 Marks
Q-5	Full Length Question OR	15 Marks
Q-5	Full Length Question	15 Marks
Q-6	G) Theory questions H) Theory questions OR	10 Marks 10 Marks
Q-6	Short Notes To be asked 06 To be answered 04	20 Marks



Note:

Theory question of 15 marks may be divided into two sub questions of 7/8 and 10/5 Marks.

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B.Com. Programme
Under Choice Based Credit, Grading and Semester System
Course Structure

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

Semester IV

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

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




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***List of Skill Enhancement Courses (SEC) Group A
for Semester IV (Any One)**

1	Advertising II
2	Field Sales Management II
3	Public Relations II
4	Mass Communication II
5	Travel & Tourism Management II
6	Journalism II
7	Company Secretarial Practice II
8	Rural Development II
9	Co-operation II
10	Mercantile Shipping II
11	Indian Economic Problem II
12	Computer Programming II
13	Logistic and Supply Chain Management I
14	Economic System II.

Note: Course selected in Semester III will continue in Semester IV

**** List of Skill Enhancement Courses (SEC) Group B**

1	Foundation Course- Contemporary Issues - IV
2	Foundation Course in NSS - IV
3	Foundation Course in NCC - IV
4	Foundation Course in Physical Education - IV

Note: Course selected in Semester III will continue in Semester IV




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with Effect from the Academic Year 2017-2018**

Elective Courses (EC)

Discipline Specific Elective (DSE) Courses

1Aa. Accountancy and Financial Management IV

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Company Accounts	15
2	Redemption of Preference Shares	15
3	Redemption of Debentures	15
4	Ascertainment and Treatment of Profit Prior to Incorporation	15
Total		60



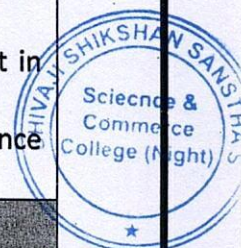

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Sr. No.	Modules / Units
1	Introduction to Company Accounts
	Introduction of basic terms: Types of companies, nature and formation of companies, Shares, Debentures, Share Capital, Reserves and surplus, types of assets and liabilities, dividend, format of Balance Sheet (Only theory) Issue of shares: Different modes IPO, Private Placements, Preferential, Rights, ESO, SWEAT and ESCROW account, Issue of shares at par, premium and discount, Under subscription and Over subscription of shares, forfeiture and reissue of forfeited shares, issue of shares for consideration other than cash. (Only theory) Issue of Debentures: types of Debentures, Issue of debentures at par, premium and discount, Issue of Debentures with consideration of Redemption, Issue of debentures for cash receivable in instalments or at a time Issue of debentures for consideration other than cash. (Only theory)
2	Redemption of Preference Shares
	Provision of the Companies Act for redemption of Preference Shares (Sec 55 of the Companies Act, 2013), Companies (Share and Debentures) Rules. Methods of Redemption of fully paid up Preference Shares as per Companies Act, 2013: The proceed of a fresh issue of shares, the capitalisation of undistributed profits and a combination of both, calculation of minimum fresh issue to provide the fund for redemption, (Question on entries and/or Balance Sheet) Note: Companies governed by Section 133 of the Companies Act, 2013 and comply with the accounting standards prescribed for them. Hence, the balance in security premium account not to be utilised for premium payable on redemption of preference shares.
3	Redemption of Debentures
	Introduction : Provisions of Section 71 (1) and (4) of the Companies Act, 2013, Creation and investment of DRR including The Companies (Share Capital and Debentures) Rules, 2014, the methods of writing-off discount/loss on issue of debentures; Terms of issue of debentures Methods of redemption of debentures: By payment in lumpsum and by payment in instalments (excluding from by purchase in open market), Conversion. (Question on entries. ledgers and/or Balance Sheet and /or redemption of preference shares)
4	Ascertainment and Treatment of Profit Prior to Incorporation
	(i) Principles for ascertainment Preparation of separate combined, columnar Profit and Loss A/c including different basis of allocation of expenses and income

Note: The Law and Standards in force on 1st April immediately preceding the commencement of Academic year will be applicable for ensuing Examinations

Reference Text :

1. Introduction to Accountancy T.S. Grewal S. Chand and Co. (P) Ltd., New Delhi
2. Advanced Accounts Shukla and Grewal S. Chand and Co. (P) Ltd., New Delhi
3. Advanced accountancy R.L. Gupta and M. Radhaswamy S. Chand and Co. (P) Ltd., New Delhi
4. Modern Accountancy Mukerjee and Hanif Tata Mc. Grow Hill and Co. Ltd., Mumbai
5. Financial Accountancy LesileChandWickhPretice Hall of India AdinBakley (P) Ltd.



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Question Paper Pattern (Theoretical Courses)

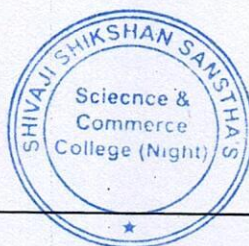
Maximum Marks: 100

Questions to be set: 06

Duration: 03 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Objective Questions. I) Sub Questions to be asked 12 and to be answered any 10 J) Sub Questions to be asked 12 and to be answered any 10 (*Multiple choice / True or False / Match the columns/Fill in the blanks)	20 Marks
Q-2	Full Length Question OR	15 Marks
Q-2	Full Length Question	15 Marks
Q-3	Full Length Question OR	15 Marks
Q-3	Full Length Question	15 Marks
Q-4	Full Length Question OR	15 Marks
Q-4	Full Length Question	15 Marks
Q-5	Full Length Question OR	15 Marks
Q-5	Full Length Question	15 Marks
Q-6	I) Theory questions J) Theory questions OR	10 Marks 10 Marks
Q-6	Short Notes To be asked 06 To be answered 04	20 Marks



Note:

Theory question of 15 marks may be divided into two sub questions of 7/8 and 10/5 Marks.

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with Effect from the Academic Year 2017-2018**

**Elective Courses (EC)-
1B Discipline Related Elective (DRE) Courses**

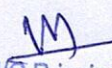
**3. Commerce – IV
(Management: Production & Finance)**

Course Objectives: -

1. To acquaint the learners with the basic concepts of Production Management, Inventory Management & Quality Management.
2. To provide basic knowledge about Indian Financial Systems.
3. To update the learners with the recent trends in Finance.

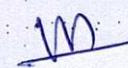
Sr. No.	Modules	No. of Lectures
1	Production & Inventory Management	11
2	Quality Management	10
3	Indian Financial System	12
4	Recent Trends In Finance	12
Total		45




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Sr. No.	Modules
1	Production & Inventory Management
	• Production Management: Objectives, Scope Production Planning & Control : Steps, Importance • Production Systems: Concept, Types - Continuous and Intermittent. Productivity: Concept, Factors Influencing Productivity, Measures for improving Productivity. • Inventory Management- Objectives, Inventory Control- Techniques. Scientific Inventory Control System - Importance
2	Quality Management
	• Introduction to Quality: Dimensions of Quality, Cost of Quality: Types – Internal Failure Cost, External Failure Cost, Appraisal Cost, Prevention Cost, Quality Circle: Features. • Quality Management Tools: TQM – Importance, Six Sigma – Process, ISO 9000 – Certification Procedure, Kaizen – Process • Service Quality Management: Importance, SERVQUAL Model, Measures to improve service quality.
3	Indian Financial System
	• Indian Financial Market: Structure, Primary Market – IPO Procedure Dematerialisation: Process, Role of Depositories : NSDL and CDSL • SEBI: Functions of SEBI, Investors protection measures of SEBI. Stock Exchange – Functions, Speculators. • Credit Rating: Advantages, Credit Rating Agencies in India - CRISIL, CARE, and ICRA.
4	Recent Trends In Finance
	• Mutual Funds- Advantages and Limitations, Types, Factors responsible for growth of mutual funds – Systematic Investment Plan. • Commodity Market: Categories, Derivatives Market: Types, Participants, Types of Derivative Instruments. • Start-up Ventures – Concept, Sources of Funding, Micro Finance – Importance, Role of Self Help Groups.



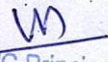

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SEMESTER – IV REFERENCE BOOKS:

REFERENCES

1. Production and Operations Management –Prof.L.C.Jhamb, Event Publishing House.
2. Production Planning & Control- Prof.L.C.Jhamb, Event Publishing House
3. Production & Operation Management (Text & Cases)- K.Ashwathappa&G.Sudeshana Reddy, Himalaya Publication.
4. Launching New Ventues : An EnterpreneurialApproach-KathleenR.Allen, Cengage Learning
5. Essentials of Inventory Management-MaxMuller,Amacon Publishes
6. Indian Financial System—BharathiPathiak, Pearson Publication
7. Financial Institutions and Markets : Structure Growth& Innovations – L.M.Bhole , Jitendra Mahakad, Tata McGraw Hill.
- 8.The IndianFinancial System and Financial Market Operator-VasantDesai, Himalaya Publishing
9. Indian Financial System – M.Y.Khan, Tata McGraw –Hill
- 10.Production and Operations Management –Anandkumar Sharma, Anmol Publication
11. Mutual Funds in India: Emerging Issues-NaliniPravaTripathy, Excel Books New Delhi.
12. Start up Stand up: A step by stepguide to Growing your Business,NandiniVaidyanathan, Jaico Publishing House,Mumbai
13. A Trades Guide to Indian Commodities Market-Vijay L. Bhambwani, Network 18 Publication Ltd.




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PAPER PATTERN
COMMERCE PAPER I & II
SEMESTER - III & IV
W.E.F. 2017-2018

Q.1 Multiple Choice Questions

(A) Select the most appropriate answer from the option given below 10

(Any Ten out of Twelve)

(B) State whether the following statements are True or False 10

(Any Ten out of Twelve)

Q.2 Answer Any Two of the following Out of Three questions - Module - I 15

a.

b.

c.

Q.3 Answer Any Two of the following Out of Three questions - Module - II 15

a.

b.

c.

Q.4 Answer Any Two of the following Out of Three questions - Module - III 15

a.

b.

c.

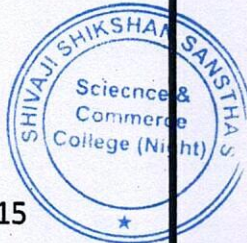
Q.5 Answer Any Two of the following Out of Three questions - Module - IV 15

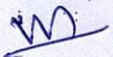
a.

b.

c.

Q.6 Write notes on Any Four out of Six




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**Revised Syllabus of Courses of B.Com. Programme at Semester IV
with Effect from the Academic Year 2017-2018**

**Elective Courses (EC)-
1B Discipline Related Elective (DRE) Courses**

**4. Business Economics IV
Foundation of Public Finance**

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Public Finance	10
2	Public revenue	10
3	Public Expenditure and Debt	10
4	Fiscal Management and Financial Administration	15
Total		45




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Business Economics IV

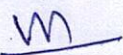
Foundation of Public Finance

Preamble

Public Finance Issues are central to economic and Political discourse worldwide, as one of the primary functions of government is to generate resources from its people to spend money for improving the lives of its people. The primary objective of this course is to provide students with the tools to understand the underlying concepts and practical tradeoffs entailed in Public finance policy alternatives.

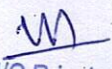
It is strongly recommended to analyze Union budget of ongoing financial year in the class room.



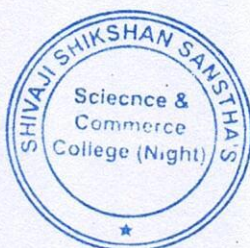

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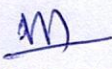
Sr. no	Modules / Units
1	The Role Of Government In An Economy
	• Meaning and Scope of Public finance. • Major fiscal functions : allocation function, distribution function & stabilization function • Principle of Maximum Social Advantage: Dalton and Musgrave Views - the Principle in Practice, Limitations. • Relation between Efficiency, Markets and Governments • The concept of Public Goods and the role of Government
2	Public Revenue
	• Sources of Public Revenue : tax and non-tax revenues • Objectives of taxation - Canons of taxation - Types of taxes : direct and indirect - Tax Base and Rates of taxation : proportional, progressive and regressive taxation • Shifting of tax burden: Impact and incidence of taxation - Processes- factors influencing incidence of taxation • Economic Effects of taxation: on Income and Wealth, Consumption, Savings, Investments and Production. • Redistributive and Anti – Inflationary nature of taxation and their implications
3	Public Expenditure And Public Debt
	• Public Expenditure: Canons - classification - economic effects of public spending - on production, consumption, distribution, employment and stabilization - Theories of Public Expenditure: Wagner's Hypothesis and Wiseman Peacock Hypothesis - Causes for Public Expenditure Growth. • Significance of Public Expenditure: Social security contributions- Low Income Support and Social Insurance Programmes. • Public Debt : Classification - Burden of Debt Finance : Internal and External- Public Debt and Fiscal Solvency
4	Fiscal Management and Financial Administration
	• Fiscal Policy: Meaning, Objectives, constituents and Limitations. • Contra cyclical Fiscal Policy and Discretionary Fiscal Policy : Principles of Sound and Functional Finance • Budget- Meaning objectives and types - Structure of Union budget - Deficit concepts-Fiscal Responsibility and Budget Management Act. • Intergovernmental Fiscal Relations: fiscal federalism and fiscal decentralization - central-state financial relations - 14th Finance Commission recommendations




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Reference Books	
	Ahuja H.L. : Modern Economics, 19th edition, 2015, S.Chand&co Pvt Ltd, New Delhi
	Bhatia H.L.: Public Finance. Vikas Publishing House Pvt. Ltd.
	David N. Hyman : Public Finance A Contemporary Application of theory of policy, Krishna Offset, Delhi
	Hoiughton E.W.(1998) : Public Finance, Penguin, Baltimore
	Hajela T.N: Public Finance – Ane Books Pvt.Ltd
	Jha, R (1998) : Modern Public Economics, Route Ledge, London
	Musgrave, R.A and P.B. Musgrave (1976) : Public Finance in Theory and Practice, Tata McGraw Hill, Kogakusha, Tokyo
	Mithani, D.M (1998) : Modern Public Finance, Himalaya Publishing House, Mumbai




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QUESTION PAPER PATTERN

Business Economics Semester IV

Maximum Marks: 100 Marks

Time: 3 Hours

Note: 1) Attempt all Questions

2) Attempt any two out of three questions from each of question no. 2, 3, 4 & 5

Question No	Particulars	Marks
Q-1	Objective Questions: A) Conceptual questions (Any Five out of Eight) (Two from each module) B) Multiple Choice questions (10 questions - at least two from each Module)	20Marks 10 Marks 10 Marks
Q-2 (from Module I)	A) Full Length Question B) Full Length Question C) Full Length Question	20Marks
Q-3 (from Module II)	A) Full Length Question B) Full Length Question C) Full Length Question	20Marks
Q-4 (from Module III)	A) Full Length Question B) Full Length Question C) Full Length Question	20Marks
Q-5 (from Module IV)	A) Full Length Question B) Full Length Question C) Full Length Question	20Marks



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Projects / Assignments (for Internal Assessment)

- Projects/Assignments should be drawn for the component on Internal Assessment from the topics in **Module 1 to Module 4**.
- Students should be given a list of possible topics - at least 3 from each Module at the beginning of the semester.
- The Project/Assignment can take the form of Street-Plays / Power-Point Presentations / Poster Exhibitions and similar other modes of presentation appropriate to the topic.
- Students can work in groups of not more than 8 per topic.
- Students must submit a hard / soft copy of the Project / Assignment before appearing for the semester end examination.

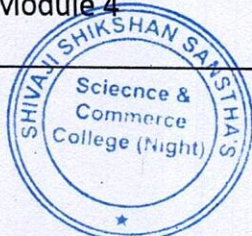
QUESTION PAPER PATTERN (Semester III)

The Question Paper Pattern for Semester End Examination shall be as follows:

TOTAL MARKS: 75

DURATION: 150 MINUTES

QUESTION NUMBER	DESCRIPTION	MARKS ASSIGNED
1	- Question 1 A will be asked on the meaning / definition of concepts / terms from all Modules. - Question 1 B will be asked on the topic of the Project / Assignment done by the student during the Semester - In all 8 Questions will be asked out of which 5 have to be attempted.	- Total marks: 15 - For 1 A, there will be 3 marks for each sub-question. - For 1 B there will be 15 marks without any break-up.
2	Descriptive Question with internal option (A or B) on Module 1	15
3	Descriptive Question with internal option (A or B) on Module 2	15
4	Descriptive Question with internal option (A or B) on Module 3	15
5	Descriptive Question with internal option (A or B) on Module 4	15



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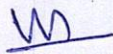
**Revised Syllabus of Courses of B.Com. Programme at Semester IV
with Effect from the Academic Year 2017-2018**

Core Courses (CC)

7. Business Law II

Sr. No.	Modules	No. of Lectures
1	Indian Companies Act – 2013 Par T –I	12
2	Indian Companies Act – 2013, Par T –II	12
3	Indian Partnership Act – 1932	12
4	Consumer Protection Act, 1986 & Competition Act 2002	12
5	Intellectual Property Rights	12
Total		60




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Sr. No.	Modules
1	Indian Companies Act – 2013 Par T –I
	- Company –Concept, Features, Role of Promoters (S. 2(69) S. 92), Duties and liabilities of the Promoter Effects of Pre-Incorporation contracts, Consequences of non-registration, and Lifting of Corporate Veil. - Classification of Companies Distinction between Private Company and Public Company, Advantages and disadvantages of Private company and Public Company. –Common Procedure for Incorporation of Company, - Memorandum of Association (MOA) & Article of Association(AOA) – Concept , Clauses of MOA, AOA- Contents, Doctrine of constructive notice, Doctrine of Ultra Vires, Doctrine of Indoor Management. - Prospectus – Concept, Kinds, Contents, Private Placement
2	Indian Companies Act – 2013, Par T –II
	- Member of a Company –Concept, Who can become a member, Modes of acquiring membership, Cessation of membership, Right & Liabilities of Members. - Director – Qualifications& Disqualification, Classification, Director Identification Number (DIN), Legal Position of Directors. - Meetings – Types, Legal Provisions of Statutory Meeting, Annual General Meeting, Extra-Ordinary Meeting, Board Meeting.
3	Indian Partnership Act – 1932
	- Partnership – Concept, Essentials, True Test of Partnership, Partnership Deed, Types of Partnership, Rights and Duties of Partners, Distinguish between Partnership & Hindu Undivided Family (HUF). - Dissolution – Concept, Modes of Dissolution, Consequences of Dissolution. - Limited Liability Partnership (LLP) 2008 – Concept, Characteristics, Advantages & Disadvantages, Procedure for Incorporation. - Extent of L.L.P.- Conversion of LLP, Mutual rights & duties of partners, Winding up of LLP, Distinction between LLP and Partnership.
4	Consumer Protection Act, 1986 & Competition Act 2002
	- Consumer Protection Act – Concept , Objects, Reasons for enacting the Consumer Protection Act, Definition of Consumer, Consumer Dispute, Complaint, Complainant, Defect, Deficiency, Consumer Dispute, Unfair Trade Practices, Goods and Services. - Consumer Protection Councils & Redressal Agencies – District, State & National. - Competition Act 2002 – Concept, Salient Features, Objectives & Advantages. - Abuse of Dominant Position, Competition Commission of India, Anti-Competition Agreements,

Sr. No.	Modules
5	INTELLECTUAL PROPERTY RIGHTS 12
	- Intellectual Property Right (IPR) – Concept, Nature, Introduction & background of IPR in India. - IPR relating to Patents – Concepts of Invention and discovery, Comparison (S2 (j)), Concept of Patents, General principles applicable to working of patented inventions, Term of Patent. Infringement of Patent Rights & Remedies. (Ss. 104-115) - IPR relating to Copyrights- Concept of Copyright (Ss. 14, 16, 54,) Concept of author and authorised acts, (S.2) Ownership of Copy right (S.17) Duration or term of Copy right. (S. 22-27), Original work and fair use, Rights of Copyright holder, Infringement of Copyrights & Remedies. (Ss. 51, 52) - IPR relating to Trademarks –Concept, Functions of Trade Mark, types, trademarks that cannot be registered, Registration of Trade Marks and rights of the proprietor of Trade Marks. Procedure for registration of Trade Marks., Infringement of Trademarks & Remedies.



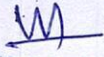

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SEMESTER – IV REFERENCE BOOKS:

REFERENCES

1. Guide to the Companies Act, 2013 by A Ramaiya , Lexis Nexis.
2. Company Law by G.K.Kapoor.
3. Company Law by N.D.Kapoor.
4. Company Law by P.C. Tulsian.
5. Law and practice of Intellectual Property in India by Dr.Vikas Vashishth, Bharat Law House.
6. Law of Partnership along with Limited Liability Partnership by Avatar Singh , Eastern Book Company.
7. Laws Relating to Intellectual Property, Universal Law Publishing Co. Dr. B.L.Wadhera.
8. Consumer Protection Law and Practice by Dr.V.K.Agarwal, Bharat Law House.
9. Competition Law by Avatar Singh, Eastern Book Company
10. Competition Law in India by T. Ramappa, Oxford University Press.
11. Intellectual Property Rights by Narayan.
12. Laws Relating to Intellectual Property, Universal Law Publishing Co. Dr. B.L.Wadhera




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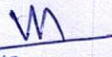
**PAPER PATTERN
S.Y.B.COM
SEMESTER III & IV**

BUSINESS LAW PAPER I & II

(100 Marks Paper Per Semester)

- 1. Question paper to have Five Questions
(One from Each Module) 20 Marks Each**
- 2. All Questions to be Compulsory.**
- 3. Each Question to have Four Sub Questions of Ten Marks Each
(Students to answer any Two out of Four)**




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Question Paper Pattern (Practical Courses)

Maximum Marks: 100

Questions to be set: 06

Duration: 03 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Objective Questions C) Sub Questions to be asked 12 and to be answered any 10 D) Sub Questions to be asked 12 and to be answered any 10 (*Multiple choice / True or False / Match the columns/Fill in the blanks)	20 Marks
Q-2	Full Length Practical Question OR	15 Marks
Q-2	Full Length Practical Question	15 Marks
Q-3	Full Length Practical Question OR	15 Marks
Q-3	Full Length Practical Question	15 Marks
Q-4	Full Length Practical Question OR	15 Marks
Q-4	Full Length Practical Question	15 Marks
Q-5	Full Length Practical Question OR	15 Marks
Q-5	Full Length Practical Question	15 Marks
Q-6	C) Theory questions D) Theory questions OR	10 Marks 10 Marks
Q-6	Short Notes To be asked 06 To be answered 04	20 Marks



Note:

Practical question of 15 marks may be divided into two sub questions of 7/8 and 10/5 Marks.

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Question Paper Pattern (Theoretical Courses)

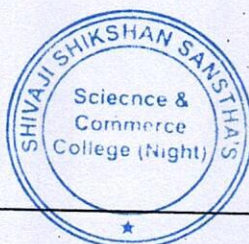
Maximum Marks: 100

Questions to be set: 06

Duration: 03 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Objective Questions O) Sub Questions to be asked 12 and to be answered any 10 P) Sub Questions to be asked 12 and to be answered any 10 (*Multiple choice / True or False / Match the columns/Fill in the blanks)	20 Marks
Q-2	Full Length Question OR	15 Marks
Q-2	Full Length Question	15 Marks
Q-3	Full Length Question OR	15 Marks
Q-3	Full Length Question	15 Marks
Q-4	Full Length Question OR	15 Marks
Q-4	Full Length Question	15 Marks
Q-5	Full Length Question OR	15 Marks
Q-5	Full Length Question	15 Marks
Q-6	O) Theory questions P) Theory questions OR	10 Marks 10 Marks
Q-6	Short Notes To be asked 06 To be answered 04	20 Marks



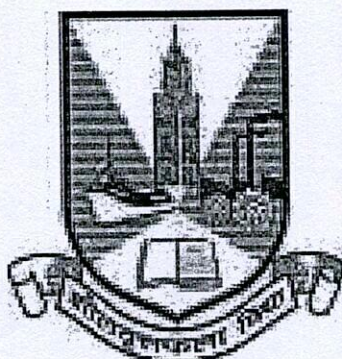
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Note:

Theory question of 15 marks may be divided into two sub questions of 7/8 and 10/5 Marks.

University of Mumbai



NAAC ACCREDITED

BACHELOR OF COMMERCE (B.COM)

SEMESTER – III & IV

DISCIPLINE RELATED ELECTIVE (DRE) COURSES

COMMERCE PAPER III & IV

Choice Based Credit System

To be implemented from AY 2017 - 2018




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**Revised Syllabus of courses of S. Y. B.Com Programme
with effect from the Academic Year 2017-2018**

COMMERCE –III (MANAGEMENT: FUNCTIONS AND CHALLENGES)

SEMESTER - III

Course Objectives:

- To make the learners aware about conceptual knowledge and evolution of Management.
- To familiarize the learners with the functions in Management.

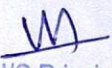
Sr. No.	Modules	No. of Lectures
1	Introduction To Management	11
2	Planning & Decision Making	10
3	Organising	12
4	Directing And Controlling	12
Total		45




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Sr. No.	Modules
1	Introduction To Management (11)
	• Management- Concept, Nature, Functions, Managerial Skills & Competencies • Evolution of Management Thoughts Classical Approach: Scientific Management – F.W.Taylor's Contribution Classical Organisation Theory: Henri Fayol's Principles Neo Classical: Human Relations Approach – Elton Mayo's Hawthorne experiments • Modern Management Approach- Peter Drucker's Dimensions of Management, Indian Management Thoughts: Origin & Significance of Indian Ethos to Management.
2	Planning & Decision Making (10)
	• Planning - Steps, Importance, Components, Coordination – Importance • M.B.O -Process, Advantages, Management By Exception- Advantages; Management Information System- Concept, Components • Decision Making - Techniques, Essentials of a Sound Decision Making, Impact of Technology on Decision Making.
3	Organising (12)
	• Organising-Steps, Organisation Structures – Features of Line & Staff Organisation, Matrix Organisation, Virtual Organisation, Formal v/s Informal Organisation. • Departmentation -Meaning -Bases, Span of Management- Factors Influencing Span of Management, Tall and Flat Organisation. • Delegation of Authority- Process, Barriers to Delegation, Principles of Effective Delegation. Decentralisation: Factors Influencing Decentralisation, Centralization v/s Decentralisation
4	Directing And Controlling (12)
	• Motivation – Concept, Importance, Influencing factors. Importance of Communication, Barriers to effective Communication • Leadership- Concept, Functions, Styles, Qualities of a good leader. • Controlling – Concept, Steps, Essentials of good control system, Techniques of Controlling -PERT, CPM, Budgetary Control, Management Audit.



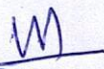

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SEMESTER – III REFERENCE BOOKS:

REFERENCES

1. Management Today Principles & Practice- Gene Burton, Manab Thakur, Tata McGraw-Hill, Publishing Co. Ltd.
2. Management – James A. F. Stoner, Prentice Hall, Inc. U.S.A.
3. Management : Global Prospective – Heinz Weihrich & Harold Koontz, Tata McGraw- Hill, Publishing Co. Ltd.
4. Essential of Database Management Systems - Alexis Leon, Mathews Leon Vijay Nicole, Imprints Pvt Ltd.
5. Management – Task, Resp, Practices – Peta Druche “willian Heinemann LTD.




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**Revised Syllabus of courses of S. Y. B.Com Programme
with effect from the Academic Year 2017-2018**

SEMESTER-IV

Commerce – IV (Management: Production & Finance)

Course Objectives: -

1. To acquaint the learners with the basic concepts of Production Management, Inventory Management & Quality Management.
2. To provide basic knowledge about Indian Financial Systems.
3. To update the learners with the recent trends in Finance.

Sr. No.	Modules	No. of Lectures
1	Production & Inventory Management	11
2	Quality Management	10
3	Indian Financial System	12
4	Recent Trends In Finance	12
Total		45




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Sr. No.	Modules
1	PRODUCTION & INVENTORY MANAGEMENT(11)
	• Production Management: Objectives, Scope Production Planning & Control : Steps, Importance • Production Systems: Concept, Types - Continuous and Intermittent. Productivity: Concept, Factors Influencing Productivity, Measures for improving Productivity. • Inventory Management- Objectives, Inventory Control- Techniques. Scientific Inventory Control System - Importance
2	QUALITY MANAGEMENT(10)
	• Introduction to Quality: Dimensions of Quality, Cost of Quality: Types – Internal Failure Cost, External Failure Cost, Appraisal Cost, Prevention Cost, Quality Circle: Features. • Quality Management Tools: TQM – Importance, Six Sigma – Process, ISO 9000 – Certification Procedure, Kaizen – Process • Service Quality Management: Importance, SERVQUAL Model, Measures to improve service quality.
3	INDIAN FINANCIAL SYSTEM (12)
	• Indian Financial Market: Structure, Primary Market – IPO Procedure Dematerialisation: Process, Role of Depositories : NSDL and CDSL • SEBI: Functions of SEBI, Investors protection measures of SEBI. Stock Exchange – Functions, Speculators. • Credit Rating: Advantages, Credit Rating Agencies in India - CRISIL, CARE, and ICRA.
4	RECENT TRENDS IN FINANCE (12)
	• Mutual Funds- Advantages and Limitations, Types, Factors responsible for growth of mutual funds – Systematic Investment Plan. • Commodity Market: Categories, Derivatives Market: Types, Participants, Types of Derivative Instruments. • Start-up Ventures – Concept, Sources of Funding, Micro Finance – Importance, Role of Self Help Groups.




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SEMESTER – IV REFERENCE BOOKS:

REFERENCES

1. Production and Operations Management – Prof L.C.Jhamb, Event Publishing House.
2. Production Planning & Control- Prof L.C.Jhamb, Event Publishing House
3. Production & Operation Management (Text & Cases)- K.Ashwathappa & G.Sudeshana Reddy, Himalaya Publication.
4. Launching New Ventures : An Entrepreneurial Approach-Kathleen R.Allen, Cengage Learning
5. Essentials of Inventory Management-Max Muller, Amacon Publishes
6. Indian Financial System—Bharathi Pathiak, Pearson Publication
7. Financial Institutions and Markets : Structure Growth & Innovations – L.M.Bhole , Jitendra Mahakad, Tata McGraw Hill.
8. The Indian Financial System and Financial Market Operator-Vasant Desai, Himalaya Publishing
9. Indian Financial System – M.Y.Khan, Tata McGraw –Hill
10. Production and Operations Management –Anandkumar Sharma, Anmol Publication
11. Mutual Funds in India: Emerging Issues-Nalini Prava Tripathy, Excel Books New Delhi.
12. Start up Stand up: A step by step guide to Growing your Business, Nandini Vaidyanathan, Jaico Publishing House, Mumbai
13. A Trades Guide to Indian Commodities Market-Vijay L. Bhambwani, Network 18 Publication Ltd.




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PAPER PATTERN
COMMERCE PAPER III & IV
SEMESTER - III & IV
W.E.F. 2017-2018

Q.1 Multiple Choice Questions

(A) Select the most appropriate answer from the option given below 10
(Any Ten out of Twelve)

(B) State whether the following statements are True or False 10
(Any Ten out of Twelve)

Q.2 Answer **Any Two** of the following **Out of Three** questions - Module - I 15

- a.
- b.
- c.

Q.3 Answer **Any Two** of the following **Out of Three** questions - Module - II 15

- a.
- b.
- c.

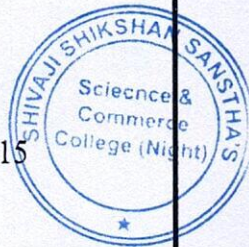
Q.4 Answer **Any Two** of the following **Out of Three** questions - Module - III 15

- a.
- b.
- c.

Q.5 Answer **Any Two** of the following **Out of Three** questions - Module - IV 15

- a.
- b.
- c.

Q.6 Write notes on **Any Four** out of Six




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Academic Council 24 /06/2016

Item No. 4.17

UNIVERSITY OF MUMBAI



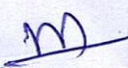
Syllabus for First Year
B.Com(Semester I and Semester
II)
Programme

Business Economics Paper I & II

with effect from the academic year

2016 – 2017




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First Year B.Com Semester I

Business Economics Paper I

Preamble

This paper provides an overall introduction to economics as dealing with the problems of allocation of scarce resources in optimum manner. It aims to build a familiarity with the basic tools of consumer and producer theory, the operation of markets and optimisation in an economic context. In order to explain economic issues and solutions in a practical manner, the concepts are to be discussed with case studies and numerical problems wherever applicable.

Unit I: Introduction

(10 lectures)

Scope and Importance of Business Economics - basic tools- Opportunity Cost principle- Incremental and Marginal Concepts. Basic economic relations - functional relations: equations- Total, Average and Marginal relations- Use of Marginal analysis in decision making.

The basics of market demand, market supply and equilibrium price- shifts in the demand and supply curves and equilibrium

Unit II: Demand Analysis (15 lectures)

Demand Function - nature of demand curve under different markets

Meaning, significance, types and measurement of elasticity of demand (Price, income cross and promotional) - relationship between price elasticity of demand and revenue concepts

Demand Estimation and forecasting: Meaning and significance - methods of demand estimation- survey and statistical methods (numerical examples on trend analysis and simple linear regression)

Unit III: Supply and Production Decisions:

(10 lectures)

Production function: short run analysis with Law of Variable Proportions- Production function with two variable inputs- isoquants, ridge lines and least cost combination of inputs- Long run production function and Laws of Returns to Scale - expansion path - Economies and diseconomies of Scale and economies of scope

Unit IV: Cost of Production:

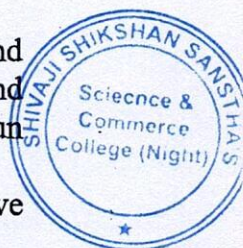
(10 lectures)

Cost concepts: accounting cost and economic cost, implicit and explicit cost, social and private cost, historical cost and replacement cost, sunk cost and incremental cost -fixed and variable cost - total, average and marginal cost - Cost Output Relationship in the Short Run and Long Run- (hypothetical numerical problems to be discussed)

Extension of cost analysis: Cost reduction through experience- LAC and Learning curve and Break Even Analysis (with business application)

References:

- 1) Mehta, P.L.: *Managerial Economics – Analysis, Problem and Cases* (S. Chand & Sons, N. Delhi, 2000)
- 2) Hirchey .M., *Managerial Economics*, Thomson South western (2003)
- 3) Salvatore, D.: *Managerial Economics in a global economy* (Thomson South Western Singapore, 2001)
- 4) Frank R.H, Bernanke.B.S., *Principles of Economics* (Tata McGraw Hill (ed.3))
- 5) Gregory Mankiw., *Principles of Economics*, Thomson South western (2002)



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- 6) Samuelson & Nordhas.: Economics (Tata McGraw Hills, New Delhi, 2002)
 7) Pal Sumitra, Managerial Economics cases and concepts (Macmillan, New Delhi, 2004)

F.Y B.Com Semester II

Business Economics Paper II

Unit I: Market Structure: Perfect Competition and Monopoly (10 lectures)

Perfect competition and Monopoly models as two extreme cases - profit maximisation and the competitive firm's supply curve - Short run and long run equilibrium of a firm and of industry - Monopoly - Sources of monopoly power - short run and long run equilibrium of a firm under Monopoly

Unit II: Pricing and Output Decisions under Imperfect Competition (15 lectures)

Monopolistic competition: Competitive and Monopolistic elements of monopolistic competition- equilibrium of firm under monopolistic competitions, monopolistic verses perfect competition, excess capacity and inefficiency, debate over role of advertising, (topics to be taught using case studies from real life examples)

Oligopolistic Market: Key attributes of oligopoly- Collusive and non-collusive oligopoly market, Price rigidity, Cartels and price leadership models (with practical examples)

Unit III: Pricing practices (10 lectures)

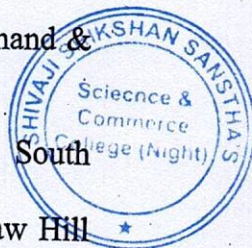
Cost oriented pricing methods: cost -plus (full cost)/mark-up pricing, marginal cost pricing, Mark up pricing, discriminating pricing, multiple - product pricing - transfer pricing (case studies on how pricing methods are used in business world)

Unit IV: Evaluating capital projects (10 lectures)

Meaning and importance of capital budgeting- steps in capital budgeting- Techniques of Investment appraisal: payback period method, net present value method, and internal rate of return method (with numerical examples)

References:

- 1) Mehta, P.L.: Managerial Economics - Analysis, Problem and Cases (S. Chand & Sons, N. Delhi, 2000)
- 2) Hirchey .M., Managerial Economics, Thomson South western (2003)
- 3) Salvatore, D.: Managerial Economics in a global economy (Thomson South Western Singapore, 2001)
- 4) Frank Robert.H, Bernanke. Ben S., Principles of Economics (Tata McGraw Hill (ed.3)
- 5) Gregory Mankiw., Principles of Economics, Thomson South western (2002 reprint)
- 6) Samuelson & Nordhas.: Economics (Tata McGraw Hills, New Delhi, 2002)
- 7) Pal Sumitra, Managerial Economics cases and concepts (Macmillan, New Delhi, 2004)




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Question Paper Pattern (Business Economics Paper I & II)

Maximum Marks: 100

Questions to be set: 06

Duration: 03Hrs.

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 07 and to be answered any 05 B) Sub Questions to be asked 12 and to be answered any 10 (*Multiple choice / True or False / Match the columns/Fill in the blanks)	20
Q-2 Q-2	Full Length Question OR Full Length Question	15
Q-3 Q-3	Full Length Question OR Full Length Question	15
Q-4 Q-4	Full Length Question OR Full Length Question	15
Q-5 Q-5	Full Length Question OR Full Length Question	15
Q-6	Short Notes To be asked 06 To be answered 04	20

Note- Theory questions of 15 marks may be divided into two sub questions of 7/8 and 10/5.




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University of Mumbai

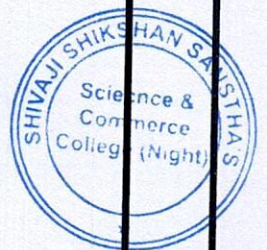


**Revised Syllabus
and
Question Paper Pattern
of Courses of
B.Com. Programme
First Year
*Semester I and II***

**Under Choice Based Credit, Grading
and Semester System**

(To be implemented from Academic Year- 2016-2017)

Faculty of Commerce



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B.Com. Programme

Under Choice Based Credit, Grading and Semester System

Course Structure

F.Y.B.Com.

(To be implemented from Academic Year- 2016-2017)

No. of Courses	Semester I	Credits	No. of Courses	Semester II	Credits
1	<i>Elective Courses (EC)</i>		1	<i>Elective Courses (EC)</i>	
1A	<i>Discipline Specific Elective(DSE)Courses</i>		1A	<i>Discipline Specific Elective(DSE)Courses</i>	
1	Accountancy and Financial Management I	03	1	Accountancy and Financial Management II	03
1B	<i>Discipline Related Elective(DRE)Courses</i>		1B	<i>Discipline Related Elective(DRE)Courses</i>	
2	Commerce I	03	2	Commerce II	03
3	Business Economics I	03	3	Business Economics II	03
2	<i>Ability Enhancement Courses (AEC)</i>		2	<i>Ability Enhancement Courses (AEC)</i>	
2A	<i>Ability Enhancement Compulsory Courses (AECC)</i>		2A	<i>Ability Enhancement Compulsory Courses (AECC)</i>	
4	Business Communication I	03	4	Business Communication II	03
5	Environmental Studies I	03	5	Environmental Studies II	03
2B	<i>*Skill Enhancement Courses (SEC)</i>		2B	<i>**Skill Enhancement Courses (SEC)</i>	
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	<i>Core Courses (CC)</i>		3	<i>Core Courses (CC)</i>	
7	Mathematical and Statistical Techniques I	03	7	Mathematical and Statistical Techniques II	03
Total Credits		20	Total Credits		20

<i>*List of Skill Enhancement Courses (SEC) for Semester I (Any One)</i>		<i>**List of Skill Enhancement Courses (SEC) for Semester II (Any One)</i>	
1	Foundation Course - I	1	Foundation Course - II
2	Foundation Course in NSS - I	2	Foundation Course in NSS - II
3	Foundation Course in NCC - I	3	Foundation Course in NCC - II
4	Foundation Course in Physical Education - I	4	Foundation Course in Physical Education - II
Note: Course selected in Semester I will continue in Semester II			




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B.Com. Programme

Under Choice Based Credit, Grading and Semester System

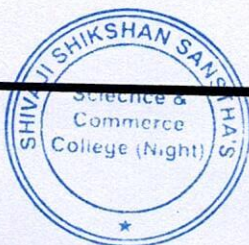
Course Structure

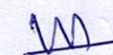
(To be implemented from Academic Year- 2016-2017)

Semester I

No. of Courses	Semester I	Credits
1	Elective Courses (EC)	
1A	Discipline Specific Elective(DSE)Courses	
1	Accountancy and Financial Management I	03
1B	Discipline Related Elective(DRE)Courses	
2	Commerce I	03
3	Business Economics I	03
2	Ability Enhancement Courses (AEC)	
2A	Ability Enhancement Compulsory Courses (AECC)	
4	Business Communication I	03
5	Environmental Studies I	03
2B	*Skill Enhancement Courses (SEC)	
6	Any one course from the following list of the courses	02
3	Core Courses (CC)	
7	Mathematical and Statistical Techniques I	03
Total Credits		20

*List of Skill Enhancement Courses (SEC) for Semester I (Any One)	
1	Foundation Course - I
2	Foundation Course in NSS - I
3	Foundation Course in NCC - I
4	Foundation Course in Physical Education - I




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

**Elective Courses (EC)-
Discipline Related Elective (DRE) Courses**

2.Commerce I

Modules at a Glance

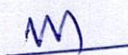
Sr. No.	Modules	No. of Lectures
1	Business	12
2	Business Environment	11
3	Project Planning	12
4	Entrepreneurship	10
Total		45




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Sr. No.	Modules / Units
1	Business
	Introduction: Concept, Functions, Scope and Significance of business. Traditional and Modern Concept of business. Objectives of Business: Steps in setting business objectives, classification of business objectives, Reconciliation of Economic and Social Objectives. New Trends in Business: Impact of Liberalization, Privatization and Globalization, Strategy alternatives in the changing scenario, Restructuring and turnaround strategies
2	Business Environment
	Introduction: Concept and Importance of business environment, Inter-relationship between Business and Environment Constituents of Business Environment: Internal and External Environment, Educational Environment and its impact, International Environment – Current Trends in the World, International Trading Environment – WTO and Trading Blocs and their impact on Indian Business.
3	Project Planning
	Introduction: Business Planning Process; Concept and importance of Project Planning; Project Report; feasibility Study types and its importance Business Unit Promotion: Concept and Stages of Business Unit Promotion, Location – Factors determining location, and Role of Government in Promotion. Statutory Requirements in Promoting Business Unit: Licensing and Registration procedure, Filing returns and other documents, Other important legal provisions
4	Entrepreneurship
	Introduction: Concept and importance of entrepreneurship, factors Contributing to Growth of Entrepreneurship, Entrepreneur and Manager, Entrepreneur and Intrapreneur The Entrepreneurs: Types of Entrepreneurs, Competencies of an Entrepreneur, Entrepreneurship Training and Development centers in India. Incentives to Entrepreneurs in India. Women Entrepreneurs: Problems and Promotion.




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B.Com. Programme
Under Choice Based Credit, Grading and Semester System
Course Structure
(To be implemented from Academic Year- 2016-2017)

Semester II

No. of Courses	Semester II	Credits
1	<i>Elective Courses (EC)</i>	
1A	<i>Discipline Specific Elective(DSE)Courses</i>	
1	Accountancy and Financial Management II	03
1B	<i>Discipline Related Elective(DRE)Courses</i>	
2	Commerce II	03
3	Business Economics II	03
2	<i>Ability Enhancement Courses (AEC)</i>	
2A	<i>Ability Enhancement Compulsory Courses (AECC)</i>	
4	Business Communication II	03
5	Environmental Studies II	03
2B	<i>**Skill Enhancement Courses (SEC)</i>	
6	Any one course from the following list of the courses	02
3	<i>Core Courses (CC)</i>	
7	Mathematical and Statistical Techniques II	03
Total Credits		20

<i>*List of Skill Enhancement Courses (SEC) for Semester II (Any One)</i>	
1	Foundation Course - II
2	Foundation Course in NSS - II
3	Foundation Course in NCC - II
4	Foundation Course in Physical Education - II



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

**Elective Courses (EC)-
Discipline Related Elective(DRE) Courses**

2. Commerce II

Modules at a Glance

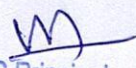
Sr. No.	Modules	No. of Lectures
1	Concept of Services	12
2	Retailing	12
3	Recent Trends in Service Sector	10
4	E-Commerce	11
Total		45




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Sr. No.	Modules / Units
1	Concept of Services
	Introduction: Meaning, Characteristics, Scope and Classification of Services – Importance of service sector in the Indian Marketing Mix Services: Consumer expectations, Services Mix, - Product, Place, Price, Promotion, Process of Services delivery, Physical evidence and people Service Strategies: Market research and Service development cycle, Managing demand and capacity, opportunities and challenges in service sector.
2	Retailing
	Introduction: Concept of organized and unorganized retailing , Trends in retailing, growth of organized retailing in India, Survival strategies for unorganized Retailers Retail Format: Store format, Non – Store format, Store Planning, design and layout Retail Scenario: Retail Scenario in India and Global context – Prospects and Challenges in India. Mall Management – Retail Franchising. FDI in Retailing, Careers in Retailing
3	Recent Trends in Service Sector
	ITES Sector: Concept and scope of BPO, KPO, LPO and ERP. Banking and Insurance Sector: ATM, Debit & Credit Cards, Internet Banking – Opening of Insurance sector for private players, FDI and its impact on Banking and Insurance Sector in India Logistics: Net working – Importance – Challenges
4	E-Commerce
	Introduction: Meaning, Features, Functions and Scope of E-Commerce-Importance and Limitations of E-Commerce Types of E-Commerce: Basic ideas and Major activities of B2C, B2B, C2C. Present status of E-Commerce in India: Transition to E-Commerce in India, E-Transition Challenges for Indian Corporates; on-line Marketing Research.




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**Revised Syllabus of Courses of B.Com. Programme at
Semester I and II
with effect from the Academic Year 2016-2017**

Reference Books

Commerce

- Business Organisation Management Maheshwari, Rajendra P, Mahajan, J.P., International Book House
- Business Organisation, Maheshwari, Rajendra P, Mahajan, J.P., International Book House
- Introduction To Commerce, Vikram, Amit, Atlantic Pub
- A Course Book On Business Environment, Cherunilam, Francis, Himalaya Pub
- Business Environment, Cherunilam, Francis, Himalaya Pub
- Essentials Of Business Environment, Aswathappa, K., Himalaya Pub
- Essentials Of Business Environment, Aswathappa, Himalaya Pub
- Strategic Management, Kapoor, Veekas, Taxmann
- Strategic Management, David, Fred R., Phi Learning
- Strategic Management, Bhutani, Kapil, Mark Pub.
- Strategic Management, Bhutani, Kapil, Mark Pub.
- Entrepreneurship, Hisrich, Robert D, Mc Graw Hill
- Entrepreneurship Development, Sharma, K.C., Reegal Book Depot
- Service Marketing, Temani, V.K., Prism Pub
- Service Marketing, Temani, V.K., Prism Pub
- Management Of Service Sector, Bhatia, B S, V P Pub
- Introduction To E – Commerce, Dhawan, Nidhi, International Book House
- Introduction To Retailing, Lusch, Robert F., Dunne, Patrick M., Carver, James R., Cengage Learning
- Retailing Management, Levy Michael., Weitz Barton A, Tata McGraw Hill




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PAPER PATTERN
COMMERCE PAPER I & II
SEMESTER - I & II
W.E.F. 2017-2018

Q.1 Multiple Choice Questions

(A) Select the most appropriate answer from the option given below 10
(Any Ten out of Twelve)

(B) State whether the following statements are True or False 10
(Any Ten out of Twelve)

Q.2 Answer **Any Two** of the following **Out of Three** questions - Module - I 15

- a.
- b.
- c.

Q.3 Answer **Any Two** of the following **Out of Three** questions - Module - II 15

- a.
- b.
- c.

Q.4 Answer **Any Two** of the following **Out of Three** questions - Module - III 15

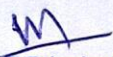
- a.
- b.
- c.

Q.5 Answer **Any Two** of the following **Out of Three** questions - Module - IV 15

- a.
- b.
- c.

Q.6 Write notes on **Any Four out of Six** 20




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No. UG/56 of 2019-20

(Dr. Ajay Deshmukh)

AC – 15/04/2019
Item No. – 4.47

UNIVERSITY OF MUMBAI



**Revised Question Paper Pattern for
Third Year B.Com. Programme in Semester V & VI of**

- **Direct and Indirect Taxation Paper I**
- **Direct and Indirect Taxation Paper II
(Goods and Services Tax)**

**Under the Choice Based Credit, Grading and Semester System
(To be implemented from Academic Year 2019-2020)**




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AC – 15/04/2019
Item No. – 4.47

EXHIBIT NO. 13

T.Y.B.Com Sem V
Direct and Indirect Taxation Paper I

Question Paper Pattern

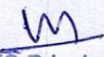
Maximum Marks: 100
Questions to be set: 05
Duration: 3 Hours

All Questions are Compulsory Carrying 20 Marks Each

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 12 and to be answered 10 B) Sub Questions to be asked 12 and to be answered 10 (*Multiple Choice/True or False/Fill in the blanks/Match the column)	20 Marks
Q-2	Practical Question	20 Marks
	OR	
Q-2	Practical Question	20 Marks
Q-3	Practical Question	20 Marks
	OR	
Q-3	Practical Question	20 Marks
Q-4	Practical Question	20 Marks
	OR	
Q-4	Practical Question	20 Marks
Q-5	A) Theory Questions B) Theory Questions	10 Marks 10 Marks
	OR	
	Short Notes To be asked 06 To be answered 04	20 Marks

Note: Practical questions of 20 marks may be divided into two sub questions of 10 marks each.




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Item No. – 4.47

EXHIBIT NO. 16

T.Y.B.Com Sem VI
Direct and Indirect Taxation Paper II
(GST)

Question Paper Pattern

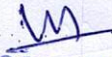
Maximum Marks: 100
Questions to be set: 05
Duration: 3 Hours

All Questions are Compulsory Carrying 20 Marks Each

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 12 and to be answered 10 B) Sub Questions to be asked 12 and to be answered 10 (*Multiple Choice/True or False/Fill in the blanks/Match the column)	20 Marks
Q-2	Practical Question	20 Marks
	OR	
Q-2	Practical Question	20 Marks
Q-3	Practical Question	20 Marks
	OR	
Q-3	Practical Question	20 Marks
Q-4	Practical Question	20 Marks
	OR	
Q-4	Practical Question	20 Marks
Q-5	A) Theory Questions B) Theory Questions	10 Marks 10 Marks
	OR	
	Short Notes To be asked 06 To be answered 04	20 Marks

Note: Practical questions of 20 marks may be divided into two sub questions of 10 marks each.




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Item No. – 4.48

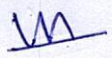
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**Revised Question Paper Pattern for
Third Year B.Com. Programme in Semester V & VI
of Financial Accounting and Auditing (Cost Accounting)
Paper VIII & X**

**Under the Choice Based Credit, Grading and Semester
System
(To be implemented from Academic Year 2019-2020)**




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AC – 15/04/2019
Item No. – 4.48

EXHIBIT NO. 12

T.Y.B.Com Sem V
Financial Accounting and Auditing Paper VIII
(Cost Accounting)

Question Paper Pattern

Maximum Marks: 100

Questions to be set: 05

Duration: 3 Hours

All Questions are Compulsory Carrying 20 Marks Each

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 12 and to be answered 10 B) Sub Questions to be asked 12 and to be answered 10 (*Multiple Choice/True or False/Fill in the blanks/Match the column)	20 Marks
Q-2	Practical Question	20 Marks
	OR	
Q-2	Practical Question	20 Marks
Q-3	Practical Question	20 Marks
	OR	
Q-3	Practical Question	20 Marks
Q-4	Practical Question	20 Marks
	OR	
Q-4	Practical Question	20 Marks
Q-5	A) Theory Questions B) Theory Questions	10 Marks 10 Marks
	OR	
	Short Notes To be asked 06 To be answered 04	20 Marks

Note: Practical questions of 20 marks may be divided into two sub questions of 10 marks each.



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Item No. – 4.48

EXHIBIT NO. 15

T.Y.B.Com Sem VI
Financial Accounting and Auditing Paper X
(Cost Accounting)

Question Paper Pattern

Maximum Marks: 100

Questions to be set: 05

Duration: 3 Hours

All Questions are Compulsory Carrying 20 Marks Each

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 12 and to be answered 10 B) Sub Questions to be asked 12 and to be answered 10 (*Multiple Choice/True or False/Fill in the blanks/Match the column)	20 Marks
Q-2	Practical Question	20 Marks
	OR	
Q-2	Practical Question	20 Marks
Q-3	Practical Question	20 Marks
	OR	
Q-3	Practical Question	20 Marks
Q-4	Practical Question	20 Marks
	OR	
Q-4	Practical Question	20 Marks
Q-5	A) Theory Questions B) Theory Questions	10 Marks 10 Marks
	OR	
	Short Notes To be asked 06 To be answered 04	20 Marks

Note: Practical questions of 20 marks may be divided into two sub questions of 10 marks each.




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Item No. – 4.49

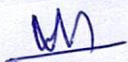
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**Revised Question Paper Pattern for
Third Year B.Com. Programme in Semester V & VI
of Financial Accounting and Auditing (Financial Accounting)
Paper VII & IX**

**Under the Choice Based Credit, Grading and Semester System
(To be implemented from Academic Year 2019-2020)**




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Item No. – 4.49

EXHIBIT NO. 11

T.Y.B.Com Sem V

Financial Accounting and Auditing Paper VII
(Financial Accounting)
Question Paper Pattern

Maximum Marks: 100

Questions to be set: 05

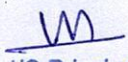
Duration: 3 Hours

All Questions are Compulsory Carrying 20 Marks Each

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 12 and to be answered 10 B) Sub Questions to be asked 12 and to be answered 10 (*Multiple Choice/True or False/Fill in the blanks/Match the column)	20 Marks
Q-2	Practical Question	20 Marks
	OR	
Q-2	Practical Question	20 Marks
Q-3	Practical Question	20 Marks
	OR	
Q-3	Practical Question	20 Marks
Q-4	Practical Question	20 Marks
	OR	
Q-4	Practical Question	20 Marks
Q-5	A) Theory Questions B) Theory Questions	10 Marks 10 Marks
	OR	
	Short Notes To be asked 06 To be answered 04	20 Marks

Note: Practical questions of 20 marks may be divided into two sub questions of 10 marks each.




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Item No. – 4.49

EXHIBIT NO. 14

T.Y.B.Com Sem VI
Financial Accounting and Auditing Paper IX
(Financial Accounting)

Question Paper Pattern

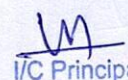
Maximum Marks: 100
Questions to be set: 05
Duration: 3 Hours

All Questions are Compulsory Carrying 20 Marks Each

Question No	Particular	Marks
Q-1	Objective Questions A) Sub Questions to be asked 12 and to be answered 10 B) Sub Questions to be asked 12 and to be answered 10 (*Multiple Choice/True or False/Fill in the blanks/Match the column)	20 Marks
Q-2	Practical Question	20 Marks
	OR	
Q-2	Practical Question	20 Marks
Q-3	Practical Question	20 Marks
	OR	
Q-3	Practical Question	20 Marks
Q-4	Practical Question	20 Marks
	OR	
Q-4	Practical Question	20 Marks
Q-5	A) Theory Questions B) Theory Questions	10 Marks 10 Marks
	OR	
	Short Notes To be asked 06 To be answered 04	20 Marks

Note: Practical questions of 20 marks may be divided into two sub questions of 10 marks each.




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UNIVERSITY OF MUMBAI

No. UG/122 of 2018-19

CIRCULAR:-

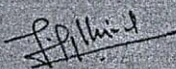
The Principals of the Affiliated Colleges and Directors of the recognized Institutions in Commerce and Management Faculty are hereby informed that the recommendations made by the Board of Examinations & Evaluation at its meeting held on 6th June, 2018 have been accepted by the Academic Council at its meeting held on 14th June, 2018 vide item No. 5.4 and that in accordance therewith to successfully complete the T.Y.B.Com. Program, candidates seeking admission to the same during the academic year 2018-19 onwards and who have taken admission to F.Y.B.Com. prior to 2016-17 shall complete and qualify in one appropriate course [i.e. as per appendix (List of Discipline Specific Elective courses 1A) for Semester III & IV] that he/she has not acquired credits in Semester III & IV, so as to acquire the required number of credits for completing the T.Y.B.Com. program.

And further it was resolved that the examination in the said appropriate course shall be taken and conducted by the same college in which he/she has taken admission for the T.Y.B.Com. program. The obtained marks in the said appropriate course be counted at S.Y.B.Com. Semester III & IV, the relevant marks so obtained by the learner shall be communicated to the University Examinations Section by the college in which T.Y.B.Com. program is being pursued by the learner. The concerned college shall issue the Statement of Marks for the same, accordingly.

(The same is available on the University's website www.mu.ac.in).

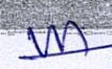
MUMBAI - 400 032

20th October, 2018


(Prof. Sunil Bhurud)
I/c. REGISTRAR

2/-




I/C Principal
Shriyaji Shikshan Sanstha's
Science & Commerce College (Night)
Dr. Ankush Shankar Gawade Marg,
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To,

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

A.C/5.4/14/06/2018

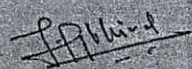
No. UG/122-A of 2018

MUMBAI-400 032

20th October, 2018

Copy forwarded with Compliments for information to:-

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


(Prof. Sunil Bhirud)
I/c REGISTRAR

Copy to :-

The Director of Board of Student Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Offg. Director of Board of Examinations and Evaluation (3 copies), the Finance and Accounts Office (1 copies), Record Section (2 copies), Publications Section (2 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (1 copies), the Deputy Registrar (Accounts Section), Vidyanagari (1 copies), the Deputy Registrar, Affiliation Section (1 copies), the Professor-cum-Director, Institute of Distance and Open Learning Education, (4 copies) the Director University Computer Center (IDE Building), Vidyanagari, (1 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) the Assistant Registrar, Academic Authorities Unit (1 copies) and the Assistant Registrar, Executive Authorities Unit (1 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above circular and that on separate Action Taken Report will be sent in this connection. The Assistant Registrar Constituent Colleges Unit (1 copies), BUCTU (1 copy), the Deputy Accountant, Unit V (1 copy), the In-charge Director, Centralize Computing Facility (1 copy), the Receptionist (1 copy), the Telephone Operator (1 copy), the Secretary MUASA (1 copy), the Superintendent, Post-Graduate Section (1 copies), the Superintendent, Thesis Section (1 copies)



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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

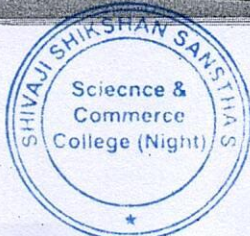
(To be implemented from Academic Year- 2017-2018)

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

Faculty of Commerce, University of Mumbai

2 | Page



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<i>*List of Skill Enhancement Courses (SEC) Group A for Semester III (Any One)</i>		<i>*List of Skill Enhancement Courses (SEC) Group A for Semester IV (Any One)</i>	
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 II
14	Economic System I	14	Economic System II
<i>Note: Course selected in Semester III will continue in Semester IV</i>			

<i>*List of Skill Enhancement Courses (SEC) Group B for Semester III (Any One)</i>		<i>** List of Skill Enhancement Courses (SEC) Group B for Semester IV (Any One)</i>	
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
<i>Note: Course selected in Semester III will continue in Semester IV</i>			



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UNIVERSITY OF MUMBAI



Syllabus for Sem III & IV

Program: B.Sc.

Course: Computer Science

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

21-22

Preamble

The revised and restructured curriculum for the Three-year integrated course is systematically designed considering the current industry needs in terms of skills sets demanded under new technological environment. It also endeavours to align the programme structure and course curriculum with student aspirations and corporate expectations. The proposed curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context.

Second year of this course is about studying core computer science subjects. Theory of Computation course provides understanding of grammar, syntax and other elements of modern language designs. It also covers developing capabilities to design formulations of computing models and its applications in diverse areas.

The course in Operating System satisfies the need of understanding the structure and functioning of system. Programming holds key indispensable position in any curriculum of Computer Science. It is essential for the learners to know how to use object oriented paradigms. There is also one dedicated course Android Developer Fundamentals as a skill enhancement catering to modern day needs of Mobile platforms and applications. The syllabus has Database Systems courses in previous semesters. The course in Database Management Systems is its continuation in third semester. The course has objectives to develop understanding of concepts and techniques for data management along with covers concepts of database at advance level.

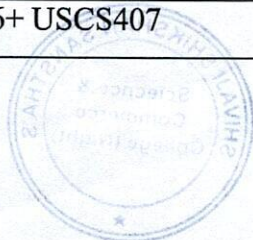
The course of Combinatorics and Graph Theory in third semester and the course of Linear Algebra in fourth semester take the previous courses in Mathematics. Graph theory is rapidly moving into the mainstream mainly because of its applications in diverse fields which include can further open new opportunities in the areas of genomics, communications networks and coding theory, algorithms and computations and operations research.

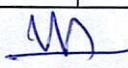
Introducing one of the upcoming concepts Physical Computing and IoT programming will definitely open future area as Embedded Engineer, involvement in IoT projects, Robotics and many more. The RasPi is a popular platform as it offers a complete Linux server in a tiny platform for a very low cost and custom-built hardware with minimum complex hardware builds which is easier for projects in education domain.

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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SEMESTER III

THEORY

Course: USCS301	TOPICS (Credits : 02 Lectures/Week:03) Theory of Computation	
Objectives: To provide the comprehensive insight into theory of computation by understanding grammar, languages and other elements of modern language design. Also to develop capabilities to design and develop formulations for computing models and identify its applications in diverse areas.		
Expected Learning Outcomes: 1. Understand Grammar and Languages 2. Learn about Automata theory and its application in Language Design 3. Learn about Turing Machines and Pushdown Automata 4. Understand Linear Bound Automata and its applications		
Unit I	Automata Theory: Defining Automaton, Finite Automaton, Transitions and Its properties, Acceptability by Finite Automaton, Nondeterministic Finite State Machines, DFA and NDFA equivalence, Mealy and Moore Machines, Minimizing Automata. Formal Languages: Defining Grammar, Derivations, Languages generated by Grammar, Chomsky Classification of Grammar and Languages, Recursive Enumerable Sets, Operations on Languages, Languages and Automata	15L
Unit II	Regular Sets and Regular Grammar: Regular Grammar, Regular Expressions, Finite automata and Regular Expressions, Pumping Lemma and its Applications, Closure Properties, Regular Sets and Regular Grammar Context Free Languages: Context-free Languages, Derivation Tree, Ambiguity of Grammar, CFG simplification, Normal Forms, Pumping Lemma for CFG Pushdown Automata: Definitions, Acceptance by PDA, PDA and CFG	15L



Unit III	Linear Bound Automata: The Linear Bound Automata Model, Linear Bound Automata and Languages. Turing Machines: Turing Machine Definition, Representations, Acceptability by Turing Machines, Designing and Description of Turing Machines, Turing Machine Construction, Variants of Turing Machine, Undecidability: The Church-Turing thesis, Universal Turing Machine, Halting Problem, Introduction to Unsolvability Problems	15L
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Tutorials :

1. Problems on generating languages for given simple grammar
2. Problems on DFA and NDFA equivalence
3. Problems on generating Regular Expressions
4. Problems on drawing transition state diagrams for Regular Expressions
5. Problems on Regular Sets and Regular Grammar
6. Problems on Ambiguity of Grammar
7. Problems on working with PDA
8. Problems on working with Turing Machines
9. Problems on generating derivation trees
10. Problems on Linear Bound Automata/Universal Turing Machine

Textbook(s):

- 1) Theory of Computer Science, K. L. P Mishra, Chandrasekharan, PHI, 3rd Edition
- 2) Introduction to Computer Theory, Daniel Cohen, Wiley, 2nd Edition
- 3) Introductory Theory of Computer Science, E.V. Krishnamurthy, Affiliated East-West Press.

Additional Reference(s):

- 1) Theory of Computation, Kavi Mahesh, Wiley India
- 2) Elements of The Theory of Computation, Lewis, Papadimitriou, PHI
- 3) Introduction to Languages and the Theory of Computation, John E Martin, McGraw-Hill Education
- 4) Introduction to Theory of Computation, Michel Sipser, Thomson




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Course: USCS302	TOPICS (Credits : 02 Lectures/Week:03) Core Java	
Objectives: The objective of this course is to teach the learner how to use Object Oriented paradigm to develop code and understand the concepts of Core Java and to cover-up with the pre-requisites of Core java.		
Expected Learning Outcomes: 1. Object oriented programming concepts using Java. 2. Knowledge of input, its processing and getting suitable output. 3. Understand, design, implement and evaluate classes and applets. 4. Knowledge and implementation of AWT package.		
Unit I	The Java Language: Features of Java, Java programming format, Java Tokens, Java Statements, Java Data Types, Typecasting, Arrays OOPS: Introduction, Class, Object, Static Keywords, Constructors, this Key Word, Inheritance, super Key Word, Polymorphism (overloading and overriding), Abstraction, Encapsulation, Abstract Classes, Interfaces String Manipulations: String, String Buffer, String Tokenizer Packages: Introduction to predefined packages (java.lang, java.util, java.io, java.sql, java.swing), User Defined Packages, Access specifiers	15L
Unit II	Exception Handling: Introduction, Pre-Defined Exceptions, Try-Catch-Finally, Throws, throw, User Defined Exception examples Multithreading: Thread Creations, Thread Life Cycle, Life Cycle Methods, Synchronization, Wait() notify() notify all() methods I/O Streams: Introduction, Byte-oriented streams, Character- oriented streams, File, Random access File, Serialization Networking: Introduction, Socket, Server socket, Client –Server Communication	15L
	Wrapper Classes: Introduction, Byte, Short, Integer, Long, Float, Double, Character, Boolean classes Collection Framework: Introduction, util Package interfaces, List, Set, Map, List interface & its classes, Set interface & its classes, Map interface & its classes	

Unit III	Inner Classes: Introduction, Member inner class, Static inner class, Local inner class, Anonymous inner class AWT: Introduction, Components, Event-Delegation-Model, Listeners, Layouts, Individual components Label, Button, CheckBox, Radio Button, Choice, List, Menu, Text Field, Text Area	15L
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Textbook(s):

- 1) Herbert Schildt, Java The Complete Reference, Ninth Edition, McGraw-Hill Education, 2014

Additional Reference(s):

- 1) E. Balagurusamy, Programming with Java, Tata McGraw-Hill Education India, 2014
- 2) Programming in JAVA, 2nd Ed, Sachin Malhotra & Saurabh Choudhary, Oxford Press
- 3) The Java Tutorials: <http://docs.oracle.com/javase/tutorial/>

Course: USCS303	TOPICS (Credits : 02 Lectures/Week:03) Operating System	
Objectives: Learners must understand proper working of operating system. To provide a sound understanding of Computer operating system, its structures, functioning and algorithms.		
Expected Learning Outcomes: 1. To provide a understanding of operating system, its structures and functioning 2. Develop and master understanding of algorithms used by operating systems for various purposes.		
Unit I	Introduction and Operating-Systems Structures: Definition of Operating system, Operating System's role, Operating-System Operations, Functions of Operating System, Computing Environments Operating-System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, Operating-System Structure Processes: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication	15L




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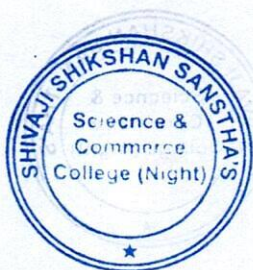
	Threads: Overview, Multicore Programming, Multithreading Models	
Unit II	Process Synchronization: General structure of a typical process, race condition, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms (FCFS, SJF, SRTF, Priority, RR, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling), Thread Scheduling Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	15L
Unit III	Main Memory: Background, Logical address space, Physical address space, MMU, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing Mass-Storage Structure: Overview, Disk Structure, Disk Scheduling, Disk Management File-System Interface: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management	15L

Textbook(s):

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley, 8th Edition

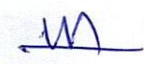
Additional Reference(s):

1. Achyut S. Godbole, Atul Kahate, Operating Systems, Tata McGraw Hill
2. Naresh Chauhan, Principles of Operating Systems, Oxford Press
3. Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, 4e Fourth Edition, Pearson Education, 2016



Course: USCS304	TOPICS (Credits : 02 Lectures/Week:03) Database Management Systems	
Objectives: To develop understanding of concepts and techniques for data management and learn about widely used systems for implementation and usage.		
Expected Learning Outcomes: 1. Master concepts of stored procedure and triggers and its use. 2. Learn about using PL/SQL for data management 3. Understand concepts and implementations of transaction management and crash recovery		
Unit I	Stored Procedures: Types and benefits of stored procedures, creating stored procedures, executing stored procedures, altering stored procedures, viewing stored procedures. Triggers: Concept of triggers, Implementing triggers – creating triggers, Insert, delete, and update triggers, nested triggers, viewing, deleting and modifying triggers, and enforcing data integrity through triggers. Sequences: creating sequences, referencing, altering and dropping a sequence. File Organization and Indexing: Cluster, Primary and secondary indexing, Index data structure: hash and Tree based indexing, Comparison of file organization: cost model, Heap files, sorted files, clustered files. Creating, dropping and maintaining indexes.	15L
	Fundamentals of PL/SQL: Defining variables and constants, PL/SQL expressions and comparisons: Logical Operators, Boolean Expressions, CASE Expressions Handling, Null Values in Comparisons and Conditional Statements, PL/SQL Datatypes: Number Types, Character Types, Boolean Type, Datetime and Interval Types.	




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Unit II	Overview of PL/SQL Control Structures: Conditional Control: IF and CASE Statements, IF-THEN Statement, IF-THEN-ELSE Statement, IFTHEN-ELSIF Statement, CASE Statement, Iterative Control: LOOP and EXIT Statements, WHILE-LOOP, FOR-LOOP, Sequential Control: GOTO and NULL Statements	15L
Unit III	Transaction Management: ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read Problem, Read-Write Locks, Deadlocks Handling, Two Phase Locking protocol. DCL Statements: Defining a transaction, Making Changes Permanent with COMMIT, Undoing Changes with ROLLBACK, Undoing Partial Changes with SAVEPOINT and ROLLBACK Crash Recovery: ARIES algorithm. The log based recovery, recovery related structures like transaction and dirty page table, Write-ahead log protocol, check points, recovery from a system crash, Redo and Undo phases.	15L

Textbook(s):

- 1) Ramakrishnam, Gehrke, Database Management Systems, Bayross, McGraw-Hill, 3rd Edition
- 2) Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th Edition
- 3) Ivan Bayross, "SQL, PL/SQL - The Programming language of Oracle", B.P.B. Publications

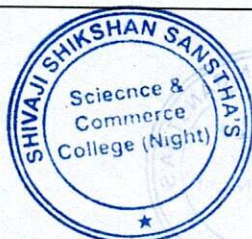
Additional Reference(s):

- 1) Ramez Elmasri & Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education
- 2) Robert Sheldon, Geoff Moes, Begning MySQL, Wrox Press.
- 3) Joel Murach, Murach's MySQL, Murach

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Course: USCS305	TOPICS (Credits : 02 Lectures/Week: 03) Combinatorics and Graph Theory	
Objectives: To give the learner a broad exposure of combinatorial Mathematics through applications especially the Computer Science applications.		
Expected Learning Outcomes: 1. Appreciate beauty of combinatorics and how combinatorial problems naturally arise in many settings. 2. Understand the combinatorial features in real world situations and Computer Science applications. 3. Apply combinatorial and graph theoretical concepts to understand Computer Science concepts and apply them to solve problems		
Unit I	Introduction to Combinatorics: Enumeration, Combinatorics and Graph Theory/ Number Theory/Geometry and Optimization, Sudoku Puzzles. Strings, Sets, and Binomial Coefficients: Strings- A First Look, Combinations, Combinatorial, The Ubiquitous Nature of Binomial Coefficients, The Binomial, Multinomial Coefficients. Induction: Introduction, The Positive Integers are Well Ordered, The Meaning of Statements, Binomial Coefficients Revisited, Solving Combinatorial Problems Recursively, Mathematical Induction, and Inductive Definitions Proofs by Induction. Strong Induction	15L
Unit II	Graph Theory: Basic Notation and Terminology, Multigraphs: Loops and Multiple Edges, Eulerian and Hamiltonian Graphs, Graph Coloring, Planar Counting, Labeled Trees, A Digression into Complexity Theory. Applying Probability to Combinatorics, Small Ramsey Numbers, Estimating Ramsey Numbers, Applying Probability to Ramsey Theory, Ramsey's Theorem The Probabilistic Method	15L
Unit III	Network Flows: Basic Notation and Terminology, Flows and Cuts, Augmenting Paths, The Ford-Fulkerson Labeling Algorithm,	15L




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	A Concrete Example, Integer Solutions of Linear Programming Problems. Combinatorial Applications of Network Flows: Introduction, Matching in Bipartite Graphs, Chain partitioning, Pólya's Enumeration Theorem: Coloring the Vertices of a Square.	
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Textbook(s):

- 1) Applied Combinatorics, Mitchel T. Keller and William T. Trotter, 2016, <http://www.rellek.net/appcomb>.

Additional Reference(s):

- 1) Applied Combinatorics, sixth.edition, Alan Tucker, Wiley; (2016)
- 2) Graph Theory and Combinatorics, Ralph P. Grimaldi, Pearson Education; Fifth edition (2012)
- 3) Combinatorics and Graph Theory, John Harris, Jeffry L. Hirst, Springer(2010).
- 4) Graph Theory: Modeling, Applications and Algorithms, Agnarsson, Pearson Education India (2008).

Course: USCS306	TOPICS (Credits : 02 Lectures/Week:03) Physical Computing and IoT Programming
Objectives: To learn about SoC architectures; Learn how Raspberry Pi. Learn to program Raspberry Pi. Implementation of internet of Things and Protocols. Expected Learning Outcomes: 1. Enable learners to understand System On Chip Architectures. 2. Introduction and preparing Raspberry Pi with hardware and installation. 3. Learn physical interfaces and electronics of Raspberry Pi and program them using practical's 4. Learn how to make consumer grade IoT safe and secure with proper use of protocols.	

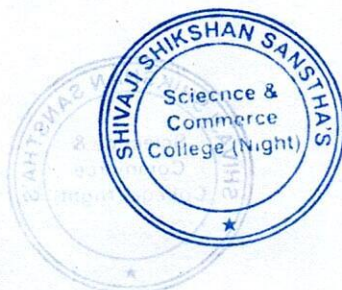
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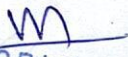
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Unit I	SoC and Raspberry Pi System on Chip: What is System on chip? Structure of System on Chip. SoC products: FPGA, GPU, APU, Compute Units. ARM 8 Architecture: SoC on ARM 8. ARM 8 Architecture Introduction Introduction to Raspberry Pi: Introduction to Raspberry Pi, Raspberry Pi Hardware, Preparing your raspberry Pi. Raspberry Pi Boot: Learn how this small SoC boots without BIOS. Configuring boot sequences and hardware.	15L
Unit II	Programming Raspberry Pi Raspberry Pi and Linux: About Raspbian, Linux Commands, Configuring Raspberry Pi with Linux Commands Programing interfaces: Introduction to Node.js, Python. Raspberry Pi Interfaces: UART, GPIO, I2C, SPI Useful Implementations: Cross Compilation, Pulse Width Modulation, SPI for Camera.	15L
Unit III	Introduction to IoT: What is IoT? IoT examples, Simple IoT LED Program. IoT and Protocols IoT Security: HTTP, UPnp, CoAP, MQTT, XMPP. IoT Service as a Platform: Clayster, Thinger.io, SenseIoT, carriots and Node RED. IoT Security and Interoperability: Risks, Modes of Attacks, Tools for Security and Interoperability.	15L
Textbook(s): 1) Learning Internet of Things, Peter Waher, Packt Publishing(2015) 2) Mastering the Raspberry Pi, Warren Gay, Apress(2014) Additional Reference(s): 1) Abusing the Internet of Things, Nitesh Dhanjani, O'Reilly		




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Course: USCS307	TOPICS (Credits : 02 Lectures/Week: 03) Web Programming	
Objectives: To provide insight into emerging technologies to design and develop state of - the art web applications using client-side scripting, server-side scripting, and database connectivity.		
Expected Learning Outcomes: 1. To design valid, well-formed, scalable, and meaningful pages using emerging technologies. 2. Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites 3. To develop and implement client-side and server-side scripting language programs. 4. To develop and implement Database Driven Websites. 5. Design and apply XML to create a markup language for data and document centric applications.		
Unit I	HTML5: Fundamental Elements of HTML, Formatting Text in HTML, Organizing Text in HTML, Links and URLs in HTML, Tables in HTML, Images on a Web Page, Image Formats, Image Maps, Colors, FORMs in HTML, Interactive Elements, Working with Multimedia - Audio and Video File Formats, HTML elements for inserting Audio / Video on a web page CSS: Understanding the Syntax of CSS, CSS Selectors, Inserting CSS in an HTML Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element	15L
Unit II	JavaScript: Using JavaScript in an HTML Document, Programming Fundamentals of JavaScript – Variables, Operators, Control Flow Statements, Popup Boxes, Functions – Defining and Invoking a Function, Defining Function arguments, Defining a Return Statement, Calling Functions with Timer, JavaScript Objects - String, RegExp, Math, Date, Browser Objects - Window, Navigator, History, Location, Document, Cookies, Document Object Model, Form Validation using JavaScript XML: Comparing XML with HTML, Advantages and Disadvantages of XML,	15L


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	Structure of an XML Document, XML Entity References, DTD, XSLT: XSLT Elements and Attributes - xsl:template, xsl:apply-templates, xsl:import, xsl:call-template, xsl:include, xsl:element, xsl:attribute, e xsl:attribute-set, xsl:value-of	
Unit III	AJAX: AJAX Web Application Model, How AJAX Works, XMLHttpRequest Object – Properties and Methods, Handling asynchronous requests using AJAX PHP: Variables and Operators, Program Flow, Arrays, Working with Files and Directories, Working with Databases, Working with Cookies, Sessions and Headers Introduction to jQuery: Fundamentals, Selectors, methods to access HTML attributes, methods for traversing, manipulators, events, effects	15L

Text Book(s):

- 1) HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press
- 2) Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India.
- 3) PHP: A Beginners Guide, Vikram Vaswani, TMH

Additional Reference(s):

- 1) HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY
- 2) Learn to Master HTML 5, scriptDemics, StarEdu Solutions Pvt Ltd.
- 3) Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly
- 4) PHP, MySQL, JavaScript & HTML5 All-in-one for Dummies, Steve Suehring, Janet Valade Wiley




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Suggested List of Practical- SEMESTER III

Course: USCSP301	(Credits : 03 Lectures/Week: 09) USCS302+ USCS303+USCS304	
USCS302: Core JAVA		
1. Accept integer values for a, b and c which are coefficients of quadratic equation. Find the solution of quadratic equation. 2. Accept two n x m matrices. Write a Java program to find addition of these matrices. 3. Accept n strings. Sort names in ascending order. 4. Create a package: Animals. In package animals create interface Animal with suitable behaviors. Implement the interface Animal in the same package animals. 5. Demonstrate Java inheritance using extends keyword. 6. Demonstrate method overloading and method overriding in Java. 7. Demonstrate creating your own exception in Java. 8. Using various swing components design Java application to accept a student's resume. (Design form) 9. Write a Java List example and demonstrate methods of Java List interface. 10. Design simple calculator GUI application using AWT components.		
USCS303: Operating System		
<i>Practical can be implemented either in JAVA or any other programming language.</i> 1. Process Communication: (i) Give solution to the producer–consumer problem using shared memory. (ii) Give solution to the producer–consumer problem using message passing. (iii) One form of communication in a Client–Server Systems environment is Remote method invocation (RMI). RMI is a Java feature similar to RPCs. RMI allows a thread to invoke a method on a remote object. Objects are considered remote if they reside in a different Java virtual machine (JVM). Demonstrate RMI program for adding/subtracting/multiplying/dividing two numbers. 2. Threads: (i) The Java version of a multithreaded program that determines the summation of a		


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non-negative integer. The Summation class implements the Runnable interface. Thread creation is performed by creating an object instance of the Thread class and passing the constructor a Runnable object.

- (ii) Write a multithreaded Java program that outputs prime numbers. This program should work as follows: The user will run the program and will enter a number on the command line. The program will then create a separate thread that outputs all the prime numbers less than or equal to the number entered by the user.
- (iii) The Fibonacci sequence is the series of numbers 0, 1, 1, 2, 3, 5, 8, ... Formally, it can be expressed as: $fib_0 = 0$, $fib_1 = 1$, $fib_n = fib_{n-1} + fib_{n-2}$. Write a multithreaded program that generates the Fibonacci sequence using either the Java,

3. Synchronization:

- (i) Give Java solution to Bounded buffer problem.
- (ii) Give solution to the readers-writers problem using Java synchronization.
- (iii) The Sleeping-Barber Problem: A barber shop consists of awaiting room with n chairs and a barber room with one barber chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs. If the barber is asleep, the customer wakes up the barber. Write a program to coordinate the barber and the customers using Java synchronization.

- 4. Implement FCFS scheduling algorithm in Java.
- 5. Implement SJF (with no preemption) scheduling algorithm in Java
- 6. Implement RR scheduling algorithm in Java
- 7. Write a Java program that implements the banker's algorithm
- 8. Write a Java program that implements the FIFO page-replacement algorithm.
- 9. Write a Java program that implements the LRU page-replacement algorithm.
- 10. Design a File System in Java.



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USCS304: Database Management Systems

1. Creating and working with Insert/Update/Delete Trigger using Before/After clause.
2. Writing PL/SQL Blocks with basic programming constructs by including following:
 - a. Sequential Statements
 - b. unconstrained loop
3. Sequences:
 - a. Creating simple Sequences with clauses like START WITH, INCREMENT BY, MAXVALUE, MINVALUE, CYCLE | NOCYCLE, CACHE | NOCACHE, ORDER | NOORDER.
 - b. Creating and using Sequences for tables.
4. Writing PL/SQL Blocks with basic programming constructs by including following:
 - a. If...then...Else, IF...ELSIF...ELSE... END IF
 - b. Case statement
5. Writing PL/SQL Blocks with basic programming constructs for following Iterative Structure:
 - a. While-loop Statements
 - b. For-loop Statements.
6. Writing PL/SQL Blocks with basic programming constructs by including a GoTO to jump out of a loop and NULL as a statement inside IF
7. Writing Procedures in PL/SQL Block
 - a. Create an empty procedure, replace a procedure and call procedure
 - b. Create a stored procedure and call it
 - c. Define procedure to insert data
 - d. A forward declaration of procedure
8. Writing Functions in PL/SQL Block.
 - a. Define and call a function
 - b. Define and use function in select clause,
 - c. Call function in dbms_output.put_line
 - d. Recursive function
 - e. Count Employee from a function and return value back
 - f. Call function and store the return value to a variable
9. Writing a recursive Functions in PL/SQL Block
10. Study of transactions and locks



Course: USCSP302	(Credits : 03 Lectures/Week: 09) USCS305+ USCS306+USCS307	
USCS305: Combinatorics and Graph Theory		
1. Solving problems on strings, sets and binomial coefficients. 2. Solving problems using induction. 3. Solving problems on Eulerian and Hamiltonian graphs. 4. Solving problems on Chromatic number and coloring 5. Solving problems using Kruskal's Algorithm 6. Solving problems using Prim's Algorithm 7. Solving problems using Dijkstra's Algorithm 8. Solving problems of finding augmenting paths in network flows. 9. Solving problems on network flows using Ford-Fulkerson Labeling Algorithm 10. Solving problems on posets and their associated networks.		
USCS306: Physical Computing and IoT Programming		
1. Preparing Raspberry Pi: Hardware preparation and Installation 2. Linux Commands: Exploring the Raspbian 3. GPIO: Light the LED with Python 4. GPIO: LED Grid Module: Program the 8X8 Grid with Different Formulas 5. SPI: Camera Connection and capturing Images using SPI 6. Real Time Clock display using PWM. 7. Stepper Motor Control: PWM to manage stepper motor speed. 8. Node RED: Connect LED to Internet of Things 9. Stack of Raspberry Pi for better Computing and analysis 10. Create a simple Web server using Raspberry Pi		
USCS307: Web Programming		
1. Design a webpage that makes use of a. Document Structure Tags b. Various Text Formatting Tags c. List Tags d. Image and Image Maps 2. Design a webpage that makes use of a. Table tags b. Form Tags (forms with various form elements)		


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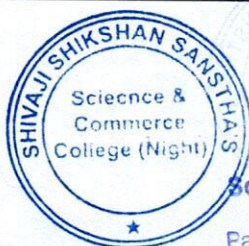


- c. Navigation across multiple pages d. Embedded Multimedia elements
3. Design a webpage that make use of Cascading Style Sheets with
 - a. CSS properties to change the background of a Page
 - b. CSS properties to change Fonts and Text Styles
 - c. CSS properties for positioning an element
4. Write JavaScript code for
 - a. Performing various mathematical operations such as calculating factorial / finding Fibonacci Series / Displaying Prime Numbers in a given range / Evaluating Expressions / Calculating reverse of a number
 - b. Validating the various Form Elements
5. Write JavaScript code for
 - a. Demonstrating different JavaScript Objects such as String, RegExp, Math, Date
 - b. Demonstrating different JavaScript Objects such as Window, Navigator, History, Location, Document,
 - c. Storing and Retrieving Cookies
6. Create a XML file with Internal / External DTD and display it using
 - a. CSS
 - b. XSL
7. Design a webpage to handle asynchronous requests using AJAX on
 - a. Mouseover
 - b. button click
8. Write PHP scripts for
 - a. Retrieving data from HTML forms
 - b. Performing certain mathematical operations such as calculating factorial / finding Fibonacci Series / Displaying Prime Numbers in a given range / Evaluating Expression / Calculating reverse of a number
 - c. Working with Arrays
 - d. Working with Files (Reading / Writing)
9. Write PHP scripts for
 - a. Working with Databases (Storing Records / Retrieving Records and Display them)
 - b. Storing and Retrieving Cookies
 - c. Storing and Retrieving Sessions
10. Design a webpage with some jQuery animation effects.

SEMESTER IV

THEORY

Course: USCS401	TOPICS (Credits : 02 Lectures/Week:03) Fundamentals of Algorithms	
Objectives: 1. To understand basic principles of algorithm design and why algorithm analysis is important 2. To understand how to implement algorithms in Python 3. To understand how to transform new problems into algorithmic problems with efficient solutions 4. To understand algorithm design techniques for solving different problems Expected Learning Outcomes: 1. Understand the concepts of algorithms for designing good program 2. Implement algorithms using Python		
Unit I	Introduction to algorithm, Why to analysis algorithm, Running time analysis, How to Compare Algorithms, Rate of Growth, Commonly Used Rates of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega- Ω Notation, Theta- Θ Notation, Asymptotic Analysis, Properties of Notations, Commonly used Logarithms and Summations, Performance characteristics of algorithms, Master Theorem for Divide and Conquer, Divide and Conquer Master Theorem: Problems & Solutions, Master Theorem for Subtract and Conquer Recurrences, Method of Guessing and Confirming	15L
Unit II	Tree algorithms: What is a Tree? Glossary, Binary Trees, Types of Binary Trees, Properties of Binary Trees, Binary Tree Traversals, Generic Trees (N-ary Trees), Threaded Binary Tree Traversals, Expression Trees, Binary Search Trees (BSTs), Balanced Binary Search Trees, AVL (Adelson-Velskii and Landis) Trees Graph Algorithms: Introduction, Glossary, Applications of Graphs, Graph Representation, Graph Traversals, Topological Sort, Shortest Path Algorithms, Minimal Spanning Tree	15L



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	Selection Algorithms: What are Selection Algorithms? Selection by Sorting, Partition-based Selection Algorithm, Linear Selection Algorithm - Median of Medians Algorithm, Finding the K Smallest Elements in Sorted Order	
Unit III	Algorithms Design Techniques: Introduction, Classification, Classification by Implementation Method, Classification by Design Method Greedy Algorithms: Introduction, Greedy Strategy, Elements of Greedy Algorithms, Advantages and Disadvantages of Greedy Method, Greedy Applications, Understanding Greedy Technique Divide and Conquer Algorithms: Introduction, What is Divide and Conquer Strategy? Divide and Conquer Visualization, Understanding Divide and Conquer, Advantages of Divide and Conquer, Disadvantages of Divide and Conquer, Master Theorem, Divide and Conquer Applications Dynamic Programming: Introduction, What is Dynamic Programming Strategy? Properties of Dynamic Programming Strategy, Problems which can be solved using Dynamic Programming, Dynamic Programming Approaches, Examples of Dynamic Programming Algorithms, Understanding Dynamic Programming, Longest Common Subsequence	15L

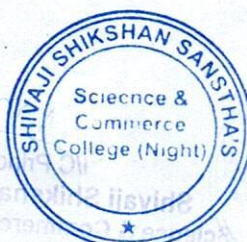
Textbook(s):

1. Data Structure and Algorithmic Thinking with Python, Narasimha Karumanchi , CareerMonk Publications, 2016
2. Introduction to Algorithm, Thomas H Cormen, PHI

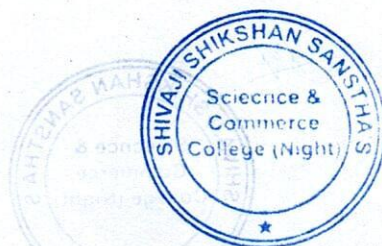
Additional References(s):

1. Data Structures and Algorithms in Python, Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, 2016, Wiley
2. Fundamentals of Computer Algorithms, Sartaj Sahni and Sanguthevar Rajasekaran Ellis Horowitz, Universities Press


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Course: USCS402	TOPICS (Credits : 02 Lectures/Week: 03) Advanced Java	
Objectives: Explore advanced topic of Java programming for solving problems.		
Expected Learning Outcomes: 1) Understand the concepts related to Java Technology 2) Explore and understand use of Java Server Programming		
Unit I	Swing: Need for swing components, Difference between AWT and swing, Components hierarchy, Panes, Swing components: JLabel, JTextField and JPasswordField, JTextArea, JButton, JCheckBox, JRadioButton, JComboBox and JList JDBC: Introduction, JDBC Architecture, Types of Drivers, Statement, ResultSet, Read Only ResultSet, Updatable ResultSet, Forward Only ResultSet, Scrollable ResultSet, PreparedStatement, Connection Modes, SavePoint, Batch Updates, CallableStatement, BLOB & CLOB	15L
Unit II	Servlets: Introduction, Web application Architecture, Http Protocol & Http Methods, Web Server & Web Container, Servlet Interface, GenericServlet, HttpServlet, Servlet Life Cycle, ServletConfig, ServletContext, Servlet Communication, Session Tracking Mechanisms. JSP: Introduction, JSP LifeCycle, JSP Implicit Objects & Scopes, JSP Directives, JSP Scripting Elements, JSP Actions: Standard actions and customized actions,	15L
Unit III	Java Beans: Introduction, JavaBeans Properties, Examples Struts 2: Basic MVC Architecture, Struts 2 framework features, Struts 2 MVC pattern, Request life cycle, Examples, Configuration Files, Actions, Interceptors, Results & Result Types, Value Stack/OGNL JSON: Overview, Syntax, DataTypes, Objects, Schema, Comparison with XML, JSON with Java	15L




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Textbook(s):

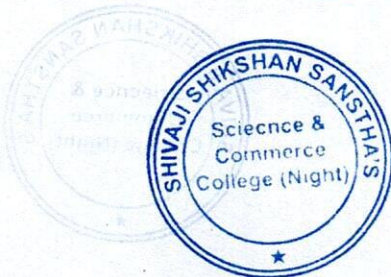
- 1) Cay S. Horstmann, Gary Cornell, Core Java™ 2: Volume II–Advanced Features Prentice Hall PTR, 9th Edition
- 2) Herbert Schildt, Java2: The Complete Reference, Tata McGraw-Hill, 5th Edition
- 3) Joe Wigglesworth and Paula McMillan, Java Programming: Advanced Topics, Thomson Course Technology (SPD), 3rd Edition

Additional Reference(s):

- 1) Advanced Java Programming, Uttam K. Roy, Oxford University Press
- 2) *The Java Tutorials*: <http://docs.oracle.com/javase/tutorial/>
- 3) The Java Tutorials of Sun Microsystems Inc

Course: USCS403	TOPICS (Credits :02 Lectures/Week:03) Computer Networks	
Objectives: In this era of Information, its computation and its exchange techniques, Learner should be able to conceptualize and understand the framework and working of communication networks. And on completion, will be able to have a firm grip over this very important segment of Internet. Expected Learning Outcomes : 1. Learner will be able to understand the concepts of networking, which are important for them to be known as a '<i>networking professionals</i>'. 2. Useful to proceed with industrial requirements and International vendor certifications.		
Unit I	Introduction Network Models: Introduction to data communication, Components, Data Representation, Data Flow, Networks, Network Criteria, Physical Structures, Network types, Local Area Network, Wide Area Network, Switching, The Internet, Accessing the Internet, standards and administration Internet Standards. Network Models, Protocol layering, Scenarios, Principles of Protocol Layering, Logical Connections, TCP/IP Protocol Suite, Layered Architecture, Layers in	15L

	the TCP/IP Protocol Suite, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing. Detailed introduction to Physical Layer, Detailed introduction to Data-Link Layer, Detailed introduction to Network Layer, Detailed introduction to Transport Layer, Detailed introduction to Application Layer. Data and Signals, Analog and Digital Data, Analog and Digital Signals, Sine Wave Phase, Wavelength, Time and Frequency Domains, Composite Signals, Bandwidth, Digital Signal, Bit Rate, Bit Length, Transmission of Digital Signals, Transmission Impairments, Attenuation, Distortion, Noise, Data Rate Limits, Performance, Bandwidth, Throughput, Latency (Delay)	
Unit II	Introduction to Physical Layer and Data-Link Layer: Digital Transmission digital-to-digital conversion, Line Coding, Line Coding Schemes, analog-to-digital conversion, Pulse Code Modulation (PCM), Transmission Modes, Parallel Transmission, Serial Transmission. Analog Transmission, digital-to-analog Conversion, Aspects of Digital-to-Analog Conversion, Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, analog-to-analog Conversion, Amplitude Modulation (AM), Frequency Modulation (FM), Phase Modulation (PM), Multiplexing, Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Time-Division Multiplexing. Transmission Media, Guided Media, Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable. Switching, Three Methods of Switching, Circuit Switched Networks, Packet Switching, Introduction to Data-Link Layer, Nodes and Links, Services, Two Sub-layers, Three Types of addresses, Address Resolution Protocol (ARP). Error Detection and Correction, introduction, Types of Errors, Redundancy, Detection versus Correction,	15L
Unit III	Network layer, Transport Layer Media Access Control (MAC), random access, CSMA, CSMA/CD, CSMA/CA, controlled access, Reservation, Polling, Token Passing, channelization, FDMA, TDMA, CDMA. Connecting Devices and Virtual LANs, connecting devices, Hubs, Link-Layer	15L



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	Switches, Routers, Introduction to Network Layer, network layer services, Packetizing, Routing and Forwarding, Other Services, IPv4 addresses, Address Space, Classful Addressing. Unicast Routing, General Idea, Least-Cost Routing, Routing Algorithms, Distance-Vector Routing, Link-State Routing, Path-Vector Routing, Introduction to Transport Layer, Transport-Layer Services, Connectionless and Connection-Oriented Protocols. Transport-Layer Protocols, Service, Port Numbers, User Datagram Protocol, User Datagram, UDP Services, UDP Applications, Transmission Control Protocol, TCP Services, TCP Features, Segment.	
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Textbook(s):

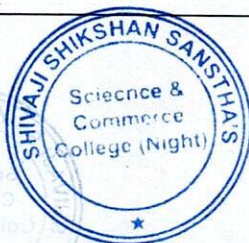
- 1) Data Communications and Networking, Behrouz A. Forouzan, Fifth Edition, TMH, 2013.
- 2) Computer Network, Andrew S. Tanenbaum, David J. Wetherall, Fifth Edition, Pearson Education, 2011.

Additional Reference(s):

- 1) Computer Network, Bhushan Trivedi, Oxford University Press
- 2) Data and Computer Communication, William Stallings, PHI

Course: USCS404	TOPICS (Credits : 02 Lectures/Week: 03) Software Engineering	
Unit I	Introduction: The Nature of Software, Software Engineering, The Software Process, Generic Process Model, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, Component-Based Development, The Unified Process Phases, Agile Development- Agility, Agile Process, Extreme Programming Requirement Analysis and System Modeling: Requirements Engineering, Eliciting Requirements, SRS Validation, Components of	15L

	SRS, Characteristics of SRS , Object-oriented design using the UML - Class diagram, Object diagram, Use case diagram, Sequence diagram, Collaboration diagram, State chart diagram, Activity diagram, Component diagram, Deployment diagram	
Unit II	System Design: System/Software Design, Architectural Design, Low-Level Design Coupling and Cohesion, Functional-Oriented Versus The Object-Oriented Approach, Design Specifications, Verification for Design, Monitoring and Control for Design Software Measurement and Metrics: Product Metrics – Measures, Metrics, and Indicators, Function-Based Metrics, Metrics for Object-Oriented Design, Operation-Oriented Metrics, User Interface Design Metrics, Metrics for Source Code, Halstead Metrics Applied to Testing, Metrics for Maintenance, Cyclomatic Complexity, Software Measurement - Size-Oriented, Function-Oriented Metrics, Metrics for Software Quality Software Project Management: Estimation in Project Planning Process –Software Scope And Feasibility, Resource Estimation, Empirical Estimation Models – COCOMO II, Estimation for Agile Development, The Make/Buy Decision, Project Scheduling - Basic Principles, Relationship Between People and Effort, Effort Distribution, Time-Line Charts	15L
Unit III	Risk Management - Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan Software Quality Assurance: Elements of SQA, SQA Tasks, Goals, and Metrics, Formal Approaches to SQA, Six Sigma, Software Reliability, The ISO 9000 Quality Standards, Capability Maturity Model Software Testing : Verification and Validation, Introduction to Testing, Testing Principles, Testing Objectives, Test Oracles, Levels of Testing, White-Box Testing/Structural Testing, Functional/Black-Box Testing, Test Plan, Test-Case Design	15L



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Text book(s):

- 1) Software Engineering, A Practitioner's Approach, Roger S, Pressman.(2014)

Additional Reference(s):

- 1) Software Engineering, Ian Sommerville, Pearson Education
- 2) Software Engineering: Principles and Practices", Deepak Jain, OXFORD University Press,
- 3) Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI
- 4) Software Engineering: Principles and Practices, Hans Van Vliet, John Wiley & Sons
- 5) A Concise Introduction to Software Engineering, Pankaj Jalote, Springer

Course: USCS405	TOPICS (Credits : 02 Lectures/Week: 03) Linear Algebra using Python	
Objectives: To offer the learner the relevant linear algebra concepts through computer science applications.		
Expected Learning Outcomes: 1. Appreciate the relevance of linear algebra in the field of computer science. 2. Understand the concepts through program implementation 3. Instill a computational thinking while learning linear algebra.		
Unit I	Field: Introduction to complex numbers, numbers in Python , Abstracting over fields, Playing with GF(2), Vector Space: Vectors are functions, Vector addition, Scalar-vector multiplication, Combining vector addition and scalar multiplication, Dictionary-based representations of vectors, Dot-product, Solving a triangular system of linear equations. Linear combination, Span, The geometry of sets of vectors, Vector spaces, Linear systems, homogeneous and otherwise	15L
Unit II	Matrix: Matrices as vectors, Transpose, Matrix-vector and vector-matrix multiplication in terms of linear combinations, Matrix-vector multiplication in terms of dot-products, Null space, Computing sparse matrix-vector product, Linear functions, Matrix-matrix multiplication, Inner product and outer product,	15L

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	From function inverse to matrix inverse Basis: Coordinate systems, Two greedy algorithms for finding a set of generators, Minimum Spanning Forest and GF(2), Linear dependence, Basis, Unique representation, Change of basis, first look, Computational problems involving finding a basis Dimension: Dimension and rank, Direct sum, Dimension and linear functions, The annihilator	
Unit III	Gaussian elimination: Echelon form, Gaussian elimination over GF(2), Solving a matrix-vector equation using Gaussian elimination, Finding a basis for the null space, Factoring integers, Inner Product: The inner product for vectors over the reals, Orthogonality, Orthogonalization: Projection orthogonal to multiple vectors, Projecting orthogonal to mutually orthogonal vectors, Building an orthogonal set of generators, Orthogonal complement, Eigenvector: Modeling discrete dynamic processes, Diagonalization of the Fibonacci matrix, Eigenvalues and eigenvectors, Coordinate representation in terms of eigenvectors, The Internet worm, Existence of eigenvalues, Markov chains, Modeling a web surfer: PageRank.	15L

Textbook(s):

- 1) Coding the Matrix Linear Algebra through Applications to Computer Science Edition 1, PHILIP N. KLEIN, Newtonian Press (2013)

Additional References:

- 1) Linear Algebra and Probability for Computer Science Applications, Ernest Davis, A K Peters/CRC Press (2012).
- 2) Linear Algebra and Its Applications, Gilbert Strang, Cengage Learning, 4th Edition (2007).
- 3) Linear Algebra and Its Applications, David C Lay, Pearson Education India; 3rd Edition (2002)



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Course: USCS406	TOPICS (Credits : 02 Lectures/Week: 03) .Net Technologies	
Objectives: To explore .NET technologies for designing and developing dynamic, interactive and responsive web applications.		
Expected Learning Outcomes: 1. Understand the .NET framework 2. Develop a proficiency in the C# programming language 3. Proficiently develop ASP.NET web applications using C# 4. Use ADO.NET for data persistence in a web application		
Unit I	The .NET Framework: .NET Languages, Common Language Runtime, .NET Class Library C# Language Basics: Comments, Variables and Data Types, Variable Operations, Object-Based Manipulation, Conditional Logic, Loops, Methods, Classes, Value Types and Reference Types, Namespaces and Assemblies, Inheritance, Static Members, Casting Objects, Partial Classes ASP.NET: Creating Websites, Anatomy of a Web Form - Page Directive, Doctype, Writing Code - Code-Behind Class, Adding Event Handlers, Anatomy of an ASP.NET Application - ASP.NET File Types, ASP.NET Web Folders, HTML Server Controls - View State, HTML Control Classes, HTML Control Events, HtmlControl Base Class, HtmlContainerControl Class, HtmlInputControl Class, Page Class, global.asax File, web.config File	15L
Unit II	Web Controls: Web Control Classes, WebControl Base Class, List Controls, Table Controls, Web Control Events and AutoPostBack, Page Life Cycle State Management: ViewState, Cross-Page Posting, Query String, Cookies, Session State, Configuring Session State, Application State Validation: Validation Controls, Server-Side Validation, Client-Side Validation, HTML5 Validation, Manual Validation, Validation with Regular Expressions Rich Controls: Calendar Control, AdRotator Control, MultiView Control Themes and Master Pages: How Themes Work, Applying a Simple Theme,	15L

	Handling Theme Conflicts, Simple Master Page and Content Page, Connecting Master pages and Content Pages, Master Page with Multiple Content Regions, Master Pages and Relative Paths Website Navigation: Site Maps, URL Mapping and Routing, SiteMapPath Control, TreeView Control, Menu Control	
Unit III	ADO.NET: Data Provider Model, Direct Data Access - Creating a Connection, Select Command, DataReader, Disconnected Data Access Data Binding: Introduction, Single-Value Data Binding, Repeated-Value Data Binding, Data Source Controls – SqlDataSource Data Controls: GridView, DetailsView, FormView Working with XML: XML Classes – XMLTextWriter, XMLTextReader Caching: When to Use Caching, Output Caching, Data Caching LINQ: Understanding LINQ, LINQ Basics, ASP.NET AJAX: ScriptManager, Partial Refreshes, Progress Notification, Timed Refreshes	15L

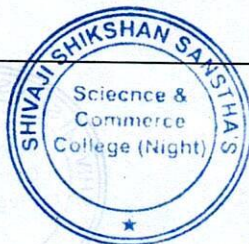
Textbook(s):

- 1) Beginning ASP.NET 4.5 in C#, Matthew MacDonald, Apress(2012)

Additional Reference(s):

- 1) The Complete Reference ASP .NET, MacDonald, Tata McGraw Hill
- 2) Beginning ASP.NET 4 in C# and VB Imar Spanjaars, WROX

Course: USCS407	TOPICS (Credits : 02 Lectures/Week: 03) Android Developer Fundamentals	
Objectives: To provide the comprehensive insight into developing applications running on smart mobile devices and demonstrate programming skills for managing task on mobile. To provide systematic approach for studying definition, methods and its applications for Mobile-App development.		



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Suggested List of Practical – SEMESTER IV

Course: USCSP401	(Credits : 03 Lectures/Week:09) USCS401+ USCS402+USCS403	
USCS401: Fundamentals of Algorithms		
1. Write Python program to perform matrix multiplication. Discuss the complexity of algorithm used. 2. Write Python program to sort n names using Quick sort algorithm. Discuss the complexity of algorithm used. 3. Write Python program to sort n numbers using Merge sort algorithm. Discuss the complexity of algorithm used. 4. Write Python program for inserting an element into binary tree. 5. Write Python program for deleting an element (assuming data is given) from binary tree. 6. Write Python program for checking whether a given graph G has simple path from source s to destination d. Assume the graph G is represented using adjacent matrix. 7. Write Python program for finding the smallest and largest elements in an array A of size n using Selection algorithm. Discuss Time complexity. 8. Write Python program for finding the second largest element in an array A of size n using Tournament Method. Discuss Time complexity. 9. Write Python program for implementing Huffman Coding Algorithm. Discuss the complexity of algorithm. 10. Write Python program for implementing Strassen's Matrix multiplication using Divide and Conquer method. Discuss the complexity of algorithm.		
USCS402: Advanced JAVA		
1. Develop the presentation layer of Library Management software application with suitable menus. 2. Design suitable database for Library Management System. 3. Develop business logic layer for Library Management System. 4. Develop Java application to store image in a database as well as retrieve image from database.		




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5. Write a Java application to demonstrate servlet life cycle.
6. Design database for student administration. Develop servlet(s) to perform CRUD operations.
7. Create Employees table in EMP database. Perform select, insert, update, and delete operations on Employee table using JSP.
8. Write a Student class with three properties. The useBean action declares a JavaBean for use in a JSP. Write Java application to access JavaBeans Properties.
9. Design application using Struts2. Application must accept user name and greet user when command button is pressed.
10. Write Java application to encoding and decoding JSON in Java.

USCS403: Computer Networks

1. Understanding the working of NIC cards, Ethernet/Fast Ethernet/Gigabit Ethernet.
2. Crimping of Twisted-Pair Cable with RJ45connector for Straight-Through, Cross-Over Roll-Over.
3. To understand their respective role in networks/internet.
4. Problem solving with IPv4, which will include concept of Classful addressing. (supportive Hint: use Cisco Binary Game)
5. Using, linux-terminal or Windows-cmd, execute following networking commands and note the output: *ping, traceroute, netstat, arp, ipconfig*.
6. Using **Packet Tracer**, create a basic network of two computers using appropriate network wire.
7. Using **Packet Tracer**, connect multiple (min.6) computers using layer 2 switch.
8. Using **Packet Tracer**, connect a network in triangular shape with three layer two switches and every switch will have four computer. Verify their connectivity with each other.
9. Using **Packet Tracer**, create a wireless network of multiple PCs using appropriate access point.
10. Using **Wireshark**, network analyzer, set the filter for ICMP, TCP, HTTP, UDP, FTP and perform respective protocol transactions to show/prove that the network analyzer is working.



Course: USCSP402	(Credits : 03 Lectures/Week:09) USCS405+ USCS406+ USCS407	
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USCS405: Linear Algebra using Python

1. Write a program which demonstrates the following:
 - Addition of two complex numbers
 - Displaying the conjugate of a complex number
 - Plotting a set of complex numbers
 - Creating a new plot by rotating the given number by a degree 90, 180, 270 degrees and also by scaling by a number $a=1/2$, $a=1/3$, $a=2$ etc.
2. Write a program to do the following:
 - Enter a vector u as a n -list
 - Enter another vector v as a n -list
 - Find the vector $au+bv$ for different values of a and b
 - Find the dot product of u and v
3. Write a program to do the following:
 - Enter two distinct faces as vectors u and v .
 - Find a new face as a linear combination of u and v i.e. $au+bv$ for a and b in $\mathbb{R}$.
 - Find the average face of the original faces.
4. Write a program to do the following:
 - Enter an r by c matrix M (r and c being positive integers)
 - Display M in matrix format
 - Display the rows and columns of the matrix M
 - Find the scalar multiplication of M for a given scalar.
 - Find the transpose of the matrix M .
5. Write a program to do the following:
 - Find the vector-matrix multiplication of a r by c matrix M with an c -vector u .
 - Find the matrix-matrix product of M with a c by p matrix N .
6. Write a program to enter a matrix and check if it is invertible. If the inverse exists, find the inverse.
7. Write a program to convert a matrix into its row echelon form.



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8. Write a program to do the following:

- Enter a positive number N and find numbers a and b such that $a^2 - b^2 = N$
- Find the gcd of two numbers using Euclid's algorithm.

9. Write a program to do the following:

- Enter a vector b and find the projection of b orthogonal to a given vector u .
- Find the projection of b orthogonal to a set of given vectors

10. Write a program to enter a given matrix and an eigen value of the same. Find its eigen vector.

USCS406: .NET Technologies

1. Write C# programs for understanding C# basics involving

- a. Variables and Data Types
- b. Object-Based Manipulation
- c. Conditional Logic
- d. Loops
- e. Methods

2. Write C# programs for Object oriented concepts of C# such as:

- a. Program using classes
- b. Constructor and Function Overloading
- c. Inheritance
- d. Namespaces

3. Design ASP.NET Pages with

- a. Server controls.
- b. Web controls and demonstrate the use of AutoPostBack
- c. Rich Controls (Calendar / Ad Rotator)

4. Design ASP.NET Pages for State Management using

- a. Cookies
- b. Session State
- c. Application State

5. Perform the following activities

- a. Design ASP.NET page and perform validation using various Validation Controls
- b. Design an APS.NET master web page and use it other (at least 2-3) content pages.
- c. Design ASP.NET Pages with various Navigation Controls

6. Performing ADO.NET data access in ASP.NET for

- a. Simple Data Binding
- b. Repeated Value Data Binding

7. Design ASP.NET application for Interacting (Reading / Writing) with XML documents

8. Design ASP.NET Pages for Performance improvement using Caching

9. Design ASP.NET application to query a Database using LINQ

10. Design and use AJAX based ASP.NET pages.


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USCS407:Android Developer Fundamentals

1. Install Android Studio and Run Hello World Program.
2. Create an android app with Interactive User Interface using Layouts.
3. Create an android app that demonstrates working with TextView Elements.
4. Create an android app that demonstrates Activity Lifecycle and Instance State.
5. Create an android app that demonstrates the use of Keyboards, Input Controls, Alerts, and Pickers.
6. Create an android app that demonstrates the use of an Options Menu.
7. Create an android app that demonstrate Screen Navigation Using the App Bar and Tabs.
8. Create an android app to Connect to the Internet and use BroadcastReceiver.
9. Create an android app to show Notifications and Alarm manager.
10. Create an android app to save user data in a database and use of different queries.


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Evaluation Scheme

I. Internal Exam - 25 Marks

(i) Test – 20 Marks

20 marks Test – Duration 40 mins

It will be conducted either using any open source learning management system like Moodle (Modular object-oriented dynamic learning environment)

OR

A test based on an equivalent online course on the contents of the concerned course (subject) offered by or build using MOOC (Massive Open Online Course) platform.

- (ii) 5 Marks – Active participation in routine class instructional deliveries
Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

II. External Exam– 75 Marks

III. Practical Exam – 50 Marks

- Each course carry 50 Marks : 40 marks + 05 marks (journal) + 05 marks (viva)
- Minimum 75 % practical from each paper are required to be completed and written in the journal.

(Certified Journal is compulsory for appearing at the time of Practical Exam)



UNIVERSITY OF MUMBAI



Syllabus for
Program: Bachelor of Science
Course: Computer Science
Choice Based Credit System (CBCS)
(Revised)

with effect from
Academic Year 2021-2022



Dr. Jyoti Chavhan (E) Mumbai-400 072
Faculty of Commerce College (Mumbai)
Dr. Jyoti Chavhan (E) Mumbai-400 072

Preamble

The rise of Information and Communication Technology (ICT) has profoundly affected modern society. Increasing applications of computers in almost all areas of human endeavor has led to vibrant industries with concurrent rapid change in technology.

As the computing field advances at a rapid pace, the students must possess a solid foundation that allows and encourages them to maintain relevant skills as the field evolves. Specific languages and technology platforms change over time. Thus students must continue to learn and adapt their skills throughout their careers. To develop this ability, students will be exposed to multiple programming languages, tools, paradigms and technologies as well as the fundamental underlying principles throughout this programme.

The programme offers required courses such as programming languages, data structures, computer architecture and organization, algorithms, database systems, operating systems, and software engineering; as well as specialized courses in artificial intelligence, computer-based communication networks, distributed computing, information security, graphics, human-computer interaction, multimedia, scientific computing, web technology, and other current topics in computer science.

The core philosophy of this programme is to –

- Form strong foundations of Computer Science
- Nurture programming, analytical & design skills for the real world problems.
- Introduce emerging trends to the students in gradual way.
- Groom the students for the challenges of ICT industry

The students these days not only aspire for a career in the industry but also look for research opportunities. The main aim of this programme is to deliver a modern curriculum that will equip graduates with strong theoretical and practical backgrounds to enable them to excel in the workplace and to be lifelong learners. Not only does it prepares the students for a career in Software industry, it also motivates them towards further studies and research opportunities. Graduating students, can thus take up postgraduate programmes in CS leading to research as well as R&D, can be employable at IT industries, or can adopt a business management career.

In the first year i.e. for semester I & II, basic foundation of important skills required for software development is laid. The syllabus proposes to have four core subjects of Computer science and two core courses of Mathematics-Statistics. All core subjects are proposed to have theory as well as practical tracks. While the Computer Science courses will form fundamental skills for solving computational problems, the Mathematics & Statistics course will inculcate research-oriented acumen. Ability Enhancement Courses on Soft Skill Development will ensure an overall and holistic development of the students. The syllabus design for further semesters encompasses more advanced and specialized courses of Computer Science.

We sincerely believe that any student taking this programme will get very strong foundation and exposure to basics, advanced and emerging trends of the subject. We hope that the students' community and teachers' fraternity will appreciate the treatment given to the courses in the syllabus.

We wholeheartedly thank all experts who shared their valuable feedbacks and suggestions in order to improvise the contents, we have sincerely attempted to incorporate each of them. We further thank Chairperson and members of Board of Studies for their confidence in us.

Special thanks to Department of Computer Science and colleagues from various colleges, who volunteered or have indirectly helped designing certain specialized courses and the syllabus as a whole.

Programme Structure for B.Sc. Computer Science

Programme Duration	06 Semesters <i>spread across 3 years</i>
Total Credits required for successful completion of the Course	120
Credits required from the Core Courses	76
Credits required for the Ability Enhancement Courses	04
Credits required for Skills Enhancement Courses	32
Credits for General Elective Courses	08
Minimum Attendance per Semester	75%

Programme Objectives

The objectives of the 3 year B.Sc. Computer Science programme are as follows:

- To develop an understanding and knowledge of the basic theory of Computer Science with good foundation on theory, systems and applications.
- To foster necessary skills and analytical abilities for developing computer based solutions of real-life problems.
- To provide training in emergent computing technologies which lead to innovative solutions for industry and academia.
- To develop the necessary study skills and knowledge to pursue further post-graduate study in computer science or other related fields.
- To develop the professional skillset required for a career in an information technology oriented business or industry.
- To enable students to work independently and collaboratively, communicate effectively, and become responsible, competent, confident, insightful, and creative users of computing technology

Programme Learning Outcomes

At the end of three year Bachelor of Computer Science the students will be able:

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.
- To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.
- To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.
- To apply concepts, principles, and theories relating to computer science to new situations.
- To use current techniques, skills, and tools necessary for computing practice
- To apply standard Software Engineering practices and strategies in real-time software project development
- To pursue higher studies of specialization and to take up technical employment.
- To work independently or collaboratively as an effective team member on a substantial software project.
- To communicate and present their work effectively and coherently.
- To display ethical code of conduct in usage of Internet and Cyber systems.
- To engage in independent and life-long learning in the background of rapid changing IT industry.



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F.Y.B.Sc. Computer Science Syllabus

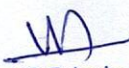
Choice Based Credit System (CBCS)

with effect from

Academic year 2021-2022

Semester – I				
Course Code	Course Type	Course Title	Credits	Lectures/Week
USCS101	Core Subject	Digital Systems & Architecture	2	3
USCSP101	Core Subject Practical	Digital Systems & Architecture – Practical	1	3
USCS102	Core Subject	Introduction to Programming with Python	2	3
USCSP102	Core Subject Practical	Introduction to Programming with Python – Practical	1	3
USCS103	Core Subject	LINUX Operating System	2	3
USCSP103	Core Subject Practical	LINUX Operating System – Practical	1	3
USCS104	Core Subject	Open Source Technologies	2	3
USCSP104	Core Subject Practical	Open Source Technologies – Practical	1	3
USCS105	Core Subject	Discrete Mathematics	2	3
USCSP105	Core Subject Practical	Discrete Mathematics – Practical	1	3
USCS106	Core Subject	Descriptive Statistics	2	3
USCSP106	Core Subject Practical	Descriptive Statistics – Practical	1	3
USCS107	Ability Enhancement Course	Soft Skills	2	3




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F.Y.B.Sc. Computer Science Syllabus

Choice Based Credit System (CBCS)

with effect from

Academic year 2021-2022

Semester – II				
Course Code	Course Type	Course Title	Credits	Lectures/Week
USCS201	Core Subject	Design & Analysis of Algorithms	2	3
USCSP201	Core Subject Practical	Design & Analysis of Algorithms – Practical	1	3
USCS202	Core Subject	Advanced Python Programming	2	3
USCSP202	Core Subject Practical	Advanced Python Programming – Practical	1	3
USCS203	Core Subject	Introduction to OOPs using C++	2	3
USCSP203	Core Subject Practical	Introduction to OOPs using C++ – Practical	1	3
USCS204	Core Subject	Database Systems	2	3
USCSP204	Core Subject Practical	Database Systems – Practical	1	3
USCS205	Core Subject	Calculus	2	3
USCSP205	Core Subject Practical	Calculus – Practical	1	3
USCS206	Core Subject	Statistical Methods	2	3
USCSP206	Core Subject Practical	Statistical Methods – Practical	1	3
USCS207	Ability Enhancement Course	E-Commerce & Digital Marketing	2	3


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Semester I

Course Code	Course Title	Credits	Lectures /Week
USCS101	Digital Systems & Architecture	2	3

About the Course:

This course introduces the principles of computer organization and the basic architecture concepts. The course emphasizes performance and cost analysis, instruction set design, pipelining, memory technology, memory hierarchy, virtual memory management, and I/O systems.

Course Objectives:

- To have an understanding of Digital systems and operation of a digital computer.
- To learn different architectures & organizations of memory systems, processor organization and control unit.
- To understand the working principles of multiprocessor and parallel organization's as advanced computer architectures

Learning Outcomes:

After successful completion of this course, students would be able to

- To learn about how computer systems work and underlying principles
- To understand the basics of digital electronics needed for computers
- To understand the basics of instruction set architecture for reduced and complex instruction sets
- To understand the basics of processor structure and operation
- To understand how data is transferred between the processor and I/O devices

Unit	Topics	No of Lectures
I	Fundamentals of Digital Logic: Boolean algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps. Combinational Circuits: Adders, Mux, De-Mux, Sequential Circuits: Flip-Flops (SR, JK & D), Counters: synchronous and asynchronous Counter Computer System: Comparison of Computer Organization & Architecture, Computer Components and Functions, Interconnection Structures. Bus Interconnections, Input / Output: I/O Module, Programmed I/O, Interrupt Driven I/O, Direct Memory Access	15
II	Memory System Organization: Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory. Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performance, Cache Coherence. Virtual Memory, External Memory: Magnetic Discs, Optical Memory, Flash Memories, RAID Levels Processor Organization: Instruction Formats, Instruction Sets, Addressing Modes, Addressing Modes Examples with Assembly Language [8085/8086 CPU], Processor Organization, Structure and Function. Register	15

	Organization, Basic Microprocessor operations: Data Transfer (Register / Memory) Operations, Arithmetic & Logical Operations, Instruction Cycle, Instruction Pipelining. Introduction to RISC and CISC Architecture, Instruction Level Parallelism and Superscalar Processors: Design Issues	
III	Control Unit: Micro-Operations, Functional Requirements, Processor Control, Hardwired Implementation, Micro-programmed Control. Fundamentals of Advanced Computer Architecture: Parallel Architecture: Classification of Parallel Systems, Flynn's Taxonomy, Array Processors, Clusters, and NUMA Computers. Multiprocessor Systems: Structure & Interconnection Networks, Multi-Core Computers: Introduction, Organization and Performance.	15

Textbooks:

1. M. Mano, Computer System Architecture 3rd edition, Pearson
2. Carl Hamacher et al., Computer Organization and Embedded Systems, 6 ed., McGraw-Hill 2012
3. R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd. , 4th Edition, 2010

Additional References:

1. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersey.
2. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,
3. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

Course Code	Course Title	Credits	Lectures /Week
USCSP101	Digital Systems & Architecture – Practical	1	3
1	Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR).		
2	Simplify given Boolean expression and realize it.		
3	Design and verify a half/full adder		
4	Design and verify half/full subtractor		
5	Design a 4 bit magnitude comparator using combinational circuits.		
6	Design and verify the operation of flip-flops using logic gates.		
7	Verify the operation of a counter.		
8	Verify the operation of a 4 bit shift register		
9	Design and implement expression using multiplexers / demultiplexers.		
10	Design and implement 3-bit binary ripple counter using JK flip flops.		
11	Simple microprocessor programs for data transfer operations		
12	Simple microprocessor programs for arithmetic & logical transfer operations		
Note	Practical 1 – 10 can be performed using any open source simulator (like Logisim) (Download it from https://sourceforge.net/projects/circuit/)		

	Practical 11 – 12 can be performed on any simulation software like Jubin's 8085 simulator		
Course Code	Course Title	Credits	Lectures /Week
USCS102	Introduction to Programming with Python	2	3

About the Course:

This course is aims at introducing one of the fastest growing programming language of current time and enables learners to understand the fundamentals of programming with Python. Learners will be able to write programs to solve real-world problems, and produce quality code. It will help to develop strong skills of programming for implementing applications for emerging fields including data science and machine learning.

Course Objectives:

- To learn how to design and program Python applications.
- To explore the innards of Python Programming and understand components of Python Program
- To define the structure and components of a Python program.
- To learn how to write loops and decision statements in Python
- To learn about inbuilt input/output operations and compound data types in Python

Learning Outcomes:

After successful completion of this course, students would be able to:

- Ability to store, manipulate and access data in Python
- Ability to implement basic Input / Output operations in Python
- Ability to define the structure and components of a Python program.
- Ability to learn how to write loops and decision statements in Python.
- Ability to learn how to write functions and pass arguments in Python.
- Ability to create and use Compound data types in Python

Unit	Topics	No of Lectures
I	Overview of Python: History & Versions, Features of Python, Execution of a Python Program, Flavours of Python, Innards of Python, Python Interpreter, Memory Management in Python, Garbage Collection in Python, Comparison of Python with C and Java, Installing Python, Writing and Executing First Python Program, Getting Help, IDLE Data Types, Variables and Other Basic Elements: Comments, Docstrings, Data types- Numeric Data type, Compound Data Type, Boolean Data type, Dictionary, Sets, Mapping, Basic Elements of Python, Variables Input and Output Operations: Input Function, Output Statements, The print() function, The print("string") function, The print(variables list) function, , The print(object) function, The print(formatted string) function, Command Line Arguments	15

	Control Statements: The if statement, The if ... else Statement, The 'if ... elif ... else' Statement, Loop Statement- while loop, for loop, Infinite loop, Nested loop, The else suite, break statement, continue statement, pass statement, assert statement, return statement	
II	Operators: Arithmetic operators, Assignment operators, Unary minus operator, Relational operators, Logical operators, Bitwise operators, Membership operators, Identity operators, Precedence of Operators, Associativity of Operators Arrays: Creating Arrays, Indexing and Slicing of Arrays, Basic Array Operations, Arrays Processing, Mathematical Operations on Array, Aliasing Arrays, Slicing and Indexing in NumPy Arrays, Basic slicing, Advanced Indexing, Dimensions of Arrays, Attributes of an Array, The ndim Attribute, The shape Attribute, The size Attribute, The itemsize Attribute Functions: Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, Difference between a Function and a Method, Pass Value by Object Reference, Parameters and Arguments, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Arbitrary Arguments, Recursive Functions, Anonymous or Lambda Functions, Using Lambda with the filter() Function, Using Lambda with the map() Function, Using Lambda with the reduce() Function Modules: Introduction to Modules in Python	15
III	Strings: Creating Strings, Functions of Strings, Working with Strings, Length of a String, Indexing and Slicing, Repeating and Concatenating Strings, Checking Membership, Comparing Strings, Removing Spaces, Finding Substrings, Counting Substrings, Immutability, Splitting and Joining Strings, Changing Case, Checking Starting and Ending of a String, Sorting Strings, Searching in the Strings, Testing Methods, Formatting Strings, Finding the Number of Characters and Words, Inserting Substrings into a String List and Tuples: Lists, List Functions and Methods, List Operations, List Slices, Nested Lists, Tuples, Functions in Tuple Dictionaries: Creating a Dictionary, Operators in Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries, Converting Lists into Dictionary, Converting Strings into Dictionary, Passing Dictionaries to Functions, Sorting the Elements of a Dictionary using Lambda, Ordered Dictionaries	15
Textbooks: 1. Practical Programming: An Introduction to Computer Science Using Python 3, Paul Gries, Jennifer Campbell, Jason Montojo, Pragmatic Bookshelf, 2nd Edition, 2014		

2. Programming through Python, M. T Savaliya, R. K. Maurya & G M Magar, Sybgen Learning India, 2020

Additional References:

1. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018
2. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017
3. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018
4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University Press, 2017
5. Let Us Python, Yashwant. B. Kanetkar, BPB Publication, 2019

Course Code	Course Title	Credits	Lectures /Week
USCSP102	Introduction to Programming with Python – Practical	1	3
1	Write a program to design and develop python program to implement various control statement using suitable examples		
2	Write program in Python to define and call functions for suitable problem.		
3	Write Python program to demonstrate different types of function arguments.		
4	Write a Python program to demonstrate the precedence and associativity of operators.		
5	Write suitable Python program to implement recursion for problems such as Fibonacci series, Factorial, Tower of Hanoi etc.		
6	Write Python program to implement and use lambda function in python		
7	Write a python program to create and manipulate arrays in Python. Also demonstrate use of slicing and indexing for accessing elements from the array.		
8	Write a program to implement list in Python for suitable problem. Demonstrate various operations on it.		
9	Write a program to implement tuple in Python for suitable problem. Demonstrate various operations on it.		
10	Write a program to implement dictionary in Python for suitable problem. Demonstrate various operations on it.		



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Course Code	Course Title	Credits	Lectures /Week
USCS103	LINUX Operating System	2	3
About the Course: This syllabus will help to train students in fundamental skills and build-up sustainable interest in Linux Operating System. It will improve necessary knowledge base to understand Linux Operating System and its practical implementation, it will also help to develop Linux based solutions for real life problems.			
Course Objectives: - To learn basic concepts of Linux in terms of operating system - To learn use of various shell commands with regular expressions - To set Linux Environment variables and learn setting file permissions to maintain Linux security implementation - To learn various editors available in Linux OS - To learn shell scripting. - To learn installation of compilers and programming using C and Python languages on Linux platform			
Learning Outcomes: After successful completion of this course, students would be able to - Work with Linux file system structure, Linux Environment - Handle shell commands for scripting, with features of regular expressions, redirections - Implement file security permissions - Work with vi, sed and awk editors for shell scripting using various control structures - Install softwares like compilers and develop programs in C and Python programming languages on Linux Platform			
Unit	Topics	No of Lectures	
I	Linux operating system and Basics : History, GNU Info and Utilities, Various Linux Distributions, The Unix/Linux architecture, Features of Unix/Linux, Starting the shell, Shell prompt, Command structure, File Systems and Directory Structure, man pages, more documentation pages Basic Bash shell commands: General purpose utility Commands, basic commands, Various file types, attributes and File handling Commands, Handling Ordinary Files. More file attributes Advanced Bash shell commands: Simple Filters, Filters using regular expressions. The Linux environment variable: Setting, Locating and removing environment variables like PATH etc, Default shell environment variables, Using command aliases.	15	

II	Understanding Linux file permission: Linux security, Using Linux groups, Decoding file permissions, Changing security setting, Sharing files. Linux Security: Understanding Linux Security, uses of root, sudo command, working with passwords, Understanding ssh. Networking: TCP/IP Basics, TCP/IP Model, Resolving IP addresses, Applications, ping, telnet, ftp, DNS Working with Editors: awk, sed and Introduction to vi	15
III	Basic script building: Using multiple commands, Creating script files, Displaying messages, Using variables, Redirecting Input and Output, Pipes performing math, Exiting the script. Using structured commands: Working with if-then, if-then-else and nested if statements, test command, Compound condition testing, while command, until command, case command. Script and Process control : Handling signals, Running scripts in background mode, Running scripts without a console, Job control, Job scheduling commands: ps, nice, renice, at, batch, cron table, Running the script at boot	15

Textbooks:

1. "Linux Command line and Shell Scripting Bible", Richard Blum, Wiley India.
2. "Unix: Concepts and Applications", Sumitabha Das, 4th Edition, McGraw Hill.
3. "Official Ubuntu Book", Matthew Helmke & Elizabeth K. Joseph with Jose Antonio Rey and Philips Ballew, 8th Ed.

Additional References:

1. "Linux Administration: A Beginner's Guide", Fifth Edition, Wale Soyinka, Tata McGraw-Hill, 2008.
2. "Linux: Complete Reference", Richard Petersen, 6th Edition, Tata McGraw-Hill
3. "Beginning Linux Programming", Neil Mathew, 4th Edition, Wiley Publishing, 2008.

Course Code	Course Title	Credits	Lectures /Week
USCSP103	LINUX Operating System – Practical	1	3
1	Installation of Ubuntu Linux operating system. a) Booting and Installing from (USB/DVD) b) Using Ubuntu Software center / Using Synaptic c) Explore useful software packages.		
2	Becoming an Ubuntu power user a) Administering system and User setting b) Learning Unity keyboard c) Using the Terminal d) Working with windows programs		

3	File System Commands: touch, help, man, more, less, pwd, cd, mkdir, rmdir, ls, find, ls, etc File handling Commands: cat, cp, rm, mv, more, file, wc, od, cmp, diff, comm, chmod, chown, chgrp, gzip and gunzip, zip and unzip, tar, ln, umask,, chmod, chgrp, chown, etc
4	General purpose utility Commands: cal, date, echo, man, printf, passwd, script, who, uname, tty, stty, etc Simple Filters and I/O redirection: head, tail, cut paste, sort, grep family, tee, uniq, tr, etc. Networking Commands: who, whoami, ping, telnet, ftp, ssh, etc
5	Editors: vi, sed, awk
6	Working and Managing with processes- sh, ps, kill, nice, at and batch etc.
7	Shell scripting I: Defining variables, reading user input, exit and exit status commands, , expr, test, [], if conditional, logical operators
8	Shell scripting II: Conditions (for loop, until loop and while loop) arithmetic operations, examples
9	Shell scripting III: Redirecting Input / Output in scripts, creating your own Redirection
10	Installation of C/C++/Java/Python Compiler and creating an environment for app development. Basic programming using C and Python Languages.



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Course Code	Course Title	Credits	Lectures /Week
USCS104	Open Source Technologies	2	3

About the Course:

Open Source Software is becoming an important resource for development, especially in developing countries. A working understanding of the economic and technical background of the Free / Open Source Software movement (FOSS) is essential for its effective use. The course takes students through the history and current status of the FOSS world, and starts them exploring it, by connecting their personal experiences with corresponding FOSS projects. Students will experience finding and using Open Source Software projects.

Course Objectives:

- Understand the difference between open-source software and commercial software.
- Understand the policies, licensing procedures and ethics of FOSS.
- Understand open-source philosophy, methodology and ecosystem.
- Awareness with Open-Source Technologies.

Learning Outcomes:

- Differentiate between Open Source and Proprietary software and Licensing.
- Recognize the applications, benefits and features of Open-Source Technologies
- Gain knowledge to start, manage open-source projects.

Unit	Topics	No of Lectures
I	Introduction to Open-Source: Open Source, Need and Principles of OSS, Open-Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open-Source Software, Public Domain. History of free software, Proprietary Vs Open-Source Licensing Model, use of Open-Source Software, FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project. Open-Source Principles and Methodology: Open-Source History, Open-Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open-Source Software Development, Licenses, Copyright vs. Copy left, Patents, Zero marginal cost, Income-generation Opportunities, Internationalization. Licensing: What Is A License, How to create your own Licenses, Important FOSS Licenses (Apache, BSD, PL, LGPL), copyrights and copy lefts, Patent.	15
II	Open-Source projects: Starting and maintaining own Open-Source Project, Open-Source Hardware, Open-Source Design, Open-source Teaching, Open-source media. Collaboration: Community and Communication, Contributing to Open-Source Projects Introduction to GitHub, interacting with the community on GitHub, Communication and etiquette, testing open-source code, reporting	15

	issues, contributing code. Introduction to Wikipedia, contributing to Wikipedia or contributing to any prominent open-source project of student's choice. Open-Source Ethics and Social Impact: Open source vs. closed source, Open-source Government, Ethics of Open-source, Social and Financial impacts of open-source technology, Shared software, Shared source, Open Source as a Business Strategy	
III.	Understanding Open-Source Ecosystem: Open-Source Operating Systems: GNU/Linux, Android, Free BSD, Open Solaris. Open-Source Hardware, Virtualization Technologies, Containerization Technologies: Docker, Development tools, IDEs, Debuggers, Programming languages, LAMP, Open-Source Database technologies Case Studies: Example Projects: Apache Web server, BSD, GNU/Linux, Android, Mozilla (Firefox), Wikipedia, Drupal, WordPress, Git, GCC, GDB, GitHub, Open Office, LibreOffice Study: Understanding the developmental models, licensing, mode of funding, commercial/non-commercial use.	15

Textbooks:

1. "Open-Source Technology", Kailash Vadera & Bhavyesh Gandhi, University Science Press, Laxmi Publications, 2009
2. "Open-Source Technology and Policy", Fadi P. Deek and James A. M. McHugh, Cambridge University Press, 2008.

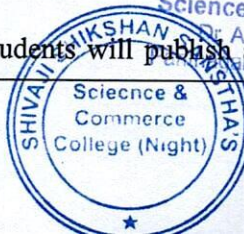
Additional References:

1. "Perspectives on Free and Open-Source Software", Clay Shirky and Michael Cusumano, MIT press.
2. "Understanding Open Source and Free Software Licensing", Andrew M. St. Laurent, O'Reilly Media.
3. "Open Source for the Enterprise", Dan Woods, Gautam Guliani, O'Reilly Media
4. Linux kernel Home: <http://kernel.org>
5. Open-Source Initiative: <https://opensource.org/>
6. The Linux Foundation: <http://www.linuxfoundation.org/>
7. The Linux Documentation Project: <http://www.tldp.org/>
8. Docker Project Home: <http://www.docker.com>
9. Linux Documentation Project: <http://www.tldp.org/>
10. Wikipedia: <https://en.wikipedia.org/>
11. GitHub: <https://help.github.com/>
12. The Linux Foundation: <http://www.linuxfoundation.org/>



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Course Code	Course Title	Credits	Lectures /Week
USCSP104	Open Source Technologies– Practical	1	3
1	Open Source Operating Systems - Learn the following open source operating system of your choice: Linux, Android, FreeBSD, Open Solaris etc. - Learn the installation. - Identify the unique features of these OS.		
2	Hands on with LibreOffice - Learn it from practical view-point - Give a brief presentation about it to the class		
3	Hands on with GIMP Photo Editing Tool - Learn it from practical view-point - Give a brief presentation about it to the class		
4	Hands on with Shotcut Video Editing Tool - Learn it from practical view-point - Give a brief presentation about it to the class		
5	Hands on with Blender Graphics and Animation Tool - Learn it from practical view-point - Give a brief presentation about it to the class		
6	Hands on with Apache Web Server - Learn it from practical view-point - Give a brief presentation about it to the class		
7	Hands on with WordPress CMS - Learn it from practical view-point - Give a brief presentation about it to the class		
8	Contributing to Wikipedia: - Introduction to wikipedia: operating model, license, how to contribute? - Create your user account on wikipedia c. Identify any topic of your choice and contribute the missing information		
9	Github - Create and publish your own open source project: Write any simple program using your choice of programming language. - Create a repository on github and save versions of your project. You'll learn about the staging area, committing your code, branching, and merging, - Using GitHub to Collaborate: Get practice using GitHub or other remote repositories to share your changes with others and collaborate on multi-developer projects. You'll learn how to make and review a pull request on GitHub. d. Contribute to a Live Project: Students will publish a repository containing		



	their reflections from the course and submit a pull request.
10	Virtualization: Open Source virtualization technologies: • Install and configure the following: VirtualBox, Zen, KVM • Create and use virtual machines
11	Containerization: • Install and configure the following containerization technologies: docker, rocket, LXD • Create and use containers using it




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Course Code	Course Title	Credits	Lectures /Week
USCS105	Discrete Mathematics	2	3

About the Course:

Discrete Mathematics provides an essential foundation for virtually every area of Computer Science. The problem-solving techniques honed in Discrete Mathematics are necessary for writing complicated software. Discrete mathematics also builds the gateway to advanced courses in Mathematical Sciences, Data Science, Machine Learning, Software Engineering, etc.

Course Objectives:

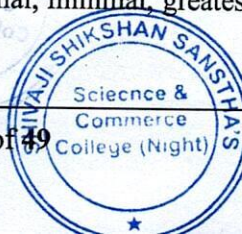
- The purpose of the course is to familiarize the prospective learners with mathematical structures that are fundamentally discrete.
- This course will enhance prospective learners to reason and ability to articulate mathematical problems.
- This course will introduce functions, forming and solving recurrence relations and different counting principles. These concepts will be useful to study or describe objects or problems in computer algorithms and programming languages and these concepts can be used effectively in other courses.

Learning Outcomes:

After successful completion of this course, learners would be able to:

- Define mathematical structures (relations, functions, graphs) and use them to model real life situations.
- Understand, construct and solve simple mathematical problems.
- Solve puzzles based on counting principles.
- Provide basic knowledge about models of automata theory and the corresponding formal languages.
- Develop an attitude to solve problems based on graphs and trees, which are widely used in software.

Unit	Topics	No of Lectures
I	Functions: Definition of function; Domain, co-domain, range of a function; Examples of standard functions such as identity and constant functions, absolute value function, logarithmic and exponential functions, flooring and ceiling functions; Injective, surjective and bijective functions; Composite and inverse functions. Relations: Definition and examples of relation; Properties of relations, Representation of relations using diagraphs and matrices; Equivalence relation; Partial Order relation, Hasse Diagrams, maximal, minimal, greatest, least element Lattices.	15



	Recurrence Relations: Definition and Formulation of recurrence relations; Solution of a recurrence relation; Solving recurrence relations- Back tracking method, Linear homogeneous recurrence relations with constant coefficients; Homogeneous solution of linear homogeneous recurrence relation with constant coefficients; Particular solution of non-linear homogeneous recurrence relation with constant coefficients; General solution of non-linear homogeneous recurrence relation with constant coefficients; Applications- Formulate and solve recurrence relation for Fibonacci numbers, Tower of Hanoi, Intersection of lines in a plane, Sorting Algorithms.	
II	Counting Principles: Basic Counting Principles (Sum and Product Rule); Pigeonhole Principle (without proof) - Simple examples; Inclusion Exclusion Principle (Sieve formula) (without proof); Counting using Tree diagrams. Permutations and Combinations: Permutation without and with repetition; Combination without and with repetition; Binomial numbers and identities: Pascal Identity, Vandermonde's Identity, Pascal triangle, Binomial theorem (without proof) and applications; Multinomial numbers, Multinomial theorem (without proof) and applications. Languages, Grammars and Machines: Languages and Grammars – Introduction, Phase structure grammar, Types of grammar, derivation trees; Finite-State Machines with Output; Finite-State Machines with No Output; Regular Expression and Regular Language.	15
III	Graphs: Graphs and Graph Models; Graph terminologies and Special types of graphs; Definition and elementary results; Representing graphs, Linked representation of a graph; Graph Isomorphism; Connectivity in graphs – path, trail, walk; Euler and Hamilton paths; Planar graphs, Graph coloring and chromatic number. Trees: Definition, Tree terminologies and elementary results; Linked representation of binary trees; Ordered rooted tree, Binary trees, Complete and extended binary trees, Expression trees, Binary Search tree, Algorithms for searching and inserting in binary search trees, Algorithms for deleting in a binary search tree; Traversing binary trees	15

Textbooks:

1. Discrete Mathematics and Its Applications, Seventh Edition by Kenneth H. Rosen, McGraw Hill Education (India) Private Limited. (2011)
2. Discrete Mathematics: Semyour Lipschutz, Marc Lipson, Schaum's out lines, McGraw-Hill Inc.

3rd Edition

3. Data Structures Seymour Lipschutz, Schaum's out lines, McGraw- Hill Inc. 2017
4. Norman L. Biggs, Discrete Mathematics, Revised Edition, Clarendon Press, Oxford 1989.

Additional References:

1. Elements of Discrete Mathematics: C.L. Liu, Tata McGraw- Hill Edition.
2. Concrete Mathematics (Foundation for Computer Science): Graham, Knuth, Patashnik Second Edition, Pearson Education.
3. Discrete Mathematics: SemyourLipschutz, Marc Lipson, Schaum's out lines, McGraw- Hill Inc.
4. Foundations in Discrete Mathematics: K.D. Joshi, New Age Publication, New Delhi.

Course Code	Course Title	Credits	Lectures /Week
USCSP105	Discrete Mathematics – Practical	1	3
1	Functions – a. Identify if the given mapping is a function b. Finding domain and range of a given function c. Check if the given function is injective/surjective/bijective d. Find the inverse of a given function e. Operations on functions f. Graphs of functions using any online tool		
2	Relations – a. Representation of relations b. Determine if the given relation satisfies equivalence relation/partial order relation c. Draw Hasse diagrams d. Find maximal, minimal, greatest, least element in a poset e. Determine if a given poset is a lattice		
3	Recurrence Relation – a. Solve recurrence relation using backtracking method b. Solve linear homogeneous recurrence relations with constant coefficients c. Find homogeneous, particular, general solution of a recurrence relation d. Formulate and solving recurrence relation		
4	Counting Principles – a. Sum and product rule b. Pigeonhole Principle c. Inclusion Exclusion Principle d. Counting using Tree diagrams		
5	Permutations and Combinations – a. Permutations b. Permutations with repetitions c. Combinations d. Combinations with repetitions e. Binomial numbers and Identities		



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	f. Applications on Binomial theorem g. Applications on Multinomial theorem
6	Languages and Grammars – a. Find the language generated by given grammar b. Check if a given string belongs or not to a given language/grammar c. Operations on languages d. Identify the type of grammar
7	Finite State Machines – a. Check if a given string is accepted or rejected by FSM without output b. Find the output for a FSM with output c. Describe a machine (diagram/table)
8	Regular Expression and Regular Language – a. Describe the regular expressions represented by given language b. Describe the language represented by given regular expression
9	Graphs – a. Types of graph b. Properties of graph c. Representation of graph d. Graph Isomorphism e. Connectivity in graphs – path, trail, walk f. Euler and Hamilton graphs g. Planar graphs h. Graph coloring and chromatic number
10	Trees – a. Tree terminologies b. Types of tree c. Properties of tree d. Representation of tree e. Expression tree f. Binary Search tree g. Tree traversal




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Course Code	Course Title	Credits	Lectures /Week
USCS106	Descriptive Statistics	2	3

About the Course:

This course is designed to provide learners with an understanding of the data and to develop an understanding of the quantitative techniques from Statistics. It also provides the knowledge of different statistical tools used for primary statistical analysis of data.

Course Objectives:

1. To develop the learners ability to deal with different types of data.
2. To enable the use of different measures of central tendency and dispersion wherever relevant.
3. To make learner aware about the techniques to check the Skewness and Kurtosis of data.
4. To make learner enable to find the correlation between different variables and further apply the regression analysis to find the exact relation between them.
5. To develop ability to analyze statistical data through R software.

Learning Outcomes:

After successful completion of this course, learners would be able to

1. Organize, manage and present data.
2. Analyze Statistical data using measures of central tendency and dispersion.
3. Analyze Statistical data using basics techniques of R.
4. Study the relationship between variables using techniques of correlation and regression.

Unit	Topics	No of Lectures
I	Data Types and Data Presentation: Data types: Attribute, Variable, Discrete and Continuous variable, Univariate and Bivariate distribution. Types of Characteristics, Different types of scales: nominal, ordinal, interval and ratio. Data presentation: Frequency distribution, Histogram, Ogive curves. Introduction to R: Data input, Arithmetic Operators, Vector Operations, Matrix Operations, Data Frames, Built-in Functions. Frequency Distribution, Grouped Frequency Distribution, Diagrams and Graphs, Summary statistics for raw data and grouped frequency distribution. Measures of Central tendency: Concept of average/central tendency, characteristics of good measure of central tendency. Arithmetic Mean (A.M.), Median, Mode - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined arithmetic mean. Partition Values: Quartiles, Deciles and Percentiles - examples for ungrouped and grouped data	15
II	Measures dispersion: Concept of dispersion, Absolute and Relative	15

	measure of dispersion, characteristics of good measure of dispersion. Range, Semi-interquartile range, Quartile deviation, Standard deviation - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined standard deviation, Variance. Coefficient of range, Coefficient of quartile deviation and Coefficient of variation (C.V.) Moments: Concept of Moments, Raw moments, Central moments, Relation between raw and central moments. Measures of Skewness and Kurtosis: Concept of Skewness and Kurtosis, measures based on moments, quartiles.	
III	Correlation: Concept of correlation, Types and interpretation, Measure of Correlation: Scatter diagram and interpretation; Karl Pearson's coefficient of correlation (r): Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, properties; Spearman's rank correlation coefficient: Definition, examples of with and without repetition. Concept of Multiple correlation. Regression: Concept of dependent (response) and independent (predictor) variables, concept of regression, Types and prediction, difference between correlation and regression, Relation between correlation and regression. Linear Regression - Definition, examples using least square method and regression coefficient, coefficient of determination, properties. Concept of Multiple regression and Logistic regression.	15

Textbooks:

1. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.
2. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi

Additional References:

1. Sarma, K. V. S. (2001). Statistics Made it Simple: Do it yourself on PC. Prentice Hall of India, NewDelhi.
2. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, NewDelhi.
3. Purohit, S. G., Gore S. D., Deshmukh S. R. (2008). Statistics Using R, Narosa Publishing House, NewDelhi.
4. Schaum's Outline Of Theory And Problems Of Beginning Statistics, Larry J. Stephens, Schaum's Outline Series McGraw-Hill

Course Code	Course Title	Credits	Lectures /Week
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USCSP106	Descriptive Statistics – Practical	1	3
Problem solving and implementation using R programming			
1	Basics of R- - Data input, Arithmetic Operators - Vector Operations, Matrix Operations - Data Frames, Built-in Functions - Frequency Distribution, Grouped Frequency Distribution - Diagrams and Graphs		
2	Frequency distribution and data presentation- - Frequency Distribution (Univariate data/ Bivariate data) - Diagrams - Graphs		
3	Measures of Central Tendency- - Arithmetic Mean - Median - Mode - Partition Values		
4	Measures dispersion- - Range and Coefficient of range - Quartile deviation and Coefficient of quartile deviation - Standard deviation, Variance and Coefficient of variation (C.V.)		
5	Moments- - Raw moments - Central moments		
6	Measures of Skewness - - Karl Pearson's measure of Skewness - Bowley's measure of Skewness - Moment coefficient of Skewness		
7	Measures of Kurtosis- - Moment coefficient of Kurtosis (Absolute measure) - Moment coefficient of Kurtosis (Relative measure)		
8	Correlation- - Karl Pearson's correlation coefficient - Spearman's Rank correlation		
9	Regression- - Method of least squares - Using regression coefficients - Properties of regression lines & regression coefficients		
10	Summary Statistics using R- - Summary statistics for raw data - Summary statistics for grouped frequency distribution - Simple Correlation & Regression using R		
Course Code	Course Title	Credits	Lectures/Week

USCS107	Soft Skills	2	3
About the Course: To help learners develop their soft skills and develop their personality along with technical skills. Focus on various communication enhancement along with academic and professional ethics.			
Course Objectives: - Understand the significance and essence of a wide range of soft skills. - Learn how to apply soft skills in a wide range of routine social and professional settings - Learn how to employ soft skills to improve interpersonal relationships - Learn how to employ soft skills to enhance employability and ensure workplace and career success			
Learning Outcomes: - Learners will be able to understand the importance and types soft skills - Learners will develop skills for Academic and Professional Presentations. - Learners will able to understand Leadership Qualities and Ethics. - Ability to understand the importance of stress management in their academic & professional life.			
Unit	Topics	No of Lectures	
I	Introduction to Soft Skills Soft Skills: An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. Personality Development: Knowing Yourself, Positive Thinking, Johari's Window, Physical Fitness Emotional Intelligence: Meaning and Definition, Need for Emotional Intelligence, Intelligence Quotient versus Emotional Intelligence Quotient, Components of Emotional Intelligence, Competencies of Emotional Intelligence, Skills to Develop Emotional Intelligence Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels Etiquette and Mannerism: Introduction, Professional Etiquette, Technology Etiquette Ethical Values: Ethics and Society, Theories of Ethics, Correlation between Values and Behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics	15	
II	Basic Skills in Communication: Components of effective communication: Communication process and handling them, Composing effective messages, Non Verbal	15	

	Communication: its importance and nuances: Facial Expression, Posture, Gesture, Eye contact, appearance (dress code). Communication Skills: Spoken English, Phonetics, Accent, Intonation Employment Communication: Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter Job Interviews: Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews Group Discussion: Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits	
III	Academic and Professional Skills: Professional Presentation: Nature of Oral Presentation, planning a Presentation, Preparing the Presentation, Delivering the Presentation Creativity at Workplace: Introduction, Current Workplaces, Creativity, Motivation, Nurturing Hobbies at Work, The Six Thinking Hat Method. Capacity Building: Learn, Unlearn and Relearn: Capacity Building, Elements of Capacity Building, Zones of Learning, Ideas for Learning, Strategies for Capacity Building Leadership and Team Building: Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams. Decision Making and Negotiation: Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts Stress and Time Management: Stress, Sources of Stress, Ways to Cope with Stress	15

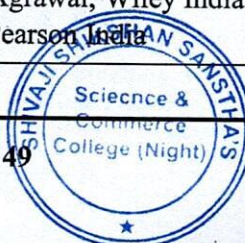
Textbooks:

1. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2017.
2. Soft Skills: An Integrated Approach to Maximize Personality, Gajendra S. Chauhan, Sangeeta Sharma, Wiley India

Additional References:

1. Personality Development and Soft Skills, Barun K. Mitra, Oxford Press
2. Business Communication, ShaliniKalia, Shailja Agrawal, Wiley India
3. Cornerstone: Developing Soft Skills, Sherfield, Pearson India

Semester II



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Course Code	Course Title	Credits	Lectures /Week
USCS201	Design & Analysis of Algorithms	2	3

About the Course:

The course covers the concepts of - (i) calculating complexity of algorithms, (ii) the essential operations like searching, sorting, selection, pattern matching & recursion, and (iii) various algorithmic strategies like greedy, divide-n-conquer, dynamic programming, backtracking and implementations of all these on basic data structures like array, list and stack.

Course Objectives:

The objectives of this course are:

- To make students understand the basic principles of algorithm design
- To give idea to students about the theoretical background of the basic data structures
- To familiarize the students with fundamental problem-solving strategies like searching, sorting, selection, recursion and help them to evaluate efficiencies of various algorithms.
- To teach students the important algorithm design paradigms and how they can be used to solve various real world problems.

Learning Outcomes:

After successful completion of this course, students would be able to

- Students should be able to understand and evaluate efficiency of the programs that they write based on performance of the algorithms used.
- Students should be able to appreciate the use of various data structures as per need
- To select, decide and apply appropriate design principle by understanding the requirements of any real life problems

Unit	Topics	No of Lectures
I	Introduction to algorithms - What is algorithm, analysis of algorithm, Types of complexity, Running time analysis, How to Compare Algorithms, Rate of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega-Ω Notation, Theta-Θ Notation, Asymptotic Analysis, Performance characteristics of algorithms, Estimating running time / number of steps of executions on paper, Idea of Computability Introduction to Data Structures - What is data structure, types, Introduction to Array(1-d & 2-d), Stack and List data structures, operations on these data structures, advantages disadvantages and applications of these data structures like solving linear equations, Polynomial Representation, Infix-to-Postfix conversion	15
II	Recursion - What is recursion, Recursion vs Iteration, recursion applications like Factorial of a number, Fibonacci series & their comparative analysis with respect to iterative version, Tower of hanoi	15

	problem Basic Sorting Techniques - Bubble, Selection and Insertion Sort & their comparative analysis Searching Techniques - Linear Search and its types, Binary Search and their comparative analysis Selection Techniques - Selection by Sorting, Partition-based Selection Algorithm, Finding the Kth Smallest Elements in Sorted Order & their comparative analysis String Algorithms - Pattern matching in strings, Brute Force Method & their comparative analysis	
III	Algorithm Design Techniques - Introduction to various types of classifications/design criteria and design techniques Greedy Technique - Concept, Advantages & Disadvantages, Applications, Implementation using problems like - file merging problem Divide-n-Conquer - Concept, Advantages & Disadvantages, Applications; Implementation using problems like - merge sort, Strassen's Matrix Multiplication Dynamic Programming - Concept, Advantages & Disadvantages, Applications, Implementation using problems like - Fibonacci series, Factorial of a number, Longest Common subsequence Backtracking Programming - Concept, Advantages & Disadvantages, Applications, Implementation using problems like N-Queen Problem	15

Textbooks:

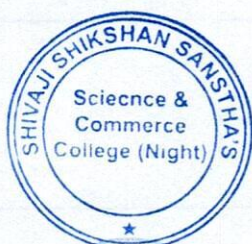
1. "Data Structure and Algorithm Using Python", Rance D. Necaise, Wiley India Edition, 2016.
2. "Data Structures and Algorithms Made Easy", Narasimha Karumanchi, CareerMonk Publications, 2016.
3. "Introduction to Algorithms", Thomas H. Cormen, 3rd Edition, PHI.

Additional References:

1. "Introduction to the Design and Analysis of Algorithms", Anany Levitin, Pearson, 3rd Edition, 2011.
2. "Design and Analysis of Algorithms", S. Sridhar, Oxford University Press, 2014.

Course Code	Course Title	Credits	Lectures / Week
USCSP201	Design & Analysis of Algorithms – Practical	1	3

1	Programs on 1-d arrays like - sum of elements of array, searching an element in array, finding minimum and maximum element in array, count the number of even and odd numbers in array. For all such programs, also find the time complexity, compare if there are multiple methods
2	Programs on 2-d arrays like row-sum, column-sum, sum of diagonal elements, addition of two matrices, multiplication of two matrices. For all such programs, also find the time complexity, compare if there are multiple methods
3	Program to create a list-based stack and perform various stack operations.
4	Program to perform linear search and binary search on list of elements. Compare the algorithms by calculating time required in milliseconds using readymade libraries.
5	Programs to sort elements of list by using various algorithms like bubble, selection sort, and insertion sort. Compare the efficiency of algorithms.
6	Programs to select the N^{th} Max/Min element in a list by using various algorithms. Compare the efficiency of algorithms.
7	Programs to find a pattern in a given string - general way and brute force technique. Compare the efficiency of algorithms.
8	Programs on recursion like factorial, fibonacci, tower of hanoi. Compare algorithms to find factorial/fibonacci using iterative and recursive approaches.
9	Program to implement file merging, coin change problems using Greedy Algorithm and to understand time complexity.
10	Program to implement merge sort, Strassen's Matrix Multiplication using D-n-C Algorithm and to understand time complexity.
11	Program to implement fibonacci series, Longest Common Subsequence using dynamic programming and to understand time complexity. Compare it with the general recursive algorithm.
12	Program to implement N-Queen Problem, Binary String generation using Backtracking Strategy and to understand time complexity.




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Course Code	Course Title	Credits	Lectures /Week
USCS202	Advanced Python Programming	2	3

About the Course:

This course aims to explore and enable learners to master the skills of advanced topics in Python Programming. It helps learners develop advanced skills such as working with databases, matching patterns, implementing threads and exception handling and GUI in Python. It also highlights why Python is a useful scripting language for all developers.

Course Objectives:

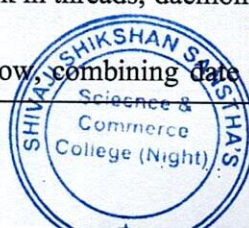
- To learn how to design object-oriented programs with Python classes.
- To learn about reading, writing and implementing other operation on files in Python.
- To implement threading concept and multithreading on Python
- To design GUI Programs and implement database interaction using Python.
- To know about use of regular expression and handling exceptions for writing robust python programs.

Learning Outcomes:

After successful completion of this course, students would be able to

- Ability to implement OOP concepts in Python including Inheritance and Polymorphism
- Ability to work with files and perform operations on it using Python.
- Ability to implement regular expression and concept of threads for developing efficient program
- Ability to implement exception handling in Python applications for error handling.
- Knowledge of working with databases, designing GUI in Python and implement networking in Python

Unit	Topics	No of Lectures
I	Working with files: Files, opening and closing a file, working with text files containing strings, knowing whether a file exists or not, working with binary files, the 'with' statement, the seek() and tell() methods, random accessing of binary files, zipping and unzipping files, working with directories, running other programs from python program Regular expressions: What is a regular expression?, sequence characters in regular expressions, quantifiers in regular expressions, special characters in regular expressions, using regular expression on files, retrieving information from an html file, Threads in python: Difference between process and thread, types of threads, benefits of threads, creating threads, single tasking and multitasking, thread synchronization, deadlock in threads, daemon threads Date and time in python: Date and time now, combining date and time,	15



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	formatting dates and times, finding durations using “time delta”, comparing two dates, sorting dates, stopping execution temporarily, knowing the time taken by a program, calendar module	
II	Database in python: Using SQL with python, retrieving rows from a table, inserting rows into a table, deleting rows from a table, updating rows in a table, creating database tables through python, Exception handling in databases. Exceptions in python: Errors in a python program, compile & run-time errors, logical error, exceptions-exception handling, types of exceptions, the except block, the assert statement, user-defined exceptions, logging the exceptions Networking: Protocols,server-client architecture, tcp/ip and udp communication Graphical user interface: Creating a GUI in python, Widget classes, Working with Fonts and Colours, working with Frames, Layout manager, Event handling	15
III	OOPs in python: Features of Object Oriented Programming system (oops)-classes and objects, encapsulation, abstraction, inheritance, polymorphism, constructors and destructors Classes and objects: Creating a class, the self-variable, types of variables, namespaces, types of methods, instance methods, class methods, static methods, passing members of one class to another class, inner classes Inheritance and polymorphism: Inheritance in python, types of inheritance- single inheritance, multilevel inheritance, hierarchical inheritance, multiple inheritance, constructors in inheritance, overriding super class constructors and methods, the super() method, method resolution order (mro), polymorphism, duck typing, operator overloading, method overloading, method overriding, Abstract classes and interfaces: Abstract class, abstract method, interfaces in python, abstract classes vs. Interfaces	15

Textbooks:

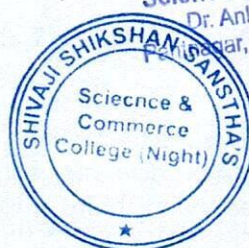
1. Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 3rd Edition, 2018
2. Programming through Python, M. T Savaliya, R. K. Maurya, G M Magar, Revised Edition, Sybgen Learning India, 2020

Additional References:

1. Advanced Python Programming, Dr. Gabriele Lanaro, Quan Nguyen, Sakis Kasampalis, Packt Publishing, 2019
2. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018
3. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018
4. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017

5. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018

Course Code	Course Title	Credits	Lectures /Week
USCSP202	Advanced Python Programming – Practical	1	3
1	Write a program to Python program to implement various file operations.		
2	Write a program to Python program to demonstrate use of regular expression for suitable application.		
3	Write a Program to demonstrate concept of threading and multitasking in Python.		
4	Write a Python Program to work with databases in Python to perform operations such as a. Connecting to database b. Creating and dropping tables c. Inserting and updating into tables.		
5	Write a Python Program to demonstrate different types of exception handling.		
6	Write a GUI Program in Python to design application that demonstrates a. Different fonts and colors b. Different Layout Managers c. Event Handling		
7	Write Python Program to create application which uses date and time in Python.		
8	Write a Python program to create server-client and exchange basic information		
9	Write a program to Python program to implement concepts of OOP such as a. Types of Methods b. Inheritance c. Polymorphism		
10	Write a program to Python program to implement concepts of OOP such as a. Abstract methods and classes b. Interfaces		



	Adverts, Facebook Marketing Tools, LinkedIn Marketing: Importance of LinkedIn Marketing, Framing LinkedIn Strategy, Lead Generation through LinkedIn, Content Strategy, Analytics and Targeting, Twitter Marketing: Framing content strategy, Twitter Advertising Campaigns, YouTube Marketing: Video optimization, Promoting on YouTube, Monetization, YouTube Analytics Email Marketing: Types of Emails, Mailing List, Email Marketing tools, Email Deliverability & Email Marketing automation Mobile Marketing: Introduction, Mobile Usage, Mobile Advertising, Mobile Marketing Types, Mobile Marketing Features, Mobile Campaign Development, Mobile Advertising Analytics Content Marketing: Introduction, Content marketing statistics, Types of Content, Types of Blog posts, Content Creation, Content optimization, Content Management & Distribution, Content Marketing Strategy, Content creation tools and apps, Challenges of Content Marketing.	
III	Search Engine Optimization: Meaning, Common SEO techniques, Understanding Search Engines, basics of Keyword search, Google rankings, Link Building, Steps to optimize website, On-page and off-page optimization Search Engine Marketing: Introduction to SEM, Introduction to Ad Words - Google Ad Words, Ad Words fundamentals, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation, Display marketing, Buying Models: Cost per Click (CPC), Cost per Milli (CPM), Cost per Lead (CPL), Cost per Acquisition (CPA). Web Analytics: Purpose, History, Goals & objectives, Web Analytic tools & Methods. Web Analytics Mistakes and Pitfalls. Google Analytics: Basics of Google Analytics, Installing Google Analytics in website, Parameters of Google Analytics, Reporting and Analysis	15
Textbooks: 1. "E-Commerce Strategy, Technologies and Applications", Whitley, David, Tata McGraw Hill, 2017 2. Digital Marketing, Seema Gupta, McGraw Hill Education, 2nd Edition Additional References: 1. E-Commerce by S. Pankaj, A.P.H. Publication, New Delhi 2. Fundamentals of Digital Marketing, Punit Singh Bhatia, Pearson, 2nd Edition 3. "Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation", Damian Ryan, Calvin Jone. Kogan Page, 4th Edition		



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Course Code	Course Title	Credits	Lectures /Week
USCS207	E-Commerce & Digital Marketing	2	3

About the Course:

This course introduces the fundamental concepts of e-commerce, its types, the various legal and ethical issues of e-commerce and different e-commerce applications. The course also aims to introduce basic principles and types of digital marketing and web and Google analytics

Course Objectives:

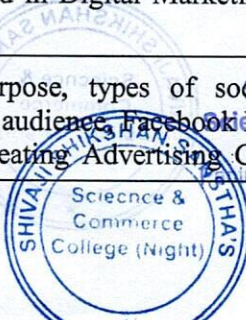
- To understand increasing significance of E-Commerce and its applications in Business and Various Sectors
- To provide an insight on Digital Marketing activities on various Social Media platforms and its emerging significance in Business
- To understand Latest Trends and Practices in E-Commerce and Digital Marketing, along with its Challenges and Opportunities for an Organization

Learning Outcomes:

After successful completion of this course, students would be able to

- Understand the core concepts of E-Commerce.
- Understand the various online payment techniques
- Understand the core concepts of digital marketing and the role of digital marketing in business.
- Apply digital marketing strategies to increase sales and growth of business
- Apply digital marketing through different channels and platforms
- Understand the significance of Web Analytics and Google Analytics and apply the same.

Unit	Topics	No of Lectures
I	Introduction to E-Commerce and E- Business: Definition and competing in the digital economy, Impact of E-Commerce on Business Models, Factors Driving e-commerce and e-Business Models, Economics and social impact of e-Business, opportunities and Challenges, e-Commerce vs m-Commerce, Different e-Commerce Models (B2B, B2C, C2B, C2C, B2E), e-Commerce Applications: e-Trading, e-Learning, e-Shopping, Virtual Reality & Consumer Experience, Legal and Ethical issues in e-Commerce. Overview of Electronic Payment systems: Types of Electronic payment schemes (Credit cards, Debit cards, Smartcards, Internet banking), E-checks, E-Cash Concepts and applications of EDI and Limitation Introduction & origin of Digital Marketing: Traditional v/s Digital Marketing. Digital Marketing Strategy, The P-O-E-M Framework, Segmenting & Customizing Messages, The Digital landscape, Digital Advertising Market in India. Skills required in Digital Marketing. Digital Marketing Plan.	15
II	Social Media Marketing: Meaning, Purpose, types of social media websites, Social Media Engagement, Target audience, Facebook Marketing, Business through Facebook Marketing, Creating Advertising Campaigns.	15



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5	Mathematical Expectation and Variance- - Mean of discrete and continuous Probability distribution - S.D. and variance of discrete and continuous Probability distribution
6	Standard probability distributions- - Calculation of probability, mean and variance based on Binomial distribution - Calculation of probability based on Normal distribution
7	Large Sample tests based on Normal (Z) - - Test of significance for proportion (Single proportion $H_0: P = P_0$) - Test of significance for difference between two proportions (Double proportion $H_0: P_1 = P_2$) - Test of significance for mean (Single mean $H_0: \mu = \mu_0$) - Test of significance for difference between two means. (Double mean $H_0: \mu_1 = \mu_2$)
8	Small sample tests based on t and F- - t-test for significance of single mean, population variance being unknown (Single mean $H_0: \mu = \mu_0$) - t-test for significance of the difference between two sample means (Independent samples) - t-test for significance of the difference between two sample means (Related samples) - F-Test to Compare Two Variances
9	Analysis of variance - - Perform One-way ANOVA - Perform Two-way ANOVA
10	Non-parametric tests- - Sign test and Wilcoxon Sign rank test - Run test - Kruskal-Wallis (H) test - Chi-square test
Note: Practical no. 6, 7, 8, 9 can also to be implemented using R programming.	




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III	Hypothesis testing: One sided, Two sided hypothesis, critical region, p-value, tests based on t, Normal and F, confidence intervals.	15
	Analysis of Variance: One-way, two-way analysis of variance.	
	Non-parametric tests: Need of non-parametric tests, Sign test, Wilcoxon's signed rank test, run test, Kruskal-Wallis tests, Chi square test.	

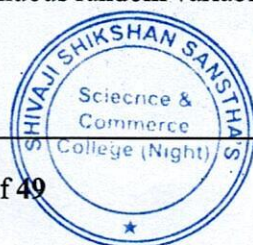
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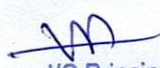
1. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi
2. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.

Additional References:

1. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the Theory of Statistics, Ed. 3, McGraw Hill Book Company.
2. Hoel P. G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, New York.
3. Hogg, R.V. and Craig R.G. (1989). Introduction to Mathematical Statistics, Ed. MacMillan Publishing Co., New York.
4. Walpole R. E., Myers R. H. and Myers S. L. (1985), Probability and Statistics for Engineers and Scientists
5. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.

Course Code	Course Title	Credits	Lectures /Week
USCSP206	Statistical Methods – Practical	1	3
1	Probability- a. Examples based on Probability definition: classical, axiomatic b. Examples based on elementary Theorems of probability		
2	Conditional probability and independence- a. Examples based on Conditional probability b. Examples based on 'Bayes' theorem c. Examples based on independence		
3	Discrete random variable- a. Probability distribution of discrete random variable b. Probability mass function		
4	Continuous random variable- a. Probability distribution of continuous random variable b. Probability density function		




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Course Code	Course Title	Credits	Lectures /Week
USCS206	Statistical Methods	2	3

About the Course:

This course introduces the key concepts in probability, conditional probabilities and distribution theory, including probability laws, random variables, expectation and variance, functions of random variables and its probability distributions. Emphasis is placed on theoretical understanding combined with problem solving using various statistical inferential techniques.

Course Objectives:

- To make learner aware about basic probability axioms and rules and its application.
- To understand the concept of conditional probability and Independence of events.
- To make learner familiar with discrete and continuous random variables as well as standard discrete and continuous distributions.
- To learn computational skills to implement various statistical inferential approaches.

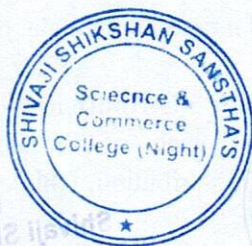
Learning Outcomes:

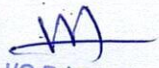
After successful completion of this course, learners would be able to

- Calculate probability, conditional probability and independence.
- Apply the given discrete and continuous distributions whenever necessary.
- Define null hypothesis, alternative hypothesis, level of significance, test statistic and p value.
- Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.
- Apply non-parametric test whenever necessary.
- Conduct and interpret one-way and two-way ANOVA.

Unit	Topics	No of Lectures
I	Probability: Random experiment, sample space, events types and operations of events, Probability definition: classical, axiomatic, Elementary Theorems of probability (without proof). Conditional probability, 'Bayes' theorem, independence, Examples on Probability. Random Variables: Concept and definition of a discrete random variable and continuous random variable. Probability mass function, Probability density function and cumulative distribution function of discrete and continuous random variable, Properties of cumulative distribution function.	15
II	Mathematical Expectation and Variance: Expectation of a function, Variance and S.D of a random variable, properties. Standard Probability distributions: Introduction, properties, examples and applications of each of the following distributions: Binomial distribution, Normal distribution, Chi-square distribution, t distribution, F distribution	15

4	Integration – - Finding area using rectangle method and antiderivative method - Indefinite and definite integrals - Properties of integrals - Numerical integration using Simpson's rule.
5	Applications of Integration – - Area between two curves - Length of a plane curve
6	Differential Equations – - Solution of a first order first degree differential equation using variable separable method - Solution of a first order linear differential equation using integrating factor - Numerical solution of first-order equations using Euler's method - Modeling using differential equation
7	Functions of Several Variables – - Functions of two or more variables, its domain and range, Operations on functions, level curves - Limits of functions of two or three variables - Continuity of functions of two or three variables
8	Partial Derivatives I – - Partial derivatives of functions, First and Second order partial derivatives, Mixed derivative theorem, Higher order partial derivatives - Differential for functions of two or three variables - Local linear approximation for functions of two or three variables
9	Partial Derivatives II – - Chain rule for functions of two or three variables - Implicit differentiation - Directional derivatives and gradient
10	Applications of Partial Derivatives– - Tangent Planes and Normal Vectors for functions of two or three variables - Maxima and Minima of Functions of Two Variables
NOTE	Above Practicals can also to be implemented using SageMath/ Geogebra.




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	Differential Equations, Separation of Variables, Slope Fields, Euler's Method, First-Order Differential Equations and Applications.	
III	PARTIAL DERIVATIVES AND ITS APPLICATIONS: Functions of Several Variables: Functions of two or more variables, Limits and Continuity of functions of two or three variables. Partial Derivatives: Partial Derivatives, Differentiability, Differentials, and Local Linearity, Chain Rule, Implicit Differentiation, Directional Derivatives and Gradients, Applications of Partial Derivatives: Tangent Planes and Normal Vectors, Maxima and Minima of Functions of Two Variables.	15

Textbooks:

1. Calculus: Early transcendental (10th Edition): Howard Anton, Irl Bivens, Stephen Davis, John Wiley & sons, 2012.

Additional References:

1. Calculus and analytic geometry (9th edition): George B Thomas, Ross L Finney, Addison Wesley, 1995
2. Calculus: Early Transcendentals (8th Edition): James Stewart, Brooks Cole, 2015.
3. Calculus (10th Edition): Ron Larson, Bruce H. Edwards, Cengage Learning, 2013.
4. Thomas' Calculus (13th Edition): George B. Thomas, Maurice D. Weir, Joel R. Hass, Pearson, 2014.

Course Code	Course Title	Credits	Lectures /Week
USCSP205	Calculus – Practical	1	3
1	Review of Basic Concepts – a. Functions of one variable, its domain and range, Operations on functions b. Limits of functions of one variable c. Continuity of functions of one variable d. Derivatives of functions of one variable		
2	Applications of Derivatives I – a. Increasing and Decreasing functions b. Concavity and inflection points c. Relative Extrema d. Absolute Extrema		
3	Applications of Derivatives II – a. Analysis of polynomials b. Graphing rational functions c. Graphs With Vertical Tangents And Cusps d. Newton's method to find approximate solution of an equation		

Course Code	Course Title	Credits	Lectures /Week
USCS205	Calculus	2	3

About the Course:

Calculus is a branch of mathematics that involves the study of rates of change. In Computer Science, Calculus is used in Machine Learning, Data Mining, Scientific Computing, Image Processing, and creating the graphics and physics engines for video games, including the 3D visuals for simulations.

Course Objectives:

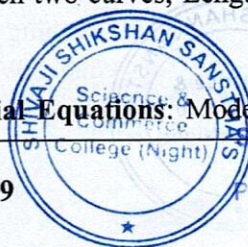
- The primary objective of this course is to introduce the basic tools of Calculus which are helpful in understanding their applications to the real world problems.
- The course is designed to have a grasp of important concepts of Calculus in a scientific way.
- It covers topics from as basic as definition of functions to partial derivatives of functions in a gradual and logical way.
- The learner is expected to solve as many examples as possible to get complete clarity and understanding of the topics covered.

Learning Outcomes:

After successful completion of this course, learners would be able to:

- Develop mathematical skills and enhance thinking power of learners.
- Understand mathematical concepts like limit, continuity, derivative, integration of functions, partial derivatives.
- Appreciate real world applications which uses the learned concepts.
- Skill to formulate a problem through Mathematical modelling and simulation.

Unit	Topics	No of Lectures
I	DERIVATIVES AND ITS APPLICATIONS: Review of Basic Concepts: Functions, limit of a function, continuity of a function, derivative function. Derivative In Graphing And Applications: Increase, Decrease, Concavity, Relative Extreme; Graphing Polynomials, Rational Functions, Cusps and Vertical Tangents. Absolute Maxima and Minima, Applied Maximum and Minimum Problems, Newton's Method.	15
II	INTEGRATION AND ITS APPLICATIONS: Integration: An Overview of the Area Problem, Indefinite Integral, Definition of Area as a Limit; Sigma Notation, Definite Integral, Evaluating Definite Integrals by Substitution, Numerical Integration: Simpson's Rule. Applications of Integration: Area between two curves, Length of a plane curve. Mathematical Modeling with Differential Equations: Modeling with	15

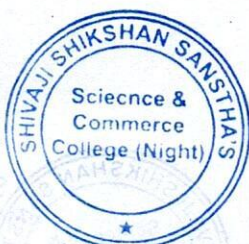


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7.	Subqueries • With IN clause • With EXISTS clause
8.	Converting ER Model to Relational Model and apply Normalization on database. (Represent entities and relationships in Tabular form, Represent attributes as columns, identifying keys and normalization up to 3 rd Normal Form).
9.	Views • Creating Views (with and without check option) • Dropping views • Selecting from a view
10.	DCL statements • Granting and revoking permissions • Saving (Commit) and Undoing (rollback)
11.	Creating Indexes on data tables.


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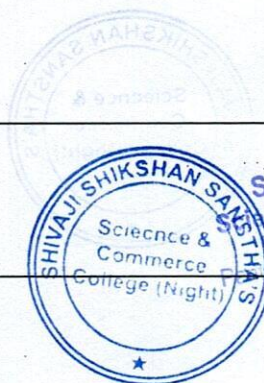
Textbooks:

1. "Fundamentals of Database System", ElmasriRamez, NavatheShamkant, Pearson Education, Seventh edition, 2017
2. "Database Management Systems", Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, 2014
3. "Murach's MySQL", Joel Murach, 3rd Edition, 3rd Edition, 2019

Additional References:

1. "Database System Concepts", Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw Hill, 2017
2. "MySQL: The Complete Reference", Vikram Vaswani, McGraw Hill, 2017
3. "Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease", Ashwin Pajankar, BPB Publications, 2020

Course Code	Course Title	Credits	Lectures /Week
USCSP204	Database Systems – Practical	1	3
1.	Conceptual Designing using ER Diagrams (Identifying entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.)		
2.	Perform the following: • Viewing all databases • Creating a Database • Viewing all Tables in a Database • Creating Tables (With and Without Constraints) • Inserting/Updating/Deleting Records in a Table		
3.	Perform the following: • Altering a Table • Dropping/Truncating/Renaming Tables • Backing up / Restoring a Database		
4.	Perform the following: • Simple Queries • Simple Queries with Aggregate functions		
5.	Queries involving • Date Functions • String Functions • Math Functions		
6.	Join Queries • Inner Join • Outer Join		



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	ER to Table- Entity to Table, Relationship to tables with and without key constraints. DDL Statements - Creating Databases, Using Databases, datatypes, Creating Tables (with integrity constraints – primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables DML Statements – Viewing the structure of a table insert, update, delete, Select all columns, specific columns, unique records, conditional select, in clause, between clause, limit, aggregate functions (count, min, max, avg, sum), group by clause, having clause	
II	Relational data model– Domains, attributes, Tuples and Relations, Relational Model Notation, Characteristics of Relations, Relational Constraints - primary key, referential integrity, unique constraint, Null constraint, Check constraint Relational Algebra operations (selection, projection, set operations union, intersection, difference, cross product, Joins –conditional, equi join and natural joins, division) Functions – String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt, round, truncate) Date Functions (adddate, datediff, day, month, year, hour, min, sec, now, reverse) Joining Tables – inner join, outer join (left outer, right outer, full outer) Subqueries – subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries	15
III	Schema refinement and Normal forms: Functional dependencies, first, second, third, and BCNF normal forms based on primary keys, lossless join decomposition. Database Protection: Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control, Backing Up and Restoring databases Views (creating, altering dropping, renaming and manipulating views) DCL Statements (creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges), Transaction control commands – Commit, Rollback Index Structures of Files: Introduction, Primary index, Clustering Index, Multilevel indexes	15

Course Code	Course Title	Credits	Lectures /Week
USCS204	Database Systems	2	3

About the Course:

The course introduces the core principles and techniques required in the design and implementation of database systems. It includes ER Model, Normalization, Relational Model, and Relational Algebra. It also provides students with theoretical knowledge and practical skills of creating and manipulating data with an interactive query language (MySQL). It also provide student knowledge and importance of data protection.

Course Objectives:

- To make students aware fundamentals of database system.
- To give idea how ERD components helpful in database design and implementation.
- To experience the students working with database using MySQL.
- To familiarize the student with normalization, database protection and different DCL Statements.
- To make students aware about importance of protecting data from unauthorized users.
- To make students aware of granting and revoking rights of data manipulation.

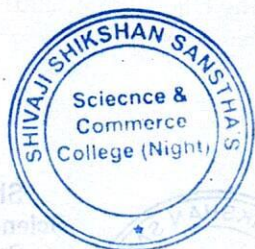
Learning Outcomes:

After successful completion of this course, students would be able to

- To appreciate the importance of database design.
- Analyze database requirements and determine the entities involved in the system and their relationship to one another.
- Write simple queries to MySQL related to String, Maths and Date Functions.
- Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands.
- Understand the normalization and its role in the database design process.
- Handle data permissions.
- Create indexes and understands the role of Indexes in optimization search.

Unit	Topics	No of Lectures
I	Introduction to DBMS – Database, DBMS – Definition, Overview of DBMS, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture Data models - Client/Server Architecture, Object Based Logical Model, Record Based Logical Model (relational, hierarchical, network) Entity Relationship Model - Entities, attributes, entity sets, relations, relationship sets, Additional constraints (key constraints, participation constraints, weak entities, aggregation / generalization, Conceptual Design using ER (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER)	15

Course Code	Course Title	Credits	Lectures /Week
USCSP203	Introduction to OOPs using C++ – Practical	1	3
1	Program to demonstrate use of data members & member functions.		
2	Programs based on branching and looping statements using classes.		
3	Program to demonstrate one and two dimensional arrays using classes		
4	Program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.		
5	Programs to demonstrate various types of constructors and destructors.		
6	Programs to demonstrate use of public, protected & private scope specifiers.		
7	Programs to demonstrate single and multilevel inheritance		
8	Programs to demonstrate multiple inheritance and hierarchical inheritance		
9	Programs to demonstrate inheritance and derived class constructors		
10	Programs to demonstrate friend function, inline function, this pointer		
11	Programs to demonstrate function overloading and overriding.		
12	Programs to demonstrate use of pointers		
13	Programs to demonstrate text and binary file handling		




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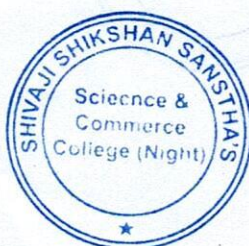
	constructor, copy constructor, private constructor, destructors. Working with objects: Accessor - mutator methods, static data and static function, access specifiers, array of objects. Polymorphism - Binding-static binding & overloading, constructor overloading function overloading, operator overloading, overloading unary and binary operators. Modelling Relationships in Class Diagrams: Association, Aggregation-Composition and examples covering these principles	
III	Inheritance: Defining base class and its derived class, access specifiers, types of inheritance-single, multiple, hierarchical, multilevel, hybrid inheritance, friend function and friend class, constructors in derived classes. Modelling Relationships: Generalization-Specialization and examples covering these principles Run time Polymorphism - Dynamic Binding, Function overriding, virtual function, pure virtual function, virtual base class, abstract class. Pointers: Introduction to pointers, * and & operators, assigning addresses to pointer variables, accessing values using pointers, pointers to objects & this pointer, pointers to derived classes File Handling: File Stream classes, opening and closing file-file opening modes, text file handling, binary file handling. Applying OOP to solve real life applications: To cover case studies like library management, order management etc. to design classes covering all relationships	15

Textbooks:

1. Object Oriented Programming with C++, Balagurusamy E., 8th Edition, McGraw Hill Education India.
2. UML & C++: A Practical Guide to Object Oriented Development, Lee/Tepfenhart, Pearson Education, 2nd Edition 2015

Additional References:

1. Mastering C++ by Venugopal, Publisher: McGraw-Hill Education, 2017
2. Let Us C++ by Kanetkar Yashwant, Publisher: BPB Publications, 2020
3. Object Oriented Analysis and Design by Timothy Budd TMH, 2001



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