

RESOLUTIONS BROUGHT FORWARD BY THE BOARDS OF STUDIES

FROM THE BOARD OF STUDIES IN TAMIL

Dr. K. Muthuvel, Chairman, Board of Studies in Tamil shall move and Dr. K. Muthan shall second the following resolutions passed in the meeting of the Board of Studies in Tamil held on 13/04/2017.

1. Resolved to introduce the existing syllabus for Part-I Tamil syllabi of B.Sc. courses to B.Sc. (Statistics) and B.Sc. (Micro Biology) and B.Sc., (Biotechnology) Courses in the self financing stream as Part-I Tamil from the academic year 2017-18 onwards.
2. Resolved to introduce the existing syllabi of B. Com NME paper to B.Com (Banking & Insurance) from the academic year 2017-18 onwards.
3. Resolved to introduce a modified question paper pattern for Basic Tamil – II for the UG students who joined 2014-15 as under:

External Exam: 75

Components: Written – 40 marks; Oral – 35 marks

FROM THE BOARD OF STUDIES IN SANSKRIT

Mr. S. Murali, shall move and Dr. K. Muthuvel shall second the following resolutions passed in the meeting of the Board of Studies in Sanskrit held on 13/04/2017.

4. Resolved to implement the existing syllabi and question paper patterns for I, II, III and IV semesters for the Part I Sanskrit for the B.Sc., Statistics, B.Sc., Microbiology and B.Sc., (Biotechnology) Courses in the self financing stream for the students joining from the academic year 2017-18.

(*The Second semester papers include a Unit on “Tamil Semozhi Varalaru” as directed by the Govt. of Tamil Nadu)

FROM THE BOARD OF STUDIES IN ENGLISH

Dr. R. Subramony, Chairman, Board of Studies in English shall move and Dr. Sheela.P. Karthick shall second the following resolutions passed in the meeting of the Board of Studies in English held on 13/04/2017.

5. Resolved to implement the existing syllabus of Part-II English papers in the B.Sc. courses to B.Sc (Statistics), B.Sc (Microbiology) and B.Sc., (Biotechnology) Courses in the self financing stream from the academic year 2017-2018.
6. Resolved to implement the existing syllabus of Part-II English papers in the B.Com., to B.Com. (Banking and Insurance) in the Self-financing stream from the academic year 2017-2018.

FROM THE BOARD OF STUDIES IN COMMERCE

Dr. A. Mayilmurugan, Chairman, Board of Studies in Commerce shall move and Dr. S. Selvakumar shall second the following resolutions passed in the meeting of the Board of Studies in Commerce held on 13/04/2017.

7. Resolved to approve the Course Structure for B.Com (Banking and Insurance) in the self financing stream under CBCS pattern for 3 years
8. Resolved to approve syllabus for B.Com (Banking and Insurance) under CBCS pattern for the first and second semesters and the list of papers to be introduced in the third, fourth, fifth and sixth semesters for the students who are joining from the academic year 2017-18.
9. To approve Internship Training for B.Com (Banking & Insurance) during the course of their studies for providing 'hands on training' in the field of Banking and Insurance
10. Resolved to approve the Industrial and field Visit/Tour for B.Com., M.Com., and M.Phil Students during the course of their studies for acquiring practical knowledge of the curriculum.

FROM THE BOARD OF STUDIES IN STATISTICS

Dr. C. Thangapandi, Chairman, Board of Studies in Statistics, shall move and Dr. R. Pandiselvi shall second the following resolutions passed in the Board of Studies meeting in Statistics held on 13.04.2017.

11. Resolved to introduce the new Syllabi and question paper pattern for B.Sc., Statistics for the Students who are joining the course from the academic year 2017-2018 onwards under Self finance stream.

FROM THE BOARD OF STUDIES IN CHEMISTRY

Dr.A.Xavier, Chairman, Board of studies in Chemistry shall move and Dr.P.S.Harikrishnan shall second the following resolution passed in the meeting of the Board of Studies in Chemistry held on 13/04/2017.

12. Resolved to introduce the existing ancillary Chemistry syllabus of B.Sc., Zoology to the B.Sc. Microbiology course for the students who are joining the course from the academic year 2017-18 onwards.

FROM THE BOARD OF STUDIES IN ZOOLOGY

Dr. S. Dinakaran, Chairman, Board of studies in Zoology shall move and R. Punitha second the following resolution passed in the meeting of the board of studies in Zoology held on 13-04-2017.

13. Resolved to introduce the existing ancillary Zoology syllabus of B.Sc., Botany to B.Sc., Microbiology for the students who are joining the course from the academic year 2017-18 onwards.
14. Resolved to introduce the existing ancillary Zoology syllabus of B.Sc., Chemistry to B.Sc., Biotechnology for the students who are joining the course from the academic year 2017-18 onwards.

FROM THE BOARD OF STUDIES IN MICROBIOLOGY

Dr. N. Paneerselvam, Chairman, Board of studies in Microbiology shall move and Dr. S. Karuppusamy shall second the following resolutions passed in the meeting of the board of studies in Microbiology held on 13-04-2017.

15. Resolved to introduce the syllabi and question paper pattern for B.Sc Microbiology students who are joining the course from the academic year 2017-2018 onwards.
16. Resolved to introduce the revised syllabi and question paper pattern for M.Sc Microbiology students who are joining the course from the academic year 2017-18.
17. Resolved to introduce Microbiology subject as one of the ancillary and the papers were identified to B.Sc Biotechnology students who are joining the course from the academic year 2017-18.

FROM THE BOARD OF STUDIES IN BIO-TECHNOLOGY

Dr. L. D. Devasree, Chairman, Board of studies in Biotechnology shall move and Dr. S. Dinakaran shall second the following resolutions passed in the meeting of the Board of studies in Biotechnology held on 13-04-2017.

18. Resolved to revise the syllabi for B.Sc., Biotechnology course for the students

who are joining from the academic year 2017-18.

19. Resolved to introduce ancillary Zoology and Microbiology papers for B.Sc., Biotechnology course from the academic year 2017-18.

PRIVATE RESOLUTION

Mr. S. Chellapandian shall move and Dr. M. Sugumaran shall second the following resolution.

20. Resolved to introduce the revised syllabus for the paper titled “Value Education” for the students of all UG courses who join the Academic Year 2017-18 onwards.

Department of Commerce

**B.Com (Banking and Insurance) Course Structure with effect from the Academic Year 2017-18
Semester - I**

Category	Course Code	Paper	Hrs	Credit
Part I	17U1ILA1	Business Communication	4	3
Part II	17U1IEN1	English -I	6	3
Part III				
Core 1	17U1IMC1	Financial Accounting -I	6	4
Core 2	17U1IMC2	Indian Financial System	6	4
Allied 1	17U1IAC1	Business Mathematics	4	4
Part IV				
Skill Based Elective 1	17U1ISM1	Accounting Software	2	2
Skill Based Elective	17U1IES	Environmental Studies	2	2

Semester – II

Category	Course Code	Paper	Hrs	Credit
Part I	17U2ILA2	Technology for Business Application	4	3
Part II	17U2IEN2	English –II	6	3
Part III				
Core 3	17U2IMC3	Financial Accounting-II	6	4
Core 4	17U2IMC4	Business Statistics	6	4
Core 5	17U2IMC5	Principles of Insurance	4	4
Part IV				
Skill Based Elective 2	17U2ISM2	Digital Banking Operations	2	2
Skill Based Elective	17U2IVE	Value Education	2	2

Semester – III

Category	Course Code	Paper	Hrs	Credit
Part III				
Core -6	17U3IMC6	Practical Banking	4	4
Core-7	17U3IMC7	Cost Accounting	6	4
Core-8	17U3IMC8	Partnership Accounting	6	4
Allied-2	17U3IAC2	Company Law & Practices	5	4
Allied-3	17U3IAC3	Managerial Economics	5	4
Part IV				
Skill Based Elective 3	17U3ISM3	International Trade & Banking	2	2
Non Major Elective	17U3INM1	Tamil- I	2	2

Semester - IV

Category	Course Code	Paper	Hrs	Credit
Part III				
Core -9	17U4IMC9	Marketing of Banking & Insurance	4	4
Core-10	17U4IMC10	Practice of Life Insurance	5	4
Core-11	17U4IMC11	Special Accounts	6	4
Allied-4	17U4IAC4	Banking Legislation -I	5	4
Allied-5	17U4IAC5	Regulation of Insurance Business	6	4
Part IV				
Skill Based Elective 4	17U4ISM4	Project Financing	2	2
Non Major Elective	17U4INM2	Tamil- II	2	2

Semester – V

Category	Course Code	Paper	Hrs	Credit
Part III				
Core -12	17U5IMC12	Operations Research	5	5
Core-13	17U5IMC13	Management Accounting	6	5
Core Elective-1	17U5IME1	Income Tax-I	6	4
Core Elective-2	17U5IME2	Accounting for Banking & Insurance	6	4
Core Elective-3	17U5IME3	Banking Legislation -II	5	4
Part IV				
Skill Based Elective 5	17U5ISM5	Stock Market Operations	2	2

Semester – VI

Category	Course Code	Paper	Hrs	Credit
Part III				
Core -14	17U6IMC14	Corporate Accounting	6	5
Core-15	17U6IMC15	Auditing of Banking & Insurance	6	5
Core Elective-4	17U6IME4	Income Tax – II	6	4
Core Elective-5	17U6IME5	Indirect Tax	5	4
Core Elective-6	17U6IME6	Practice of General Insurance	5	4
Part IV				
Skill Based Elective 6	17U6ISM6	Bank Management	2	2

Part V: NSS/NCC/AEEP/PHY. Extension Activities Credit: 1

Total Credits = 22+22+24+24+24+24+1 =141

U- Under graduate, K- Commerce, LA- Language, EN- English, MC- Major Core, AC- Allied Core, SM-Skill Based Elective Major, ES- Environmental Studies,

VE- Value Education, NM- Non Major Elective, ME- Major Elective

Course Code	Course Title	C	H	I	E	T
17U1ILA1	Business Communication	3	60	25	75	100

Unit I Introduction to Communication

12 Hrs

Meaning - Definition - Characteristics – Process - Essentials of Effective Communication - Forms of Communication - Verbal and Non-Verbal - Types - Formal and Informal - Media of Communication - Written – Oral - Visual - Audio Visual - Computer based Communication - Barriers and remedies.

Unit II Written Communication

12 Hrs

Meaning - Business Letters - Essentials of a good Business Letter - Layout - Trade Letters – Enquiries & Offers – Quotations – Orders - Circular Letters - Sales Letters - E-mail Etiquettes.

Unit III Oral Communication

12 Hrs

Oral and other forms of Communication – Speeches - Group Communication - Presentations - Listening – Dialogue skills.

Unit IV Drafting of a resume

12 Hrs

Application for a situation – Structure - Preparation of Curriculum vitae – Drafting an application for different positions.

Unit V Report Writing

12 Hrs

Meaning - Types of Business Reports - Structure of a Report - Stock exchange reports and Sales reports.

Text Book:

1. Urmila Rai & S.M Rai, *“Business Communication”*, Second Edition, 2015, Himalaya Publishing House, Mumbai.

Reference Book(s):

1. Rajendra Pal & J.S. Korlahalli, *“Essentials of Business Communication”*, Thirteenth Edition, 2013, Sultan Chand & Sons, New Delhi.
2. M.S. Ramesh, C.C. Pattanshetti *“Business Communication”*, Twenty Eight Edition, 2015, R. Chand & Co, New Delhi.
3. R.S.N. Pillai & Bagavathi, *“Modern Commercial Correspondence”*, 2007, S.Chand & Company Ltd, New Delhi.
4. Herta A Murphy, Herbert W Hildebrandt & Jane P. Thomas, Seventh Edition, 2010, *“Effective Business Communication”*, MCGraw Hill Education Private Limited, New Delhi.
5. Sanjay Kumar & Pushp Lata, 2012, *“Communication Skills”*, Oxford University Press.

Course Code	Course Title	C	H	I	E	T
17U1IMC1	Financial Accounting – I	4	90	25	75	100

Unit I Introduction to Financial Accounting **18 Hrs**

Definition – Accounting Principles, Concepts and Conventions – Rules – Accounting Equation – Double Entry System - Advantages of Double entry system - Basic knowledge of Accounting Standards and Ind AS.

Unit II Subsidiary Books **18 Hrs**

Bank Reconciliation Statement – Trial Balance – Rectification of errors – Suspense Account – Effect of errors on profit.

Unit III Final Accounts **18 Hrs**

Preparation of Manufacturing, Trading and Profit and Loss Account and Balance Sheet – Adjustment Entries – Closing entries.

Unit IV Depreciation **18 Hrs**

Meaning – Causes – Fixed installment method, Written down value method, Change in the providing depreciation with Prospective and Retrospective Effect, Annuity method, Sinking fund method, Insurance policy method – Application of depreciation as per Companies Act (useful life method) and Income-Tax Act.

Unit V Accounting for Insurance Claims and Average Due Date **18 Hrs**

Accounting for Insurance claims- Loss of Stock – Loss of Profit (Simple Problems Only). Average Due Date and Account Current.

The Questions should be asked in the ratio of 80% Problems and 20 % for theory

Text Book:

1. S.P. Jain & K.L Narang, “*Advanced Accountancy*” Vol-I, Nineteenth Edition, 2015, Kalyani Publishers, Mumbai.

Reference Book(s):

1. R.L. Gupta & M. Radhaswamy, “*Advanced Accountancy*” Vol-I, 2015, Sultan Chand & Sons, New Delhi.
2. M.A. Arulanandam & K.S. Raman, “*Advanced Accountancy*” Vol-I, Sixth Edition, 2015, Himalaya Publishing House, Mumbai.
3. S. N. Maheshwari & Suneel K Maheshwari, “*Financial Accounting*”, Fifth Edition, 2012, Vikas Publishing House.
4. R.S.N. Pillai, Bagavathi & S. Uma, “*Fundamentals of Advanced Accountancy*”, Third Edition, 2015, S. Chand, New Delhi.
5. SP. Iyengar, “*Advanced Accountancy*” Vol-I, Fourth Edition, 2004.Sultan Chand & Sons, New Delhi.

Course Code	Course Title	C	H	I	E	T
17U1IMC2	Indian Financial System	4	90	25	75	100

Unit I The Financial System in India

18 Hrs

The financial system in India – Overview – Functions of the financial system – Financial concept – Financial Instruments – Financial markets – Importance of Capital market – Money Market – Role and functions in Central Banking Authority – Market structure – Regulatory provisions / Enactment governing banks.

Unit II Banking Regulation

18 Hrs

Introduction – Reserve Bank of India (RBI) – Constitution and Objectives – Functions of RBI – Notes Issuances, Government’s Banker, Banker’s Bank, Bank Supervision – Development of Financial System – Exchange Control – Monetary Control – Tools of Monetary Control – Cash Reserve Ratio (CRR), Statutory Liquidity Ratio (SLR), Bank rate, Open market operations, Selective credit control. Retail Banking- Wholesale Banking and International Banking - Role of Banks in Demonetization- Basel Norms I, II & III.

Unit III Money Market and Capital Market

18 Hrs

Definition- Money Market vs. capital market – Features of money market – Composition of Money market – Commercial Papers- Certificate of Deposits - New Issue Market - Meaning – Stock Exchange – Distinction between New Issue and Secondary market. Listing procedures – Online Trading – Security Exchange Board of India (SEBI) guidelines – Over the Counter Exchange of India (OTCEI) – National Stock Exchange (NSE) – Bombay Stock Exchange (BSE) -

Unit IV Credit Information Bureau (CIBIL)

18 Hrs

Introduction – Ownership structure – Functions of CIBIL – Fair practices code for Debt collection – Indian Bank’s Association (IBA) Initiative – Banking Ombudsman Scheme – Banking codes and Standards Board of India (BCSBI) – Code of Bank’s Commitment to customers – Function of BCSBI – Grievance Redressal

Unit V Financial Services

18 Hrs

Mutual Funds – Types – Features. Factoring –Modus Operandi - Functions – Types of Factoring-Forfaiting – Salient Features – Merits & Demerits. Securitisation of Debt – Features. Venture Capital- Features and Scope - Merits & Demerits. Depository system – Objectives– National Services Depository Limited (NSDL) – Central Depository Service (India) Ltd (CDSL) - Depositories process in India. American Depository Receipt (ADR) / Global Depository Receipt (GDR) – Participatory Notes

Text Book(s):

1. Principles and Practices of Banking- Indian Institute of Banking and Finance- Macmillan Publication
2. Gordon E & Natarajan K, Financial Markets and Services – Himalaya Publications, 2015

Reference Book(s):

1. Bholey, Financial Markets and Institutions, Vara Publications
2. Ravi M. Kishore, Financial Management, Taxmann Publications

Course Code	Course Title	C	H	I	E	T
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17U1IAC1	Business Mathematics	4	60	25	75	100
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Unit I Ratios and Proportions **12 Hrs**

Theory of Indices and Surds - Logarithms.

Unit II Matrices and Determinants **12 Hrs**

Solving Equations using Cramm's Rule and Matrix Inversion only - Permutations and Combinations - Progressions - Arithmetic and Geometric.

Unit III Set Theory **12 Hrs**

Theory of Equations - Linear and Simultaneous Equations – Quadratic Equations. Introduction to Boolean Algebra (Properties only).

Unit IV Calculus **12 Hrs**

Basic concepts of Differential and Integral Calculus - Applications of Standard Results - Simple application of Differentiation and Integration of Commerce and Economics.

Unit V Commercial Arithmetic **12 Hrs**

Interest and Annuities - Simple and Compound Interest - Rule 72 – EMI – Annuity - Future value - Present value - Sinking fund.

Text Book:

1. C.K. Ranganath, C.S. Sampagiram and Y. Rajaram, "**Business Mathematics**", Third Edition, 2014, Himalaya Publishing House, Mumbai.

Reference Book(s):

1. Qazi Zameeruddin, Vijay K Khanna & S.K. Bhambri, "**Business Mathematics**", Second Edition, 2015, Vikas Publishing House Pvt Ltd.
2. V. Sundaresan and S.D.Jeyaseelan, "**An Introduction to Business Mathematics**", 2010, S.Chand (G/L) & Company Ltd.
3. D.C. Sanchetti & V.K. Kapoor, "**Business Mathematics**", Eleventh Edition, 2014, Sulthan Chand & Sons.
4. P.R. Vittal, "**Business Mathematics & Statistics**", Margham Publications, Chennai, 2012.

Course Code	Course Title	C	H	I	E	T
17U1ISM1	Accounting Software	2	30	25	75	100

Unit I Introduction to Accounting through Computers

5Hrs

Tally- Features of Tally – Tally and Accounting – Tally and Financial Management – Tally and Inventory/stock Management – Security Features of Tally – VAT and Tally – Service Tax and Tally – TDS and Tally – Benefits of Tally (Controlling Costs) – Benefits of Tally (Enhancement of Productivity) - Features & Configuration: General features - Accounting Features – Inventory Features.

Unit II Creation of Company

6Hrs

Directory/Name/Mailing Name/Address/State/Pin code/E-mail Address - Using security control - Groups – Sub-group – Reserved Account groups - Display of groups – Primary groups - Capital & revenue nature - Alteration of Groups - Deletion of Groups - Creation of ledgers - Process of creation of ledger.

Unit III Display of Predefined Vouchers

6Hrs

Creation and alteration of vouchers - Types of voucher - Voucher Numbers - Day – Date - Alteration of voucher - Cancellation of voucher - Deletion of voucher - Creation and alteration of New voucher types - Examples for recording transactions. Final accounts and Tally – Trial balance - Profit and loss account - Balance sheet at the gateway of Tally - Method of showing Balance sheet - Import and Export of data through Excel.

Unit IV Bank Reconciliation Statement

8Hrs

Meaning – Drawbacks - Voucher-wise reconciliation – Process of Bank reconciliation. Inventory – Introduction – Buying and Selling Activity of a Trader – Stock Journal – Non-Inventory Vouchers – Inventory Masters – Stock Groups and Stock Items Creation, Alteration and Deletion of category and Items.

Unit V Interest Calculations

5Hrs

Interest Calculations - Simple Interest – Compound interest. Backup and Restore.

Text Book:

1. S.Palanivel, “*Tally- Accounting Software*”, Margham Publications, Chennai

Reference Book(s):

1. Nellai Kannan C, “*Tally*”, 2004, Nels Publications.
2. Shraddha Singh & Navneet Mehra, “*Tally.ERP 9- Power of Simplicity*”, 2014,
3. ITC Publication.
4. Asok K Nadhani, “*Mastering Tally.ERP 9*”, 2012, BPB Publications.
5. “*Accounting Package*”, ICAI New Delhi Publications.
6. “*Tally9*”, Tally Solutions Ltd. Bangalore.

Course Code	Course Title	C	H	I	E	T
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17U2ILA2	Technology for Business Applications	3	60	25	75	100
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Unit I Introduction to Computer

12Hrs

Introduction - Types of Computers - Characteristics of Computers – Classification of Digital Computers Systems – Micro Computers, Mini Computers, Main Frame Computers, Super Computers, Net work Computers – Uses of Computers.

Unit II Anatomy of a Digital Computer

12Hrs

Digital Computers - Functions and Components of a Computer – CPU – ALU – Memory – Registers – Address – Computer Architecture – Memory Units – RAM, ROM, FROM, EPROM, EEPROM, FLASH MEMORY – Auxiliary Storage Devices. Machine Language – Assemble language – High level language – Compilers and Interpreters.

Unit III Data Base Management Systems

12Hrs

Introduction – Meaning - History of Information - Quality of Information - Information Processing - Characteristics of Data in Data Base - Types of Data Base Management Systems.

Unit IV MS Word

12Hrs

Introduction – Creating word document - Editing text - Creating a Resume Wizard – Adding and Formatting Numbers and Symbols - Print. MS Excel - Creating Tables, Graphs and Charts – Finance, Mathematical and Statistical Functions. Power Point - Presentation through Templates.

Unit V MS Access

12Hrs

Introduction – Creation of Table – Preparation of Pay Roll - Report for Product Data Base - Big Data - Data Mining - Data Warehousing – Cloud Computing - Knowledge Management System - An overview of Statistical Package for Social Science (SPSS).

Text Book:

1. Alexis Leon & Mathews Leon, *“Fundamentals of Information Technology”*, 2013, Vijay Nicole Imprints Pvt., Ltd., Chennai.

Reference Book(s):

1. Manas Parhi & Jagjit Singh, *“Information Technology for Business”*, 2003, Unistar Books Pvt., Ltd.
2. Dennis P. Curtin, Kim Foley, Kunal Sen, & Cathleen Morin, *“Information Technology”*, 2013, McGraw Hill Education (India)Pvt., Ltd.
3. Chetan Srivastava, *“Principles of Information Technology”*, 2004, Kalyani Publishers, New Delhi.
4. Brain K. Williams & Stacey. C. Sawyer, *“Using Information Technology”*, Third Edition, 2003, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

Course Code	Course Title	C	H	I	E	T
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17U2IMC3	Financial Accounting - II	4	90	25	75	100
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Unit I Consignment

18Hrs

Meaning - Distinction between sale and consignment – Account sale – Journal entries and Ledger Accounts in the books of consignor and consignee – Valuation of unsold stock on Consignment – Normal loss and Abnormal loss – Invoicing goods higher than cost.

Unit II Joint Venture

18Hrs

Meaning - Journal & Ledger Accounts in the books of Venturers - Existing books - Separate Set of Books - Memorandum Joint Venture method.

Unit III Self- Balancing Ledgers

18Hrs

Meaning - Sectional Balancing (Excluding Errors affecting Self Balancing Ledgers) Royalty Account: Meaning - Minimum Rent- Short working - Recouping short workings- Restricted and unrestricted – Entries and Ledger Accounts in the Books of Lessor and Lessee – Sub-Lease.

Unit IV Accounting for Incomplete Records

18Hrs

Introduction - Ascertainment of Profit – Net worth Method - Conversion Method.

Unit V Financial Statements for Not-for-Profit Organisation

18Hrs

Meaning- Distinction between profitable and Not for Profitable Organisation – Books to be maintained - Distinction between Capital and Revenue – Basic Records – Preparation of Income and Expenditure Account and Balance sheet from Receipts and Payments and vice versa.

Text Book:

1. S.P. Jain & K.L Narang, “*Advanced Accountancy*” Vol- I, Nineteenth Edition, 2015, Kalyani Publishers, Mumbai.

Reference Book(s):

1. R.L. Gupta & M. Radhaswamy, “*Advanced Accountancy*” Vol- I, 2015, Sultan Chand & Sons, New Delhi.
2. M.A. Arulanandam & K.S. Raman, “*Advanced Accountancy*” Vol- I, Sixth Edition, 2015, Himalaya Publishing House, Mumbai.
3. S. N. Maheshwari & Suneel K Maheshwari, “*Financial Accounting*”, Fifth Edition, 2012, Vikas Publishing House.
4. R.S.N. Pillai, Bagavathi & S. Uma, “*Fundamentals of Advanced Accountancy*”, Third Edition, 2015, S. Chand, New Delhi.
5. SP. Iyengar, “*Advanced Accountancy*” Vol-I, Fourth Edition, 2004, Sultan Chand & Sons, New Delhi.

Course Code	Course Title	C	H	I	E	T
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17U2IMC4	Business Statistics	4	90	25	75	100
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Unit I Introduction to Statistics

18Hrs

Definition – Functions - Collection, Classification, Tabulation and Presentation of Data - Frequency Distribution - Graphical and Diagrammatic Presentation – Histogram - Frequency Polygon – Ogive - Bar and Pie Diagram.

Unit II Measures of Central Tendency

18Hrs

Mean – Meaning – Definition – Arithmetic Mean, Geometric Mean & Harmonic Mean – Combined Mean - Median, Quartiles, Deciles and Percentiles – Mode (Uni and Bi Model) - Measures of Dispersion – Range - Standard Deviation - Combined Standard Deviation - Coefficient of Variation.

Unit III Correlation and Regression Analysis

18Hrs

Correlation - Meaning – Definition - Types - Measures of Correlations - Karl Pearson’s Coefficient of Correlation – Rank Coefficient of Correlation – Concurrent Deviation.

Regression Analysis – Meaning - Definition - Regression Lines.

Unit IV Index Numbers and Analysis of Time series

18Hrs

Index Numbers – Meaning – Types – Definition - Methods - Tests of consistency of Index number (Time reversal & Factor reversal test) - Cost of Living Index – Chain Base – Fixed Base – Base shifting.

Analysis of Time Series – Meaning – Definition - Models - Method of Least Square and Moving Average.

Unit V Probability

18Hrs

Meaning - Addition - Multiplication – Conditional - Bayes’ Theorem - Mathematical Expectation.

The Questions should be asked in the ratio of 80% Problems and 20 % for theory

Text Book:

1. RSN. Pillai & Bagavathi, “*Business Statistics*”, Eight Edition, 2016, S.Chand & Co Pvt., Ltd., New Delh.

Reference Book(s):

1. S.P. Gupta, “*Statistical Methods*”, Forty Fourth Edition, 2014, Sultan Chand & Sons, New Delhi.
2. S.C. Gupta & V.K. Kapoor, “*Fundamentals of Mathematical Statistics*”, 2014, Sultan Chand & Sons, New Delhi.
3. J.K. Sharma, “*Fundamentals of Business Statistics*”, Second Edition, 2014, Vikas Publishing House Pvt., Ltd., Noida.
4. B.M. Aggarwal, “*Business Mathematics and Statistics Fundamentals*”, Twentieth Edition, 2008, Sultan Chand & Sons, New Delhi.
5. D. C. Sancheti & V.K. Kapoor, “*Statistics [Theory, Methods & Applications]*”, Seventh Edition, 2010. Sultan Chand & Sons, New Delhi.

Course Code	Course Title	C	H	I	E	T
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17U2IMC5	Principles of Insurance	4	60	25	75	100
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UNIT I Introduction to Insurance

12Hrs

Risk – Meaning - Types – Factors affecting the risk – Sources of Risk information - Hazards – Types - Risk Analysis Technique & Risk Management Techniques. Introduction to Insurance – Definition - Evolution of Insurance - Purpose & Need of Insurance - Insurance Terminologies – Insurer, Insured, Nomination, Assignment, Surrender, Deferment, Insurance claim, Mortality Table and Surrender value - Functions of Insurance - Business of Insurance -Insurance as a social security tool - Role of Insurance in the development of economy.

UNIT II Insurance Market

12Hrs

Introduction - Constituents of Insurance Market - Insurance companies – Life Insurance – Non-Life Insurance – Re-Insurance. Insurance Intermediaries – Banks, Marketing Firms, Web Aggregators and Brokers. Insurance Specialists – Third Party Administrators (TPA), Surveyors, Loss Assessors, Medical Examiners. Regulatory Bodies – Insurance Regulatory and Development Authority of India (IRDAI), Insurance Council, Ombudsman. Educational Institutions – Insurance Institute of India (III), National Institute Academy (NIA).

UNIT III Insurance Customers

12Hrs

Introduction – Insured - Insured Categories - Corporate Customers and Retail customers (SME & individual) – Different Types of Customers - Ethical behavior of customers.

UNIT IV Insurance Contract

12Hrs

Introduction – General Contract - Utmost Good faith - Insurable interest - Material facts - Indemnity - Proximate cause – Subrogation – Warranties - Contract of Insurance - Essential conditions for a contract - Contractual duties.

UNIT V Types of Insurance

12Hrs

Classification of Insurance - Life Insurance - Life Assurance Products - General Insurance - Fire, Marine, Motor, Fidelity insurance, Accident insurance, Health Insurance, Travel Insurance, Crop Insurance – Difference between Life and Fire Insurance - Difference between Fire and Marine Insurance. Annuities – Features of Annuities.

Text Book(s):

1. Principles of Insurance- Insurance Institute of India, Mumbai Publication 2016
2. M.N.Mishra & S.B.Mishra, "Insurance: Principles and Practice, S.Chand & Co., New Delhi,2009

Reference Book(s):

1. P.K.Gupta, "Fundamental of Life Insurance Theories and Applications", PHI Learning Private Limited, New Delhi, 2010.
2. Dr.P.Periasamy, "Principles Practice of Insurance", Himalaya Publishing House, Mumbai, 2007.
3. Kahinika Mishra, "Fundamentals of Life Insurance Theories and Applications", PHI Learning Private Ltd, New Delhi, 2010.
4. Jagannath Kulkarni, A.B. Dange and Ms. Nazareth, "IC – 01 Principles of Insurance", Insurance Institute of India, Mumbai, 2016.

Course Code	Course Title	C	H	I	E	T
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17U2ISM2	Digital Banking Operations	2	30	25	75	100
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Unit I Bank Computerization

6Hrs

Bank Computerization – need - stand alone system-multi user system- LAN and WAN. Digital Banking vs. Traditional banking – Models of E-Banking - Advantages and Constrains of E banking - Mobile Banking - Core Banking - components - benefits- essential requirements- Electronic Products- Security Measures.

Unit II E- Payment System and Electronic Banking

6Hrs

Electronic Payment System- Banking Technology – ATM - HWAK (The Intelligence Auto Teller and Netware Management System) –White Label- ATMs-National Payment Corporation of India- RuPay.

Unit III On Line Banking

6Hrs

Online banking – online enquiry - update facilities- Personal Identification Number (PIN) and their uses in conjunction with Magnetic Cards on both Credit and Debit Cards- Multiple PINs –Electronic Purse- Bank Card- Electronic Cheque- Electronic Cash- Electronic Token- Anytime banking- anywhere banking-home banking- internet banking –mobile banking-E Commerce- Cheque Truncation- Note and Coin Counting Machine.

Unit IV Data Communication Network and Funds Transfer

6Hrs

Modes of Transmission- Net Scenario in India- major networks-INET-NICNET-INDONET-RBI NET – RBI’s VSAT-Electronic Funds Transfer system- Plain Messages (Telex or Data Communication) Structural Messages (SWIFT) – Automated Clearing Systems- Clearing House - CHIPS-CHAPS-CHATS-Two level funds transfer system-fed wire-bank wire-POS- NEFT- RTGS- IMPS-Digital Signature

Unit V Technology Upgradation and Security Considerations

6Hrs

Trends in Technology Developments - Data Warehousing- Data Mining - Global Developments in Banking Technology - Security Considerations-Types of Threats - accidental damages- malicious damages - Control mechanism- Physical, Internal and Operational Control. – Computer Audit- scope – approaches- Information System Audit- objectives and benefits- Information System Security- need – objectives.

Text Book:

1. Principles and Practices of Banking- Indian Institute of Banking and Finance- Macmillan Publication.

Reference Book(s):

1. E. Gordon and K. Natarajan, “Banking Theory, Law and Practice”, Himalaya Publishing House, 2015.
2. Atul Kumar Srivastava, “Essentials of Bank Management – An Indian Perspective”, Kunal Books, New Delhi, 2013.
3. Dr. P. Rizwan Ahmed, “E-Business & E-Commerce”, Margam Publications, 2015.

Department of Statistics

**The Madura College (Autonomous), Madurai – 625 011
Department of Statistics**

B.Sc. Statistics Major – Course Structure

Semester	Sub. Code	Title of the Paper	Hrs	Credits	
I	17U1SMC1	Foundation of Statistics	4	4	
	17U1SMC2	Probability Theory	4	4	
	17U1SES1	Environmental Studies	2	2	
	17U1SSM1	Major Skill Based Elective – I(Theory of equations and Trigonometry)	2	2	
II	17U2SMC3	Descriptive Statistics	4	4	
	17U2SMC4	Distribution Theory	4	4	
	17U2SVE1	Value Education	2	2	
	17U2SSM2	Major Skill Based Elective– II(Matrices and Fourier Series)	2	2	
III	17U3SMC5	Sampling Techniques	6	6	
IV	17U4SMC6	Theory of Estimation	2	2	
	17U4SMC7	Elements of Stochastic Processes	2	2	
	17U4SSM3	Major Skill Based Elective – III (Mathematical Analysis)	2	2	
V	17U5SMC8	Statistical Forecasting	6	6	
	17U5SMC9	Actuarial Statistics -I	6	6	
	17U5SMC10	Operations Research	6	6	
	Elective – I Group A Papers(one to be chosen)				
	17U5SME1	Elements Econometrics	6	7	
	17U5SME2	Theory of Numbers			
	17U5SME3	Queuing theory			
VI	17U5SMC11	Design of Experiments	4	4	
	17U5SMC12	Decision Theory and its Applications	4	4	
	17U5SMC13	Actuarial Statistics -II	4	4	
	17U6SSM4	Major Skill Based Elective– IV (Quantitative Aptitude Mathematics)	2	2	
	Elective – I Group B Papers(one to be chosen)				
	17U6SME4	Application of Statistics in Economics	5	6	
	17U6SME5	Coding theory			
	17U6SME6	Non- Parametric Tests			
	Elective –I Group B Papers(one to be chosen)				
	17U6SME7	Graph Theory	5	6	
	17U6SME8	Fuzzy Mathematics			
17U6SME9	Automata Theory				

The Madura College (Autonomous), Madurai – 625011
Department of Statistics
B.Sc Statistics Allied Mathematics

Course Structure

Semester	Sub. Code	Title of the Paper	Hrs	Credits
I	17U1SAM1	Allied Mathematics – I: Calculus	6	4
II	17U2SAM2	Allied Mathematics – II: Numerical Methods	4	2
	17U2SAMP1	LAB: Practical in Numerical Methods	2	1
III	17U3SAM3	Allied Mathematics – III: Theory of sets and Groups	4	4
	17U3SAM4	Ancillary Skill based Elective - I: Switching Theory	2	2
IV	17U4SAM5	Allied Mathematics – IV: Differential Equation	4	4
	17U4SAMP2	LAB: Practical in Differential Equation	2	1

The Madura College (Autonomous), Madurai – 625011.
Department of Statistics
B.Sc Statistics Ancillary (Computer and Computational Methods)

Course Structure

Semester	Sub. Code	Title of the Paper	Hrs	Credits
III	17U3SAC1	Ancillary CCM-I: Office Automation	2	1
	17U3SACP1	LAB: Practical in Office Automation	2	1
IV	17U4SAC2	Ancillary CCM – II: Programming in C	4	2
	17U4SACP2	LAB: Practical in Programming in C	2	1
V	17U5SSA1	Skill Based Elective (CCM): Combinatorics	2	2
	17U5SAC3	Ancillary CCM - IV: Programming with C++	2	1
	17U5SACP3	LAB: Practical in C++	2	1
VI	17U6SAC4	Ancillary CCM - III: Fundamentals of JAVA Programming	4	2
	17U6SACP4	LAB: Practical in JAVA Programming	2	1

The Madura College (Autonomous), Madurai – 625011.
Department of Statistics
B.Sc Statistics Course Structure for Non-Major Elective

Semester	Sub. Code	Title of the Paper	Hrs	Credits
III	17U3SNM1	Quantitative Aptitude Mathematics	2	2
IV	17U4SNM2	Numerical Aptitude	2	2

Course Code	Course Title	C	H	I	E	T
17U1SMC1	Foundation of statistics	4	4	25	75	100

Unit I Origin of statistics and measures of central tendency

Origin –development –Definition – Important Scope of Statistics –frequency distribution – Graphic representation of frequency distribution – Measures of Central tendency – Arithmetic Mean – Properties, Merits and Demerits of Arithmetic Mean – Weighted Mean – Median – Merits and demerits of Median – Mode – Geometric Mean – Harmonic Mean – Merits and Demerits of Harmonic Mean.

Unit II Measures of dispersion

Dispersion – Measure of dispersion – Range – Quartile, Mean and Standard deviation's – Relation between Standard deviation and Root mean square deviation– Variance of the combined series – Coefficient of dispersion – Coefficient of Variation.

Unit III Moments, Skewness and Kurtosis

Moments – Relation between moment about mean in terms of moments about any point and vice versa – Effect of Change of Origin and Scale on moments – Pearson's β and γ Coefficients – Fractional moments and Absolute Moments – Skewness – kurtosis.

Unit IV Curve fitting

Curves fitting – Fitting of straight line – Fitting of second degree parabola – Change of origin – Conversion of data to linear form-Problems.

Unit V Correlation and regression

Bivariate Distribution, Correlation – Scatter Diagram – Karl Pearson Coefficient of Correlation – Limits for Correlation Coefficients – Rank Correlation – Tied Ranks – Repeated Ranks – Limits for Rank Correlation Coefficient – Regression – Lines of Regression – Regression Curves – Regression Coefficients – Properties of Regression Coefficients – Angle between two line of Regression

Text book:

S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 9th Revised Edition, Sultan Chand & Sons.

Chapters:

UNIT I: Chapter 1(1.1 to 1.3), **Chapter 2**(2.1 to 2.3, 2.5 to 2.9)

UNIT II:Chapter 3(3.1 to 3.8)

UNIT III:Chapter 3[3.9(3.9.1, 3.9.2), 3.10 to 3.14]

UNIT IV:Chapter [9.1(9.1.1, 9.1.2, 9.1.4), 9.3]

UNIT V:Chapter 10[10.1,10.2,10.3,10.3.1, 10.6, 10.7,10.7.1,10.7.3 to10.7.5]

Reference Book(s):

1. S.Arumugam and A.T.Issac, Statistics, 2009 edition, New Gamma Publishing House.

2. T. Veerarajan, Fundamentals of Mathematical Statistics, 2017 Edition, Yes Dee Publishing Pvt. Ltd.,

Course Code	Course Title	C	H	I	E	T
17U1SMC2	Probability theory	4	4	25	75	100

Unit I Theory of probability

Mathematical or classical probability – statistical or Empirical probability – Axiomatic approach to probability – Random Experiment (Sample space) – Event – Some Illustrations – Algebra of Events - Probability – Mathematical notation - Probability function – Law of Addition Probabilities – Extension of General Law of Addition of Probabilities – Multiplication Law of Probability and Conditional Probability – Extension of Multiplication Law of Probability – Probability of Occurrence of At least one of the n Independent events – Independent Events – Pairwise independent events – Conditions for Mutual Independence of n Events – Bayes Theorem.

Unit II Random variables and distribution functions

Random Variable – Distribution Function – Properties of Distribution Function – Discrete Random Variable – Probability Mass Function – Discrete Distribution Function – Continuous Random Variable – Probability Density Function – Various Measures of Central Tendency , Dispersion, Skewness and Kurtosis for Continuous Distribution – Continuous Distribution Function – Joint Probability Law – Joint Probability mass function – Joint Probability Distribution Function – Marginal Distribution function – Joint Density Function – The Conditional Distribution Function

Unit III Stochastic independence

Transformation of One – dimensional Random Variable – Transformation of two – dimensional Random Variable.

Unit IV Mathematical expectation and generating functions

Mathematical Expectation – Expectation of a Function of a Random Variable – Addition Theorem of Expectation – Multiplication Theorem of Expectation – Expectation of a Linear Combination of Random variables – Covariance – Variance of a Linear Combination of Random Variables – Moment of Bivariate Probability Distribution – Conditional Expectation and Conditional Variance – Moment Generating Function – Some Limitation Of Moment Generating Function – Theorems on Moment Generating Function – Uniqueness Theorem of Moment Generating Function.

Unit V Characteristic function and its properties

Characteristic Function – Properties of characteristic Function – Theorem of Characteristic Function – Necessary and Sufficient Condition for a Function $\varphi(t)$ to be a Characteristic Function – Multivariate Characteristic Function – Chebychev's Inequality – Convergence in Probability – Weak Law of Large Numbers – Bernoulli's Law of Large Numbers – Probability Generating Function – Convolution.

Text Book:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 9th Revised Edition, Sultan Chand & Sons.

Chapters:

Unit I: Chapter 4[4.3,4.5,4.6,4.7,4.8

Unit II:Chapter 5[5.1 to 5.5,5.5.1 to 5.5.5)]

Unit III:Chapter 5[5.5(5.5.6),5.6,5.7]

Unit IV:Chapter6[(6.1to6.10)

Unit V:Chapter6[6.12,6.13]

Reference Book(s):

1. S.Arumugam andA.T.Issac, Statistics, 2009 edition , New Gamma Publishing House.
2. T.Veerarajan, Fundamentals of Mathematical Statistics, 2017 Edition, Yes Dee Publishing Pvt. Ltd.,

Course Code	Course Title	C	H	I	E	T
17U1SSM1	Theory of equations and Trigonometry	2	2	25	75	100

Unit I Theory of Equations

Formation of equations-Relation between roots and Coefficients -Problems.

Unit II Theory of Equations(Continued)

Reciprocal equations-Solving Reciprocal equations(Type I toIV)- Transformation of equations.

Unit III Theory of Equations(Continued)

Nature and Position of roots - Descarte's Rule of Sign and Rolles Theorem- Horner's method.

Unit IV Trigonometry

Expressions of $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ -Expressions for $\sin^n \theta$ and $\cos^n \theta$ - Expansion of $\sin \theta$, $\cos \theta$ and $\tan \theta$ in powers of θ -Problems.

Unit V Trigonometry(Continued)

Hyperbolic functions- Inverse hyperbolic functions- Logarithm of complex numbers- Problems.

Text Book:

1. S.Arumugam and Issac, Theory of equations and Trigonometry, Edition(2006)New gamma publishing House.

Chapters: Part-C–Chapter 5(5.1-5.2, 5.4,5.5,5.7,5.10(Horner's Method only)).

Part-D– Chapter 6,7and 8.

Reference Book(s):

1. M. K. Venkatraman, Manorama Sridhar, Classical Algebra & Trigonometry, 1st Edition 2002, The National Publishing Company.
2. T. K. Manicavachagom Pillai, Trigonometry, 1997 Edition, S. Viswanathan (Printers & Publishers) Pvt.Ltd.

Course Code	Course Title	C	H	I	E	T
17U2SMC3	Descriptive Statistics	4	4	25	75	100

Unit I: Index Number

Definitions-Characteristics of index number-Types of index numbers-Problems in construction of index numbers- Methods of construction of index numbers- Price index number- Quality index number.

Unit II: Index Number(Continued)

Tests of adequacy of index numbers- Formulae(Time reversal tests, Factor reversal tests)-Chain of index numbers-Cost of living index number- Aggregate expenditure Method-Family budget Method.

Unit III: Time Series

Definition- Utility of time series analysis, Components of time series-Decomposition of time series models- Method of finding trend- Graphic Method-Statistical Method-Algebraic Method-Method of moving averages.

Unit IV: Time Series(Continued)

Measurements of seasonal variations-Method of simple averages-Ratio to trend method-Method of moving averages- Method of link relatives.

Unit V: Association of Attributes

Introduction-Classification of data-Relationship between classes of various order-Consistency of data,Meaning of Association-Types of Association- Methods of studying associations-Coefficient of colligation-Association of three attributes.

Text Book:

1. D. C. Sancheti, V.K.Kapoor, Statistics(Theory, Methods and Applications), Sultan Chand and sons, 7th thoroughly revised edition.

Chapters:

Unit-I:Chapters 10[10.2 to 10.9]

Unit-II: Chapters 10[10.10, 10.11 and 10.15]

Unit-III: Chapters 11[11.2 to 11.6]

Unit-IV: Chapters 11[11.7(11.7.1 to 11.7.4)]

Unit-V: 12.1 to 12.10

Reference Book(s):

1. S.Arumugam andA.T.Issac, Statistics, 2009 edition , New Gamma Publishing House.
2. S.P.Gupta, Statistical Methods 40th Revised Edition, 2011Sultan Chand and sons.

Course Code	Course Title	C	H	I	E	T
17U2SMC4	Distribution Theory	4	4	25	75	100

Unit I Theoretical discrete distribution

Introduction- Bernoulli Distribution- Moments of Bernoulli Distribution- Binomial Distribution- Moments- Recurrence Relation for the moments of Binomial Distribution- Factorial Moments of Binomial Distribution – Mean Deviation about Mean of Binomial Distribution- Mode of Binomial Distribution – Moment Generating Function of Binomial Distribution- Additive Property of Binomial Distribution- Characteristic Function of Binomial Distribution- Cumulants of Binomial Distribution – Recurrence Relation for Cumulants of Binomial Distribution – Probability Generating Function of Binomial Distribution – Fitting of Binomial Distribution – Poisson Process – Moments of Poisson Distribution – Mode of Poisson Distribution – Recurrence Relation for the Moments of Poisson Distribution- Moment Generating Function of Poisson Distribution – Characteristic Function of Poisson Distribution - Cumulants of Poisson Distribution – Additive or Reproduction Property of Independent Poisson Variates- Probability Generating Function of Poisson Distribution- Fitting of Poisson Distribution.

Unit II Theoretical discrete distribution (continued)

Negative Binomial Distribution- Moment Generating Function of Negative Binomial Distribution- Cumulants of Negative Binomial Distribution- Poisson Distribution as Limiting Case of Negative Binomial Distribution- Probability Generating Function of Negative Binomial Distribution- Deduction of Moments of Negative Binomial Distribution From Binomial Distribution- Geometric Distribution- Lack of memory – Moment Generating Function of Geometric Distribution- Hyper geometric Distribution- Mean and variance of Hyper geometric Distribution- Factorial Moments of Hyper geometric Distribution- Approximation to the Binomial Distribution- Recurrence Relation for Hyper geometric Distribution- Multinomial Distribution- Moments of Multinomial Distribution – Discrete Uniform Distribution- Power Series Distribution- Moment Generating Function of p.s.d- Recurrence Relation for Cumulants of p.s.d- Particular Cases of g.p.s.d.

Unit III Theoretical continuous distribution

Rectangular or Uniform Distribution- Moments of Rectangular Distribution- M.G.F. of Rectangular Distribution – Characteristic Function- Mean Deviation about Mean – Triangular Distribution- Normal Distribution - Normal Distribution as a Limiting form of Binomial Distribution- Chief Characteristics of the Normal Distribution and Normal Probability curve- Mode of Normal distribution – Median of Normal Distribution – M.G.F. of Normal Distribution- Cumulant Generating Function (c.g.f) of Normal Distribution- Moments of Normal Distribution –A Linear Combination of Independent Normal Variates is also a Normal Variate – Points of Inflexion of Normal Curve- Mean Deviation from the Mean for Normal Distribution- Area Property; Normal Probability Integral- Error function – Importance of Normal Distribution – Fitting of Normal Distribution – Log-Normal Distribution.

Unit IV Theoretical continuous distribution (continued)

Gamma Distribution- M.G.F. of Gamma Distribution – Cumulant Generating Function of Gamma Distribution – Additive property of Gamma Distribution – Beta Distribution of First Kind – Constants of Beta Distribution of First kind – Beta Distribution of Second kind – Constants of Beta Distribution of Second kind- The Exponential Distribution- M.G.F. of Exponential Distribution – Laplace Double Exponential Distribution-Weibul Distribution – Moments of Standard Weibul Distribution – Characterisation of Weibul Distribution- Logistic Distribution – Cauchy Distribution – Characteristic Function of Cauchy Distribution- Moments of Cauchy Distribution.

Unit V Order statistics

Order statistics - Cumulative Distribution Function of a Single Order statistics- Probability Density Function (p.d.f.) of a Single Order Statistic – Joint p.d.f. of two Order Statistics- Joint p.d.f. of k-Order Statistics – Joint p.d.f. of all n-Order Statistics.

Text Book:

1. D. C. Sancheti, V.K.Kapoor, Statistics(Theory, Methods and Applications), Sultan Chand and sons, 7th thoroughly revised edition.

Chapters

Unit-I– Chapter7 (7.0 -7.3.10)

Unit-II– Chapter 7(7.4-7.9.3)

Unit-III– Chapter 8(8.1-8.1.5, 8.2-8.2.15)

Unit-IV– Chapter 8(8.3-8.9.2)

Unit-V– Chapter8(8.14-8.14.5)

Reference Book(s):

1. S.Arumugam and A.T.Issac, Statistics, 2009 edition , New Gamma Publishing House.
2. S.P.Gupta, Statistical Methods 40th Revised Edition, 2011 Sultan Chand and sons.

Course Code	Course Title	C	H	I	E	T
17U2SSM2	Major Skill Based Elective– II (Matrices and Fourier Series)	2	2	25	75	100

Unit I Matrix Theory

Rank of a matrix- Simultaneous linear equations using the rank method-Characteristic equations - Cayley Hamilton theorem- Verification and application of Cayley Hamilton theorem.

Unit II Eigen Values and Eigen Vectors

Eigen values-Eigen vectors-Properties of Eigen values and Eigen vectors-Problems.

Unit III Fourier Series

Fourier Series-Euler's formula-Drichlet's conditions- Fourier expansion of $f(x)$ in $(0,2\pi)$ - Odd and Even functions-Fourier Series expansion for the function $f(x)$ in $(-\pi,\pi)$.

Unit IV Fourier Series(Continued)

Change of intervals in $(0,2l)$ -Half range Fourier Sine and Cosine series in $(0,\pi)$ and $(0,l)$ - Problems.

Unit V Harmonic Analysis

Harmonic Analysis- Introduction- 1st,2ndand 3rdHarmonics-Problems.

Text Book(s):

1. S. Arumugam and A.T. Isaac, Modern Algebra Reprint 2011, Scitech Publications (India) Pvt. Ltd.,
(For Unit I and II)Chapter: 7 (7.5-7.8).
2. T. K. ManicavachagomPillay and S. Narayanan, Calculus Vol. III 2002 Edition,
3. S. Viswanatham (Printers & Publishers) Pvt. Ltd.
(For Units III to V)Chapters: 6(6.1-6.8).

Reference Book(s):

1. T.Veerarajan, Engineering Mathematics, 4th Edition 2005, Tata McGraw Hill Publishers.
2. P. R. Vital, Allied Mathematics, Margam Publications (2009).

Course Code	Course Title	C	H	I	E	T
17U1SAM1	Allied Mathematics – I: Calculus	4	6	25	75	100

Unit I Differentiation

Higher derivatives - n^{th} derivatives - Leibnitz's theorem (without proof) – Partial differentiation – Problems.

Unit II Application of Differentiation

Tangent and Normal–PolarCurves–P-r equations –Curvature and Radius of Curvatures (Problems only) –Maxima and Minima of two variables – Jacobian.

Unit III Evaluation of Integrals

Evaluation of definite integrals - Properties– Integration by parts - Reduction formulae – Problems.

Unit IV Double and Triple Integrals

Double Integrals–Evaluation of Double and Triple Integrals.

Unit V Beta and Gamma functions

Definition – Properties of Beta and Gamma functions –Problems.

Text Book:

1. S. Arumugam and A. T. Isaac,Calculus Edition 2011, New Gamma Publishing House.

Chapters: Part I : Chap 2 (2.11-2.13),Chap 3(3.1-3.4,3.7,3.9)

Part II:Chap 2 (2.6-2.8), Chap 3(3.1-3.3),Chap 4(4.1only).

Reference Book(s):

1. T. K. ManicavachagomPillayDifferential Calculus, 2003 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. T. K. ManicavachagomPillay, Integral Calculus 2000 Edition, S. Viswanathan(Printers & Publishers) Pvt. Ltd.

Course Code	Course Title	C	H	I	E	T
17U2SAM2	Allied Mathematics – II Numerical Methods	2	4	25	75	100

Unit I Solutions of Linear equations

Bisection method – Iteration method – RegulaFalsi method – Newton Raphson’s method.

Unit II Simultaneous linear equations

Gauss elimination method – Inversion of matrix using Gauss elimination – Method of triangularization - Iterative methods – Gauss – Jacobi method – Gauss seidal method.

Unit III Finite differences

First difference – Differences of a polynomial – Factorial polynomial – Interpolation for equal interval – Newton’s forward interpolation formula – Newton’s backward interpolation formula.

Unit IV Interpolation

Interpolation with unequal intervals – Divided differences – Lagrange’s interpolation formula – Lagrange’s inverse interpolation formula – Numerical differentiation Newton’s forward difference formula to get the derivative – Newton’s backward difference formula to compute the derivative – Stirling’s formula – problems.

Unit V Numerical integration

Trapezoidal rule – Simpon’s one third rule – Simpon’s three - eight rule– Taylor series method(Problems only).

Text Book:

1. P.Kandasamy, K.Thilagavathy andK.Gunavathi, Numerical MethodsReprint 2008, S. Chand & Company Ltd.

Chapters:3(3.1- 3.4), 4(4.1 - 4.5,4.7 - 4.9), 5(5.1 - 5.4), 6(6.1 - 6.6), 8(8.1,8.2,8.5 - 8.7), 9(9.1 - 9.14), 11(11.1 - 11.5).

Reference Books:

1. S. Arumugam, A.T. Isaac &Somasundaram,Numerical Analysis with Programming in C New Gamma Publishing House(2007).
2. M.K.Jain, S.R.K.Iyengar and R.K.Jain, Numerical Methods for Science and Engineering Computation 6th edition, New Age International Publishers (2012).

Course Code	Course Title	C	H	I	E	T
17U2SAMP1	Practical in Numerical Methods	1	2	50	50	100

S.No.	Programs
1	Program to find a root by Bisection method.
2	Program to find a root by Iteration method.
3	Program to find a root by RegulaFalsi method.
4	Program to solve simultaneous equations by Gauss elimination method.
5	Program to solve simultaneous equations by Gauss Jacobi method.
6	Program to solve simultaneous equations by Gauss Seidal method.
7	Interpolation using Newton's forward and backward difference method.
8	Interpolation using Lagrange's method.
9	Interpolation using Newton's divided differences method.
10	Solving definite integrals using Trapezoidal rule.
11	Solving definite integrals using Simpson's 1/3 rule.
12	Solving definite integrals using Simpson's 3/8 rule

**COMPONENTS OF C.I.A AND QUESTION PATTERN FOR
END SEMESTER EXAMINATIONS**

Components of C.I.A

- | | | | |
|------|-------------------------|---|----------|
| i) | Test | - | 15 marks |
| ii) | Assignment/Quiz/Seminar | - | 5 marks |
| iii) | Attendance | - | 5 marks |
- _____

Total - 25 marks

End Semester Exam Components for U.G.

Time: 3 Hrs

Maximum Marks: 75

Part –A (10 x 1 = 10 Marks)

(Answer ALL questions)

- **Objective type Questions.**
- **Two questions from each unit.**

Part –B (5 x 7 = 35 Marks)

(Answer ALL questions)

- **Either or pattern.**
- **One question from each unit.**

Part –C (3 x 10= 30 Marks)

(Answer any THREE questions)

- **Out of FIVE questions, THREE questions to be answered**
- **One question from each unit.**

Department of Microbiology

DEPARTMENT OF MICROBIOLOGY - B.Sc MICROBIOLOGY (2017-18)

SEM	SUB CODE	COURSE TITLE	HOURS	CREDITS
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I	17U1RMC1	General Microbiology	5	5
	17U1RSM1	Basic Techniques in Microbiology	2	2
		Lab in Microbiology & Basic Techniques	3	*
	17U1RES1	Environmental Studies	2	2
II	17U2RMC2	Microbial Taxonomy	5	5
	17U2RSM2	Cell and Molecular Biology	2	2
	17U2RVE1	Value Education	2	2
	17U2RMP1	Lab in Microbial Taxonomy and Cell and Molecular Biology	3	6
III	17U3RMC3	Biochemistry	4	4
		Lab in Biochemistry & Bioinformatics	2	*
IV	17U4RMC4	Microbial Physiology	2	2
	17U4RSM3	Biostatistics	2	2
	17U4RMP2	Lab in Microbial Physiology and Biostatistics	2	4
V	17U5RE1	Microbial Genetics	5	6
	17U5RMC5	Environmental Microbiology	5	5
	17U5RMC6	Medical Microbiology	5	5
	17U5RMC7	Bioinformatics	3	3
		Lab in Genetics	3	*
		Lab in Environmental and Medical microbiology	3	*
VI	17U6RME2	Dairy & Food Microbiology	6	7
	17U6RME3	Biotechnology	6	7
	17U6RMC8	SBE II-Pharmaceutical & Forensic Microbiology.	4	4
	17U6RSM4	Industrial Microbiology	2	2
	17U6RMP3	Lab in Applied Microbiology	3	6
	17U6RMP4	Lab in Biotechnology	3	6

*Exam will be conducted at the even semester.

B.Sc. Ancillary Microbiology for B.Sc Biotechnology Course structure

Semester	Sub. Code	Title of the paper	Hours	Credits
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III	17U3RAC2	General Microbiology	2	1
	17U3RNM1	An Introduction to Microbial world	2	1
		Practical	2	*
IV	17U4RC2	Medical Microbiology	4	2
	174RAP1	Practical III & IV papers	2	2
V	17U5RAC3	Environmental Microbiology	2	2
	17U5RSA1	Mushroom cultivation– Skill Based Elective	2	1
		Practical	2	*
VI	17U6RC4	Applied Microbiology	4	2
	17U6RP2	Practical V and VI papers	2	1

Course code	Course title	C	H	I	E	T
17U1RMC1	GENERAL MICROBIOLOGY	5	5	25	75	100

Unit I

15 Hrs

Definition and scope of Microbiology- Overview of history of Microbiology-Biogenesis and Abiogenesis, Spontaneous generation, Germ theory of diseases, Contribution of Redi, Spallanzani, Needham, Louis Pasteur, Tyndal, Leewenhoek, Joseph Lister, Robert Koch, Edward Jenner, Winogradsky, Flemming, William Beijernick, Emil Christian Hansen, Elie Metchnikoff and Kary Mullis. Impact of Microbiology on future.

Unit II

15 Hrs

Ultra structure and differences of Eukaryotes and Prokaryotes, Archaeobacteria and Eubacteria, Mycoplasma with examples. Growth curve, Growth kinetics, Acidophiles, Alkalophiles Neutrophiles, Thermophiles, aerobes and anaerobes, Halophiles, Osmophiles and Basophiles.

Unit III

15 Hrs

Bacterial cell size, shape, arrangement, gram positive , negative cell wall , glycocalyx, capsule, flagella, fimbriae, pili, cell membrane, cytoplasm. Endospore : structure, formation, stages of sporulation. Ultra structure of *E.coli*, *Bacillus subtilis*. Ultra-structure and reproduction of *Saccharomyces cerevisiae* and *Penicillium* sp.

Unit IV

15 Hrs

Ultra structure of HIV, types of Hepatitis. ultra structure and reproduction of Algae – Spirulina, Chlamydomonas and Protozoans. Structure and reproduction of Amoeba and Plasmodium.

Unit V

15 Hrs

General characters of antimicrobial, antiseptics, disinfectants. Antibiotic- Beta lactum and aminoglycosides- mechanism of action. Antiviral, antiparasitic, antifungal antibiotics. Antibiotic sensitivity test & MIC.

Text Book(s):

1. Michael J Pelczar, JR. E.C.S Chan, Noel R. Krieg;(1998). Microbiology, TATA McGraw-Hill publication.
2. Madigah, Martinko, Dunlap; (2010).Brock Biology of Microorganisms; Pearson Publication.
3. P Sharma, (1986).Algae – Series on diversity of Microbes, Tata McGraw Hill Education Private Limited.

4. R.C.Dubey & K.Maheshwari (1999). A Text book of Microbiology, S. Chand & Company.

Reference Books:

1. Prescott, Harley & Klein's,(2008), Microbiology, Mac Graw Hill Higher education.
2. Jacquelyn G.Black, (2008), Microbiology Principles and explorations, JohnWiley& sons Ltd K Rajeshwar Reddy, General Microbiology, New Age Publishers.

Course code	Course title	C	H	I	E	T
17U1RSM1	BASIC TECHNIQUES IN MICROBIOLOGY	2	2	25	75	100

Unit I

6 Hrs

Microscopy- principles and components of Simple, Compound, Dark field, Phase contrast, fluorescent, Electron microscope (TEM & SEM)-Resolution power of microscope. Stains and Staining techniques- Definition of auxochrome, chromophores, dyes, classification of stains, theories of staining, mechanism of Gram staining, Acid fast staining, Negative staining, Capsule staining, Flagellar staining and Endospore staining.

Unit II

6 Hrs

Concept of sterilization and disinfection. Definitions, principles, methods of sterilization- physical methods (heat, filtration), radiation and chemical methods- Pasteurization, Tyndalization, Ultrasonication. Disinfection - sanitization, antiseptics sterilization and fumigation. Determination of phenol co- efficient of disinfectant.

Unit III

6 Hrs

Types of culture media: synthetic, complex, enriched, enrichment, selective, differential, dehydrated solid and liquid. Concept & methods of pure culture technique; Methods: enrichment, streak plate, surface spread, pour plate, colony characters and pigmentation.

Unit IV

6 Hrs

Principle of pH meter, Colorimeter, Centrifuge and its types, Chromatographic techniques – TLC and Column chromatography, Electrophoresis, Spectroscopy – UV spectrophotometer.

Unit V

6 Hrs

Microbiological media, composition and types: Selective and Differential media, growth curve and growth kinetics, influence of environmental factors for microbial growth. Maintenance and preservation of cultures - sub culturing, overlaying cultures with mineral oils, Lyophilization, and culture storage at low temperature.

Text Book(s):

1. Alexopoulos CJ, Mims CW, and Blackwell M. (1996). Introductory Mycology. 4th edition. John and Sons, Inc.
2. Atlas RM. (1997). Principles of Microbiology. 2nd edition. WM.T.Brown Publishers.
3. Kumar HD. (1990). Introductory Phycology. 2nd edition. Affiliated East Western Press.

Reference Book(s):

1. Madigan MT, Martinko JM and Parker J. (2009). Brock Biology of Microorganisms. 12th edition. Pearson/Benjamin Cummings.
2. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education limited.

Course code	Course title	C	H	I	E	T
17U2RMC2	MICROBIAL TAXONOMY	5	5	25	75	100

Unit I

15 Hrs

Bacterial Taxonomy and Classification: position of microorganisms in living world, Whittaker's five kingdom concept. Taxonomic groups, species concept, principles of Binomial nomenclature, criteria used for classification of bacteria.

Unit II

15 Hrs

Methods of Classification: intuitive methods, numerical taxonomy, genetic approach. Introduction to Bergey's manual - salient features, criteria used for classification, past and present status of bacterial taxonomy.

Unit III

15 Hrs

Fungal taxonomy: General criteria for classification, classification by Alexopoulos and Mims, Detail studies on the classes of (a) Slime molds (b) Zygomycetes (c) Deuteromycetes- morphology habitat , reproduction and economic importance of fungi.

Unit IV

15 Hrs

Classification of Algae by Fritsch, Myxophyceae – morphology, habitat and reproduction. Economic importance of algae.

Unit- V

15 Hrs

Principles of Virus taxonomy, characteristics used in nomenclature & classification of bacterial, plant and animal viruses- their major families with suitable examples.

Text Book (s):

1. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company.
2. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). General Microbiology. 5th edition. McMillan.

3. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.

4. Vashishta BR and Sinha AK. (2008). Fungi. S. Chand and Company Ltd.

Reference Book(s):

1. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. 7th edition. McGraw Hill Higher Education.

2. Vashishta BR. (2005). Algae. 3rd edition. S. Chand and Company Limited, New Delhi.

Course code	Course title	C	H	I	E	T
17U2RSM2	CELL AND MOLECULAR BIOLOGY	2	2	25	75	100

Unit I

6 Hrs

Overview of Prokaryotic & Eukaryotic cells, cell size, phages, virioids, mycoplasma. Bacterial cell wall- gram positive and gram negative, structure, chemistry & functions, fluid mosaic model of cell membrane, pili, flagella and endospore- structure and functions.

Unit II

6 Hrs

Nucleoid, Nucleus, Endoplasmic reticulum, Golgi apparatus, Lysosomes, Ribosomes, Mitochondria and Chloroplast- structure and functions.

Unit III

6 Hrs

The replication of DNA (Prokaryotes and eukaryotes), DNA replication- Meselson - Stahl experiment (evidence for semi conservative replication). Mechanism of replication-rolling circle model and theta (θ) mode of replication., enzyme involved in DNA replication-DNA polymerase, ligase, primase & telomerase.

Unit IV

6 Hrs

Transcription in prokaryotes – mechanism (initiation, elongation, termination) promoter structure, mechanism of termination, dependent and independent termination.

Unit V

6 Hrs

Mutation-spontaneous & induced, mutagens- physical and chemical. Types of mutations- addition, deletion, inversion, substitution, base analog, frame shift. DNA repair mechanisms, SOS-Photoreactivation, dark repair mechanism.

Text Book(s):

1. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. (1995) Molecular cell biology.
2. Gardner- Simon Snustad. (2001) Principles of genetics, 8th Edition. John Wiley & sons. Inc. New York.

Reference Book(s):

1. Maloy, S.R. Cronan Jr. J.E, Freifelder D (1994), Microbial genetics. Jones and Barlett publishers.
2. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. 7th edition. McGraw Hill Higher Education.

Course code	Course title	C	H	I	E	T
17U2RMP1	PRACTICAL -I	2	2	50	50	100

S.No	Experiments
1	Safety measures in laboratory & laboratory techniques.
2	Study of compound microscope. Use of oil immersion objective.
3	Study of apparatus – autoclave, hot air oven, laminar air flow chamber, incubator, centrifuges. pH meter , spectrophotometer.
4	Preparation of media.
5	Pure culture techniques- pour plate, spread plate and streaking.
6	Aseptic transfer techniques.
7	Isolation and identification of bacteria & fungi from soil. (Serial dilution and plating)
8	Staining of bacteria – gram staining, negative, endospore and capsule staining.
9	Study of bacterial motility and hanging drop techniques.
10	Biochemical characterization –IMVIC, TSI.
11	Isolation of mutants by replica plate method.
12	Isolation of genomic DNA from bacterial cells and separation of isolated genomic DNA by agarose gel electrophoresis.
13	Isolation of Plasmid DNA

Books for Reference:

1. S.Shanmugam, T.Sathish kumar and K.Panner selvam, Laboratory Hand Book on Biochemistry, 2010, PHI learning Pvt. Ltd., New Delhi- 1 .
2. Dr.S.Rajan and R.Selvi Christy, Experimental Procedure in Life Science, 1st edition 2011, Anjana publication.
3. Aparana Mathur, Laboratory instrumentation, 2013, Black printers India Inc.,

SEMESTER	SUB CODE	COURSE TITLE	HOURS	CREDITS
I	17P1RMC1	Microbial taxonomy	6	5
	17P1RMC2	Biochemistry	6	5
	17P1RMC3	Cell & Molecular Biology	6	5
	17P1RMP1	Lab in Biochemistry	6	3
	17P1RMP2	Lab in Molecular Biology	6	3

II	17P2RMC4	Microbial Physiology	6	5
	17P2RMC5	Microbial Genetics	6	5
	17P2RMC6	Medical Microbiology	6	5
	17P2RMP3	Lab in Microbial Genetics	6	3
	17P2RMP4	Lab in Medical Biology	6	3

III	17P3RMC7	Applied Microbiology	7	6
	17P3RMC8	Bioinformatics & Biostatistics	7	6
	17P3RNM1	NME – Microbial World	4	4
	17P3RMP5	Lab in Applied Microbiology	6	3
	17P3RMP6	Lab in Bioinformatics	6	3

IV	17P4RMC9	Microbial Biotechnology	6	5
	17P4RMC10	Genomics and Proteomics	6	5
	17P4RMP7	Lab in Genomics & Biotechnology	6	3
	17P4RPR1	Project	12	9

Marks Detail

Theory Paper	-	Internal 25 Marks	-	100 = 11x100 = 1100
	-	External 75 Marks		
Practical	-	Internal 50 Marks	-	100 = 7x100 = 700
	-	External 50 Marks		
Project	-	Internal 100 Marks	-	200 = 200
	-	External 100 Marks		
				----- Total Marks 2000 -----

Course	Course title	C	H	I	E	T
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code						
17P1RMC1	MICROBIAL TAXONOMY	5	6	25	75	100

Unit I

Evolution of life on earth, history and diversity of microorganism. Principles of Classification of Taxonomy of Eubacteria(Bacteria and Archaea): Major characteristics used in taxonomy: Cultural, Morphological, Biochemical, Physiological, Genetic and Molecular Characteristics; Numerical Taxonomy (Taxometrics) and Chemotaxonomy. Assessing Microbial Phylogeny: Chronometers. Phylogenetic trees, r-RNA, DNA and proteins as indicators of phylogeny.

Unit II

Ultra structure of Prokaryotic and Eukaryotic cells, *E.coli*, *Bacillus subtilis*, *Saccharomyces cerevisiae*, *Aspergillus sps*, *Nostoc*, *Chlorella*. Structure and functions of Bacterial cell wall, Gram positive, Gram negative, Mycoplasma, Archaeabacterial cell wall, slime layer, capsule, pili, flagella- ultrastructure, other inclusions bodies. Structure and signification and bacterial endospores. Endospores formation in *Bacillus*.

Unit III

Classification (up to class level), Structure and life cycle of Fungi. Ascomycetes (*Aspergillus*), Deuteromycetes (*Candida*), Zygomycetes (*Mucor*), Basidiomycetes (*Agaricus*).

Unit IV

Structure and classification of Algal cells – reproduction and chacteristics, Chlorophyta (*Chlorella*) Chrysophyta (*Diatoms*), Rhodophyta (*Gracillaria*), *Spirulina*, BGA.

Unit V

Classification of Viruses. Bacteriophage – general characteristics, morphology, classification, reproduction and nomenclature. Structure and architecture of viruses animal(Pox, Adeno, Influenza), Plant (TMV,CMV), Mycophage and Cyanophage.

Text Book (s):

1. Pelczar Jr. M.J. Chan. E.C.S and Kreig. N.R (2006). "Microbiology"- 5th Edition Mc Graw Hill Inc. New York.
2. David, B.D., Delbecco,. R., Eisen, H.N and Ginsburg, H.S (1990) "Microbiology" 5th Edition. Harper & Row, New York.

Reference Book(s) :

1. Lansing M. Prescott., John. P. Harley., Donald A, Klein, (2005)"Microbiology"-Mc Graw Hill Inc. New York.
2. Robert F.Boyd., (1991)"General Microbiology" 2nd Edition., Times MIRROR/Moshy College Publishing Virginia.

Course	Course title	C	H	I	E	T
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code						
17P1RMC2	BIOCHEMISTRY	5	6	25	75	100

Unit I Bioenergetics

Entropy, enthalpy, free energy, ATP – its role in metabolism, other energy rich compounds, oxidation- reduction reactions. Definition, classification and properties of enzymes. Mechanism of enzyme action- Lock and key mechanism, induced fit theory. Factors affecting enzyme activity: pH, temperature and substrate concentration. Michaleis- Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

Unit II Carbohydrates

Definition and classification of Carbohydrates, linear and ring forms (Haworth formula) for Monosaccharides for Glucose and Fructose. Disaccharides – Sucrose and Lactose. Physical properties- mutarotation and kiliani cynohydrin synthesis. Chemical properties – Oxidation, reduction,osazone formation. Polysaccharide; Starch and Cellulose- occurrence, structure, physical and chemical properties.

Unit III Aminoacid

Definition and Classification of aminoacids, common properties of aminoacids, amphoteric nature, isoelectric point, isoelectric pH and zwitter ion. Proteins: Classification, physical properties and structure of protein- primary, secondary, tertiary and quaternary.

Unit IV Lipid

Definition , classification, physical, chemical and biological functions- simple lipids, tertiary compound lipids, derived lipids: steroids. Saturated fatty acids: Butyric and Stearic acid. Unsaturated fatty acids: linoleic and palmitic acid. Biosynthesis, β -oxidation of fatty acid.

Unit V Nucleic acid

Definition, nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure of tRNA, mRNA and rRNA-occurrence, chemistry and its biological functions. Differences between DNA and RNA properties: cot curve and cot value, T_m , hypo and hyper chromicity.

Text Book (s):

1. Rober K. Murray, Daryl K. Grammer, (1990) -Harper's Biochemistry- McGraw Hill, Lange Medical Books. 25th edition.
2. J.L. Jain, Sanjay Jain, Nitin Jain, (2004)- Biochemistry-S. Chand & Co., Ltd.

Reference Book(s):

1. Lehninger (1970). Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
2. David, B.D., Delbecco, R., Eisen, H.N and Ginsburg, H.S (1990) "Microbiology" 5th Edition. Harper & Row, New York.

PRACTICALS

1. Colorimetric determination of Complementary colours and its Wavelength.
2. Verification of Beer & Lambert's law
3. pH meter- principle and measurements and preparation of buffers.
4. Titration between strong acid and strong base.
5. Tiration between amino acid and strong base.
6. Estimation of Carbohydrates (Glucose) by Anthrone method, Phenol sulphuric acid method.
7. Estimation of Carbohydrates (Glucose) by Phenol sulphuric acid method.
8. Estimation of Carbohydrates (Glucose) by DNS method.
9. Estimation of Proteins (Lowry's method)
10. Estimation of DNA by Diphenyl amine method.
11. Estimation of RNA by Orcinol method.
12. Separation of amino acids by paper chromatography.
13. Separation of amino acids by thin layer chromatography.
14. Separation of pigment by column chromatography.

Course code	Course title	C	H	I	E	T
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17P1RMC3	CELL AND MOLECULAR BIOLOGY	5	6	25	75	100
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Unit I

Composition of cells – Cell membrane ,Nucleus, Nucleolus, Endoplasmic Reticulum, Golgi apparatus, Lysosomes, Mitochondria, Chloroplast, Peroxisomes, Microtubules. Cell cycle-G1,G2,S and M phase. Meiotic cell division.

Unit II

Different forms of DNA-A, B and Z , Supercoiling of DNA ,DNA synthesis-DNA polymerase I,II and III, topoisomerase I and II. Properties of DNA. DNA replication – mechanism of DNA replication-types of DNA replication-conservative, semiconservative and dispersive-Q mode, D model, rolling circle model, Bi and uni directional , Enzymology of DNA replication.

Unit III

Transcription in prokaryotes-RNA polymerase structure-promoters-initiation, elongation, and termination. Transcription in eukaryotes-RNA polymerase-promoters-enhancers and silencers. Post transcriptional modifications.

Unit IV

Structure of t RNA, r RNA, m RNA-protein synthesis- initiation, elongation and termination. Protein folding, Post modifications .Genetic code, Wobble hypothesis.

Unit V

Mutation: Spontaneous and Induced types of mutation-physical mutagens and chemical mutagens. Light dependent and dark repair mechanism. Molecular Mechanisms: Site Directed Mutagenesis- Methods of directed mutagenesis.

Text Book (s):

1. Old, R.S. and Primrose, S.B. (1995) Principles of Gene manipulation. An introduction to Genetic Engineering. 5th Edition. Blackwell Scientific Publication, London.
2. Click. B.R. and-Pasternat J.J. (1994)Molecular Biotechnology. ASM press. Washington DC.

Reference Book(s):

- 1.Benjamin Lewin (1997) Genes VI, Oxford University Press.

2. David, B.D., Delbecco, R., Eisen, H.N and Ginsburg, H.S (1990) "Microbiology" 5th Edition. Harper & Row, New York.

PRACTICALS

1. Sterilization principle and methods-moist heat - dry heat and filtration methods.
2. Media preparation : Liquid media, solid media, Agar deep, Agar slants, Agar plates, Basal, enriched, selective media preparation - quality control of media, growth supporting properties, sterility check of media.
3. Pure culture technique : Streak plate, pour plate, spread plate, decimal dilution.
4. Motility demonstration : Hanging drop preparation, wet mount, dark field microscopy, semisolid agar, Craigies tube method.
5. Staining techniques : Smear preparation, simple staining, Gram's staining, Acid fast staining, Staining for metachromatic granules.
6. Micrometry : Determination of size of Bacteria, yeast. Fungal filaments.
7. Physiological characteristics : IMVic test, MRVP test, H₂S, Oxidase, catalase, urease test, gelatin liquefaction, casein, starch degradation. Carbohydrate fermentation, Maintenance of pure culture, Paraffin method - Stab culture - maintenance of mound culture.
8. Agarose Gel Electrophoresis.
9. Isolation of Chromosomal DNA from *E.coli* culture.
10. Isolation of Plasmid DNA from a Prokaryote culture.
11. Isolation of Chromosomal DNA from Yeast culture.
12. Isolation of Chromosomal DNA from Animal Tissue.

Course code	Course title	C	H	I	E	T
17P2RMC4	MICROBIAL PHYSIOLOGY	5	6	25	75	100

Unit I Microbial Nutrition

The common Nutrient requirements and sources of Carbon, Hydrogen/Energy, Oxygen. Major Nutritional types of Microbes- requirements of Carbon, Hydrogen/Electrons, Energy, Oxygen, Nitrogen, Phosphorus and Sulfur. The flow of carbon and energy. Phosphorylation-types, structure and significance of ATP.

Unit II Metabolism

An overview of Metabolism ATP Production, Anabolism, Catabolism, Phosphorylation, Amphibolic pathway and Anaplerotic pathway. Photosynthesis: Diversity, properties of photosynthetic prokaryotic organisms- Cyanobacteria, Green (sulphur and non- sulphur) Bacteria. Purple (sulphur and non-sulphur) Bacteria. Oxygenic and Anoxygenic photosynthesis. Light reactions: pigment system, carboxysomes, Bacteriochlorophyll. Carboxysomes. light reaction of Cyanobacteria (cyclic and noncyclic). Cyclic light reaction of purple, green and Helicobacteria. Dark reaction: Definition, C₃ cycle of Cyanobacteria. Reductive TCA cycle.

Unit III Catabolism

substrates, significance in Metabolism, Aerobic fermentation and Anaerobic. a) The breakdown of glucose to pyruvate. Glycolytic pathway, pentose phosphate pathway and ED pathway with examples of microbes. b) significance of pyruvic acid- TCA cycle, ETP system. Fermentation-Alcoholic-Lactic acid fermentation-Homolactic and Heterolactic and Mixed acid fermentation of Enterobacteriaceae with examples. Anaerobic Respiration with examples.

Unit IV The organization of anabolism

Amphibolic nature of TCA cycle, production of biosynthetic products. Glyoxylate cycle, Gluconeogenesis-significance. Metabolism of N₂ fixation, classification of Diazotrophs, Nitrogenase- types, structure and functions. Mechanism of N₂ fixation- role of Ferredoxins, Flavodoxins, Electro proteins and Electron transfer. Role of ATP, over all reactions with NH₃ formation.

Unit V Biosynthetic pathway of aminoacids

Glycine, valine, Isoleucine, Phenylalanine. Biosynthetic pathway of Purine and Pyrimidine. Biosynthetic pathway of Bacterial cell wall synthesis.

Text Book (s):

1. Sale, A.J (1992) "Fundamentals Principles of Bacteriology", 7th Edition. McGraw Hill Publishing Co. Ltd., New York.

2. Dubey, R.C. and Maheswari, D.K. (2005) A Text book of microbiology. S. Chand & Company Ltd. New Delhi.

Reference Book(s):

1. Dall, D.O and Rao, K.K (1995) "Photosynthesis" –Cambridge University press.
2. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L and Painter, P.R. (1986). "General Microbiology" -Mac Milan Education Ltd. London

Course code	Course title	C	H	I	E	T
17P2RMC5	MICROBIAL GENETICS	5	6	25	75	100

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Unit I

History of microbial genetics-Mutations and genetic analysis-terms used in genetics-useful phenotypes in bacterial and phage genetics-Experiment of Luria and Delbruck. Newcombe- Isolation of Auxotrophic mutants-positive and negative selection of mutants. Complementation-Allelism and cis/trans tests.

Unit II

Bacterial conjugation: F+, F- Hfr strains. Genetic mapping with Hfr crosses. F- prime factors. Complementation test using F-prime factors-conjugation in *Streptomyces* and role of Pheromones in plasmid transfer in *Enterococcus faecalis*. Transformation : Definition – competence-mechanism of DNA uptake in *E.coli*. *Bacillus sps*, and *Haemophilus sps*. Plasmid-transformation competence induction. Recombination and its mechanisms.

Unit III

Phage biology : virulent and temperate bacteriophages (T7,T4,Lambda, P1) phage crosses,recombination and complementation tests with phages.T4 RII locus mapping. Generalized transduction with P1. Mapping of bacterial markers. Co-transduction. Gene expression during lambda lytic cycle and lysogeny- specialized transduction.

Unit IV

Transposable genetic elements- identification of transposition – IS elements, composite transposons, Tn3, Tn5, Tn9, Tn10 and μ phage-mechanism of transposition. Transposable elements in eukaryotes- maize, AC and DS elements,Spm, dspm. Retro transposons. Population genetics.

Unit V

Regulation of gene expression- negative regulation (*lac* and *gal* operon). Positive regulation (*L-ara* operon) regulation bu attenuation of *trp* operon. Role of RNA molecules in gene regulations. Some regulatory mechanisms in *E.coli*- catabolite regulation. t-RNA and r –RNA regulation(stringent control).

Text Book (s):

1. Lodish, H. Baltimore Daerk . A. Zipsury, S.L. Marsudaisa. P. Darnel. J. (1995) Molecular cell biology.
2. Gardner- Simon Snustad. (2008). Principles of genetics, 8th Edition. John Wiley & sons. Inc. New York.

Reference Book(s):

1. Maloy, S.R. Cronan Jr. J.E, Freifelder D (1994), Microbial genetics. Jones and Barlett publishers.
2. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.

PRACTICALS

1. Isolation of spontaneous mutants Drug resistant mutants by Spread Plate Technique.
2. Isolation of spontaneous mutants Drug resistant mutants by Gradient Plate Technique.
3. Enrichment of auxotrophic mutant by Ampicillin treatment.
4. Isolation of mutants using UV and NTG mutagenesis.
5. Isolation of Petite mutants of Yeast.
6. T7 phage lysate preparation and titration.
7. Transformation of *E.coli* with plasmids(pUC 18/pBR322).
8. Bacterial conjugation (Hfr X F⁻).
9. P₁-lysate preparation and P₁ transduction.

Course code	Course title	C	H	I	E	T
17P2RMC6	MEDICAL MICROBIOLOGY	5	6	25	75	100

Unit I

Components of immunity-Innate immunity, Acquired immunity. Humoral immunity, Cell mediated immunity. Types of antigens- Haptens, Adjuvants: Immunoglobulins- structure and functions: classification and biological activities; Antigenic determinants on immunoglobulins- Iso, Allo and Idiotypic, Monoclonal antibodies. The Complement components, function, complement, activation-(i) Classical, (ii) Alternate and (iii) Lectin pathways(characteristics and functions) Hypersensitivity: definition, types, examples.

Unit II

Transplantation immunology-Types of grafts, allograft rejection. Tumour immunology, tumour antigens. Immune response to tumours. Autoimmunity- concepts of autoimmunity, autoimmune disorders. MHC- types, structure, restriction, HLA typing.

Unit III

Pathogenesis, lab diagnosis, prevention & control of bacterial diseases caused by *E.coli*, *Salmonella*, *Shigella*, *Vibrio*, *Staphylococcus*, *Streptococcus*, *Mycobacterium*. Pathogenesis, clinical features & diagnosis of mycoses. Superficial mycoses- black and white piedra, Cutaneous – *Trichophyton* and *Tinea*. Subcutaneous – *Sporothrix* and *Mycetoma* . Systemic mycoses- Histoplasmosis, Coccidioidosis. Opportunistic mycosis – Aspergillosis, Candidiasis.

Unit IV

Pathogenesis, clinical features & diagnosis of diseases caused by Viruses & Protozoans . Viruses – Influenza, Herpes, Hepatitis, SARS & HIV. Protozoa – Entamoeba, Plasmodium, Trypanosoma, Leishmania and Giardia.

Unit V

General characters of antiseptics, disinfectants , antibiotics – beta lactum , aminoglycoside, polyglycoside, polycyclic alkenes.Mechanism of action. Antibiotic sensitivity test. Minimum inhibitory concentration. Drug resistance. Antiviral and Antiparasitic drugs.

Text Book (s):

1. Roitt, I.M (1998) Essential Immunology Blackwell Scientific Publishers.
2. Kuby, J. (1994) Immunology, 2nd edition, W.H. Freeman and Company. New York.

3. Leffel, Donnenberg, A: and Rose, W.(1997).Hand book of Human Immunology Boca Raton Fla: C.R.C Press.
4. Abbas, A.K. Lichtman, A.M. and Pober, J.S. (1997) Cellular and Molecular immunology 3rd edition Philadelphia : W.B. Saunders
5. Ananthanarayanan R. and Jayaram Panicker C.K. (1994). Text book of Microbiology. Orient Longman.

Reference Book(s):

1. Baron, E.J. and Finegold S.M. (1995). Scientific Company. Diagnostic Microbiology. Blackwell Scientific Company.
2. Salle, A.J. (1992). Fundamental Principles of Bacteriology. 7th Edition, Mc. Graw Hill Publishing Co. Ltd., New York.

PRACTICALS

- 1.Enumeration of RBC and WBC .
- 2.Total RBC count.
- 3.Total WBC count.
- 4.Detection of blood group.
- 5.Haemagglutination test.
- 6.WIDAL Test.
- 7.Immunoelectrophoresis.
- 8.Rocket Immunoelectrophoresis.
- 9.Single radial immune diffusion.
- 10.Ouchterlony double diffusion method.
- 11.Isolation and Identification of Urinary tract infection pathogens.
- 12.Identification of Microorganism from throat swab sample.
- 13.Determination of Minimum Inhibitory concentration and Minimum lethal concentration.
- 14.Antibiotic Sensitivity test by Kirby-Bauer technique.

Course code	Course title	C	H	I	E	T
17P3RMC7	APPLIED MICROBIOLOGY	6	7	25	75	100

Unit I

Microbiology of milk, Dairy and Food: Microbiology of milk dairy industries – Microbiology of milk – milk products – production of yoghurt, cheese and rennin. Biotechnology of dairy products (plasmid concept in butler starter culture and gene manipulation. Fermented foods – fermented vegetables, sauerkraut and kimchi, fermented meals, fermented fish, soy sauce, Preservation of food – physical and chemical methods – mode of food borne disease Bacterial – *Clostridium perfringens*. Botulism- Mycotoxins- Aflatoxins - protozoa - *Entamoeba histolytica*.

Unit II

Soil microflora, Vermicompost production ,Development of Bacterial and Cyanobacterial biofertilizers - production of biofertilizers, inoculums preparation and mass scale production. Role of mycorrhizae in organic farming. Microbial insecticides-*Bacillus thuringiensis* - insecticidal toxin of *Bt*. Mode of action- various strains of *Bt* and their toxins. Toxin clone isolation and procedure for sub cloning of *Bt*. Toxicity and binding specificity of Cry proteins.Procedure for the development of genetically engineered *Pseudomonas fluorescens*- Baculo virus as biocontrol agent- mode of action –genetic engineering for improved biocontrol.

Unit III

Fermentation of microbial products: SCP, Alcoholic fermentation,Beer and Wine production- Antibiotics-Penicillin, Streptomycin: Organic acid-Citric acid, Acetic acid: Aminoacid- Glutamic acid, L-lysine: Vitamins-B12 and Riboflavin: Hormone- Gibberellic acid: Biogas- Methane: Enzyme production- Protease, Cellulase and Lipase. Mushroom cultivation.

Unit IV

Role of microbes in biogeochemical cycle- nitrogen, sulphur, phosphate solubilizing organisms. Microbial degradation. Organic pollutants, Pesticides, hydrocarbon, Xenobiotic. Biodegradation-the meta effect of biodegradation. Microbial interaction with metal pollutants- Biomagnification, metal toxicity on microbes. Microbial metal resistance and

detoxification, enhanced recovery of metals-Bioleaching with reference to Copper, Uranium. Enhanced recovery of petroleum. Biofiltration, Bioagumentation and Phytoremediation.

Unit V

Production of Insulin. Bacterial production of growth hormone(hGH), Interleukins and Interferons-Stimulatory hormone. Drugs related with AIDS treatment. Vaccine-subunit vaccine *Herpes simplex* and *Tuberculosis*, attenuated vaccines- *Chloera* and *Salmonella*- Vector vaccines-Vaccine against Hepatitis B virus.

Text Book(s):

1. Rangasami G & Bagyaraj D.J.(1993) Agricultural Microbiology 2/e, Prentice-Hall publications.
2. Atlas, R. & Richard, B. (1987). Microbial ecology 2/e, Benjamin-Cummings publications, 1987.
3. Patel A.H(1996) Industrial microbiology Macmillan India limited.

Reference Book(s):

1. Prescott L.M, Harley J.P. & Klein D.A.,(2010). Microbiology, 6/e, McGraw Hill Publishers, 204. Madigan
2. M.T., Martinko J.M. & Brock P.J.(1997). Biology of Microorganisms 8/e, Prentice-Hall Inc.

PRACTICALS

1. Microbial analysis of Food sample.
2. Examination of coliform in water by MPN method.
3. Milk quality dye reduction test and quality assessment.
4. Isolation of Rhizobium from leguminous plants.
5. Isolation of Siderophore production Rhizobacteria.
6. Isolation of Phosphate solubilizing organism from soil samples.
7. Isolation of Cyanobacteria from soil and water.
8. Isolation of plant bacteria pathogen from infected leaf.
9. Isolation of fungal bacteria pathogen from infected leaf.
10. Immobilization of Yeast cells.
11. Isolation of standard graph for Ethanol.
12. Isolation of Yeast cells from various food sample.
13. Preparation of standard graph for Reducing sugar.
14. Ethanol production by free and immobilized yeast cells.
15. Screening of Microorganisms from soil sample for α amylase production.
16. Isolation of Antibiotic producing microbes from soil sample.
17. Determination of Antimicrobial spectrum.

Course code	Course title	C	H	I	E	T
17P3RMC8	BIOINFORMATICS & BIOSTATISTICS	6	7	25	75	100

Unit I

Computer : Basic components – brief account on processor. Input and output devices. Memory and storage: software -types-applications: operating systems; internet, WAN, LAN. Network software. [WWW.SRS\(NCBI,EBB net, Entrez\)](http://WWW.SRS(NCBI,EBB net, Entrez).). Introduction to Bioinformatics-basic concepts-DNA and protein sequence, structure and functions and interrelationship-Genome projects-*E.coli* and Human -Role of bioinformatics

Unit II

Databases –Importance – Types –Classification –Sequence format –Database record :DBMS –Nucleicacid sequence databases (Gene Bank,DDBJ, GSTB) . Protein sequence database-Primary,PIR ,Swiss-Prot ,TrEMBL, NRL-30. Structure database-RCSB,MSD: Structure, classification- SCOP,CATH: Secondary databases –PROSITE .PRINT – Composite databases –NDB, CSD, BMRD.Bibliography databases – Pubmet. Virtual library . Medline. Sequence alignment pairwise sequence and multiple alignment. Homology tools BLAST ,FASTA and phylogenetic analysis using CLUSTAL W .PHYLP. Molecular visualizing tools –ROSMOL.Swiss PDP viewer. Drug design- molecular tagging – Gene finding using Genscan. WebGene Gene Wise.

Unit III

Nature and scope of statistical methods and their limitations- Compilation classification and tabulation of statistical – data. Event and sets – Samples space –Concept of probability – Addition and multiplication theorem on probability –Conditional probability and independence of events.

Unit IV

Standard distributions- Binomial poisson and normal distributions – standard distributions –to test based on normal – t,chi- square and R-non parametric test run median, Sign, Mann,Whitney and Wilcox signed rank test

Unit V

Coefficient of Correlation – scattered diagram – regression lines. Principles of scientific experiment Randomization replication and local control Analysis of Variance – One way and Two way classifications.

Text Book (s):

1. S. Palanisamy and M. Manoharan, (2002). Statistical methods for Biologists. Palani Paramount Publication, Anna Nagar, Palani, T. N.
2. S.C. Gupta and K. Kapoor, (2002). Fundamentals of Applied Statistics. 3rd Edition. Sultan Sons Educational Publisher, N.D.
3. N. Gurumani, (2002). An introduction to Biostatistics. MJP Publishers, Chennai.

Reference Book(s):

1. Ghosh,Z.and Mallick,V.(2008). Bioinformatics-principles and applications Oxford university press.
2. P.R. Vittal, and V. Malini, (2002). Statistical and Numerical Methods. Margham Publications, Chennai.

PRACTICALS

1. Computer applications in Bioinformatics, genome analysis.
2. Homology sequence search using p-BLAST & n -BLAST.
3. Biostatistical experiment on MS- Excel sheet.

Course	Course title	C	H	I	E	T
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code						
17P3RNM1	MICROBIAL WORLD	4	4	25	75	100

Unit I

Introduction – types, structure and properties. Brief account on microscopic algae, fungi, bacteria, protozoan and viruses.

Unit II

History of Microbiology – Anton Van LeEuwenhock – spontaneous generation of organisms, contribution by Redi, Spallanzani, Liebeg, Louis Pasteur, Robert Koch, Edward Jenner and Alexander Flemming in the field of Microbiology.

Unit III

Role of Microbes in the Environmentg – superbugs, Biogeochemical cycle, Biogas, Biofertilizer, Biological control, Bioremeditation.

Unit IV

Beneficial aspects of Microbes- any four important uses with specific examples form Algae, Fungi and Bacteria.

Unit V

Harmful aspects of Microbes – any four harmful effects of Fungi, Bacteria and viruses with specific examples.

Text Book (s):

1. Anathanarayan, R & Paniker, C.K. (2000). A text book of Microbiology, Orient Longman, New Delhi.
2. Dubey, R.C. (2004), Basic Microbiology, S. Chand Publication, New Delhi.

Reference Book(s):

1. Christon J. et al, (2002), Manual of Environmental Microbiology, 2nd Edition, ASM Press, New Delhi.
2. Atlas, R.A. (1995), Principles of Microbiology, Mosby Publications, USA.

Course	Course title	C	H	I	E	T
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code						
17P4RMC9	MICROBIAL BIOTECHNOLOGY	5	6	25	75	100

Unit I

Introduction – Definition – interdisciplinary approach-scope and importance –Biotechnology in India- organization and activities.Recombinant DNA technology-Restriction endonuclease-types, nomenclature, recognition sequences. Cleavage patterns. Modification of cut ends. Steps in gene cloning.isolation of desire gene clone.CDNA library, genomic library.

Unit II

Plasmids – basic biology, types, classification and properties of cloning vectors. The origin, restriction map of pBR322, pUC18, Ti plasmids. Lambda phage, M13, Cosmids, Phasmids.

Unit III

Gene transfer in Animal cells-DNA mediated transformation.viral transduction.expression systems for animal cells, role of stem cells. Production and importance of monoclonal antibodies.

Gene transfer in plant cell-Agrobacterium mediated transformation. Role of ti plasmid and cDNA in the field of vectors. Transfer of gene into plant cells with references to TGMV, *Arabidopsis*, *Nicotiana* and *Antirrhinum*.

Unit IV

Applications of recombinant DNA technology for the human welfare-Marshling rDNA to fight against AIDS,DNA based diagnosis of genetic diseases,human gene therapy with reference to HPRT,ADA,PNP,GC,PKU, β -globulin. Role of skin fibroplast in gene therapy.DNA fingerprinting and forensic studies. Concepts of stem cell therapy.

Unit V

Transgenic animals- introduction,objectives,vectors,transfection methods.brief account on transgenic mice-sheep, pigs, cattle and fish.

Transgenic plants- introduction, role of promoter,reportor and terminator genes. Antisense RNA mechanism. Production of transgenic tomato. brief account on the importance of Bt - Bt cotton, Bt brinjal- herbicide resistant,drought resistance plant productions.

Text Book(s):

1. Ratledge C & Kristiansen B.(2008). Basic Biotechnology 3/e, Cambridge University Press.
2. Darnell J. Lodish H. & Baltimore D.(2006). Molecular Cell Biology, Scientific American Books Inc., Iowa.
3. Glick B.R. & Pasternak, J.J., (2006).Molecular Biotechnology- Principles and Applications of Recombinant DNA technology, ASM press, Washington.
4. Mitra S., (2001)Genetic Engineering, Macmillan, India Limited, New Delhi.

Reference Book(s):

1. Winnacker E.L.(1987) From Genes to Clones: Introduction to Gene Technology, VCH Publications, Germany.
2. Winnacker E.L.(1987). From Genes to Clones: Introduction to Gene Technology, VCH Publications, Germany.

Course code	Course title	C	H	I	E	T
17P4RMC10	GENOMIC AND PROTEOMICS	5	6	25	75	100

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Unit I

Genome of prokaryotes and eukaryotes-structure and organization of prokaryotic genome and eukaryotic genome- eukaryotic organelle genomes. Repetitive DNA content. Mapping genomes : genetic mapping – RAPD, RFLPs, SSLPs, SNPs detection of SNPs using DNA chip and microarrays. DNA chip and microarrays, physical mapping, restriction mapping. FISH, STS mapping (Radiation hybrid , flow cytometry).

Unit II

PCR technology – gene amplification. PCR primer designing and optimization site directed mutagenesis. DNA foot printing and finger printing. Methods of DNA sequencing .Sangers and Maxam gilbert methods. Automated DNA sequencing with fluorescent labeled ddNTPS. Thermal cycle sequencer, assembly of contigs-DNA sequencer-shotgun approaches.

Unit III

Clone contig approach by chromosome walking and whole genome – shotgun approach. Gene identification, location and computer analysis gene function . molecular phylogenetics – DNA based phylogenetic tress-Tree construction and application of molecular phylogenetics. Transcriptone analysis- Northern blot. RT-PCR . RACE: S1 nuclease mapping. SAGE DNA chips.

Unit IV

Proteomics classification 1 D –SDSPAGE a 2D –SDS PAGE.Detection and quantitation of proteins in gels, pros and cous of various staining methods. Basics of mass spectrometry. MALDITOF and ES1 and their application in proteomics.

Unit V

Tandem MS/MS spectrometry. Peptide sequencing by tandom mass spectrometry. Affinity purification of protein.TAP tag. Gel based proteome profiling

Text Book(s):

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). VIII ed. Principles of Genetics Wiley India.
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. XI Edition. Benjamin Cummings.
4. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.

5. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

Reference Book(s):

1. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B.(1996). IX Edition. Introduction to Genetic Analysis, W. H. Freeman & Co.
2. Pevsner, J. (2009). Bioinformatics and Functional Genomics. II Edition. John Wiley & Sons.

PRACTICALS

1. Isolation of plasmid (pUC18) from *E.coli*-separation by gel electrophoresis.
2. Restriction digestion of plasmid single, double and triple digestion. Determination of molecular weight.
3. Cloning pUC18 insertional inactivation. Blue white selection.
4. PCR amplification of DNA. Gel electrophoresis analysis of PCR products.
5. Generation of suitable Lambda phage vector carrying Tn5 in appropriate host. Transposition of suitable lac+E coli and isolation of Tn5 insertion in lacZ.
6. Southern Hybridization.
7. Western Blot Technique.
8. Callus culture from plant tissues and Agrobacterium transformation studies.
9. Internet and Computer – Genome Analysis.

Department of Bio-technology

B.Sc (Bio-Technology) Course Structure with effect from the Academic Year 2017-18

SEM	SUB CODE	COURSE TITLE	HOURS	CREDITS
I	17U1LMC1	Cell biology and Genetics	5	5
	17U1LSM1	Bioinstrumentation	2	2
	17U1LES1	Environmental Studies	2	2
		Practical - I	3	*
II	17U2LMC2	Biochemistry & Biophysics	5	5
	17U2LSM2	Concepts of Biotechnology	2	2
	17U2LMP1	Practical -I	3	6
	17U2LVE	Value education	2	2
III	17U3LMC3	Molecular biology	4	4
		Practical -II	2	*
IV	17U4LMC4	Animal Biotechnology	2	2
	17U4LSM3	Biostatistics	2	2
	17U4LMP2	Practical -II	2	4
V	17U5LME1	Bioinformatics	5	6
	17U5LMC5	Immunology	5	5
	17U5LMC6	Industrial Biotechnology	5	5
	17U5LMC7	Plant Biotechnology	3	3
		Practical-III	3	*
		Practical -IV	3	*
VI	17U6LME2	Food preservation and processing	6	7
	17U6LME3	Medical Biotechnology	6	7
	17U6LMC8	Genetic Engineering	4	4
	17U6LSM4	Fisheries technology	2	2
	17U6LMP3	Practical -III	3	6
	17U6LMP4	Practical -IV	3	6

Course Code	Course Title	C	H	I	E	T
17U1LMC1	CELL BIOLOGY & GENETICS	5	5	25	75	100

Unit 1: The Cell

15 hours

Cell theory, Protoplasm theory, Organismal theory. Modern concept of cell. Structure of prokaryotic and eukaryotic cell. Chemical organization of the cell –protoplasm.

Unit 2: Organization of the cell

15 hours

Cell membrane- plant cell wall, extracellular matrix, plasma membrane, theories, chemical composition. Cytoskeleton- microtubules and microfilaments. Mitochondria- chemical composition and its functions. Golgi complex- morphology, chemical composition functions. Endoplasmic reticulum – types, chemical composition and functions.

Unit 3: Cell organelles and cell cycle

15 hours

Ribosomes and lysosomes- size and shape, structure, subunits, chemical nature and its functions. Centrosomes, plastids, cilia, flagella and basal bodies. Nucleus and chromosomes structure and its functions. Cell divisions– mitosis and meiosis.

Unit 4: Mendelism and genetic interaction

15 hours

Introduction to genetics (Vapour, Fluid, preformation, epigenesis, particulate, pangenetic and germplasm theory), mendelism, multiple alleles, multiple gene inheritance, linkage and crossing over, chromosomal map.

Unit 5: Sex linked inheritance

15 hours

Sex determination in animals, sex linked inheritance, non-disjunction, Cytoplasmic inheritance, twins, inborn errors of metabolism, syndromes, pedigree analysis, Eugenics and eugenics, inbreeding and outbreeding, population, human and microbial genetics.

Text Book(s):

1. Powar.C.B, Cell Biology- 1983,Himalaya publishing house, New Delhi.
2. Singh & Tomar, Cell biology, 10th revised edition, 2012, Rastogi publication, Meerut.

Reference Book(s):

1. E.J.Gardener, M.J.Simmons and D.P.Snustad,Principles of Genetics – John Wiley & Sons Publications.
2. DeRoberties, Cell Biology - - Blaze publishers & Distributors Pvt.Ltd., NewDelhi.
3. Strickberger M.W., Genetics –, Printice hall 4th edition, 1997.

Course Code	Course Title	C	H	I	E	T
17U1LSM1	Bioinstrumentation	2	2	25	75	100

Unit I: Microscopy

6 hours

Microscopy: Introduction and types; bright field, dark field, Phase contrast, Fluorescence,

Polarising microscopy; Electron microscopy: SEM and TEM.

Unit II: pH meter and Centrifuge

6 hours

pH meter: Principle and working mechanism. Centrifuge: Basic principles of Sedimentation- types of centrifuges and types of rotors. Mechanism of diffusion and sedimentation.

Unit III: Colorimetry and Spectroscopy

6 hours

Colorimetry: Beer –Lambert’s Law; Spectrophotometry: UV, Visible, Fluorescence, Raman spectroscopy and Infrared spectroscopy –principle, instrumentation and applications.

Unit IV; Chromatography

6 hours

Chromatography: Paper Chromatography; Thin layer Chromatography; Gas chromatography, ion exchange Chromatography- principle, instrumentation and applications.

Unit V: Electrophoresis

6 hours

Electrophoresis: Types-moving boundary and zone electrophoresis. Techniques and applications of Agarose gel electrophoresis, native PAGE, SDS-PAGE- principle, instrumentation and applications .

Text Book(s):

1. Veerakumari L., Bioinstrumentation, 3rd edition, 2009, MJP publishers
2. Plummer, D, An Introduction to Practical Biochemistry, 1987, Tata McGraw – Hill Publishing Company Ltd., New Delhi.
3. Jeyaraman, J., Laboratory Manual in Biochemistry, 1985, Wiley Eastern Limited, New Delhi.

Reference Book(s):

1. Boyer, R.F., Modern Experimental Biochemistry, 1993, The Benjamin / Cummings Publishing Company, Inc., New York.
2. Williams B.L., and Wilson, K. A Biologist's Guide to Principles and Techniques of Practical Biochemistry, 1983, Edward Arnold Publishers Ltd., London.
3. Wilson, K and Walker, J, Principles and Techniques of Practical Biochemistry, 1995, Cambridge University Press, New York.

Course Code	Course Title	C	H	I	E	T
17U2LMC2	BIOCHEMISTRY AND BIOPHYSICS	5	5	25	75	100

Unit 1: Fundamentals of Biochemistry

15 hours

Fundamentals of biochemistry: Elements of life; Atoms, Molecules, atomic number, Chemical bonds: Covalent, Ionic and Hydrogen, co-ordinate and Vander-Waals bond, electrolytes; pH: hydrogen ion concentration, Henderson and Hasselbach equation, buffers and osmosis.

Unit 2: Carbohydrates and its metabolism

15 hours

Carbohydrates: Definition, classification, stereochemistry, cyclic structures and anomeric forms, Haworth projections. Monosaccharide, Disaccharides, Polysaccharides. Homopolysaccharides - starch, glycogen, cellulose. Heteropolysaccharides-hyaluronic acid, chondroitin sulphate and heparin. Metabolism: Glycolysis and TCA cycle.

Unit 3: Proteins and enzyme kinetics

15 hours

Amino acids and peptides: Definition, amino acids as ampholytes. Structure and classification of amino acids based on chemical nature, Essential amino acids, Peptides; Structure and properties. Metabolism: Deamination, Decarboxylation, Transmethylation and Transamination. Enzymes: classification, kinetics, MM equation, co-enzymes and co-factors.

Unit 4: Lipids and Vitamins

15 hours

Lipids; Definition, classification of lipids- simple, compound and derived. Compound lipids-Structure and function of phospholipids, glycolipids and lipoproteins. Derived lipids- Fatty acids-saturated and unsaturated. Essential fatty acids. Metabolism of fatty acids- β oxidation. Vitamins: Definition, classification, sources of Fat and water soluble vitamins.

Unit 5: Basics of Biophysics

15 hours

Biophysics: Introduction. The free energy of a system. Chemical potential - oxidation & reduction potential. Thermodynamics: Entropy, Enthalpy. Diffusion - Fick's laws, constant laws, osmotic coefficient, Active transport Laws of thermodynamics.

Text Book(s):

1. Ambika Shanmugam, Fundamentals of Biochemistry for Medical students, 8th edition, 1998, Published by the Author, Madras.
2. Palanichamy, S. and Shanmugavelu, M. Principles of Biophysics, 2nd Edition, 2011. Palani Paramount Publications, Palani.

Reference Book(s):

1. Satyanarayana, U. and Chakrapani, U. Biochemistry, 2009. Books and Allied Pvt. Ltd., Kolkata.
2. Stryer, L., Biochemistry, Fourth edition, 2000. W.H. Freeman and Company, New York.
3. Voet, D., and J.G. Voet, Biochemistry, second edition., 1995, John Wiley & Sons Inc, New York.
4. Zubay, G. Biochemistry, third edition, 1993, W. H. Freeman and Company, Oxford, England.
5. Jain J.L., Sunjay Jain., and Nitin Jain., Fundamentals of Biochemistry, 1st Edition, 1979, S.Chand and company Ltd., New Delhi,
6. Lehninger A.L., Biochemistry, 2nd Edition, 1992, Kalyani Publishers, Ludhiana,

Course Code	Course Title	C	H	I	E	T
17U2LSM2	CONCEPTS OF BIOTECHNOLOGY	2	2	25	75	100

UNIT-I : Biotechnology: Scope and Importance

6 hours

Biotechnology: History of Biotechnology, Traditional and Modern Biotechnology, Potential of Modern Biotechnology, Biotechnology as an interdisciplinary area- Biotechnology Tree. Achievements of Biotechnology.

UNIT-II : Gene concept and Tools

6 hours

Gene concept: Definition; Size of a gene, Cistron, Muton and Recon; Gene expression and functions of gene. Tools in Biotechnology: Restriction enzymes: types, naming, target sites, nature of cut ends, host controlled restriction and modification and isoschizomers.

UNIT-III: Biotechnology and environment

6 hours

Environmental pollution: Bioremediation – Insitu and Exsitu Bioremediation, Xenobiotics. Biodegradation, Biosorption, Bioaugmentation, Mechanism of Biofiltration, Bioleaching.

UNIT-IV: Bioethics and Biosaftey

6 hours

Benefits of Biotechnology, ELSI Biotechnology, Risks and ethics of Biotechnology, Release of Genetically engineered Organisms, Biological warfare. Biosafety guidelines and regulations.

UNIT-V: Rules and Regulations in Biotechnology

6 hours

Intellectual Property Rights, Intellectual Property Protection, Forms of protection. Patents, Copyrights, WIPO, TRIPS, GATT. Patenting of Biological materials and its significance.

Text Book(s):

1. V.Kumaresan, A text of biotechnology, Saras publication
2. R.C.Dubey, A text book of Biotechnology, 1st revised edition, 2010,S.Chand Publication

Reference Book(s):

1. U.Sathyanarayana, Biotechnology, 2016, Books and allied (P)ltd
2. S.C.Rastogi, Biotechnology principles and Applications 2016, Narosa publication
3. S.S. Purohit, Biotechnology fundamentals and Applications 2010, Fourth edition
4. H.K.Das., Text book of Biotechnology. Willey India publication fourth edition
5. Old & Primrose, Principles of Gene Manipulation, 3rd edition 1989.

Course Code	Course Title	C	H	I	E	T
17U2LMP1	PRACTICAL -I	6	6	50	50	100

S.No	Experiment
1	Micrometry
2	Mitotic studies in onion root tip
3	Meiotic studies in grasshopper testes
4	Mounting of polytene chromosomes
5	Study the cell morphology and motility using hanging drop method
6	Blood smear differential staining
7	Simple Mendelian traits in man
8	Qualitative analysis of carbohydrate
9	Estimation of carbohydrate by Anthrone method
10	Qualitative analysis of protein
11	Estimation of protein by Biuret method
12	Qualitative analysis of Lipids
13	Estimation of DNA by DPA method
14	Verification of Beer-Lambert's law
15	Thin layer chromatography
16	Measurement of pH
17	Preparation of Buffer
18	Separation of amino acids by paper chromatography
19	Agarose gel electrophoresis
20	SDS - PAGE

Reference Book(s):

1. N.Arumugam, Dulsy Fatima, Practical Zoology, 1st edition , 2013, Saras publication
2. Aparana Mathur, Laboratory instrumentation, 2013, Black printers India Inc.,
3. Dr.S.Rajan and R.Selvi Christy, Experimental Procedure in Life Science, 1st edition 2011, Anjana publication.
4. S.Shanmugam, T.Sathish kumar and K.Panner selvam, Laboratory Hand Book on Biochemistry, 2010, PHI learning Pvt. Ltd., New Delhi- 1 .

Value Education

Course Code	Course Title	C	H	I	E	T
17U2XVE1	VALUE EDUCATION	2	30	25	75	100

Unit I

Value Education: Definition. Need. Values and Individuals; Self discipline. Areas that contribute for values: Arts, Science, Philosophy and Mythology. Classification of Values: Morals, Social, Spiritual, Cultural and Natural (Diversity).

Unit II

Character building: Contribution from Family, society and Educational Institutions. Social Evils: Alcoholism, Smoking, Drug Abuse.

Unit III

Values and Religions: Faith and Believes. Hinduism- Purusharthas-Dharma, Artha, Kama, Moksha. Islam- Brotherhood, Christianity- Love and Justice. Sikhism- Courage. Buddhism- Four Noble Truths, Jainism- Tri Ratna.

Unit IV

Values and Society. Socialization. Traditions and Changes; Culture & Civilization in value building; Conflicts; destructions; Extinctions. Acceptance and Adaptability; Mutual recognition and respect. Role of Mass media in value formation.

Unit V

Impact of exploitation of men, material and money on values. Desertion of villages- Urbanization- Globalization: Concepts, Causes, impacts on Values and Remedial Measures.

QUESTION PATTERN

TOTAL MARKS =75

PART-A

Answer All Questions, Each Not Exceeding Two Pages (Either or Type) (5x6=30)

- 1.
- 2.
- 3.
- 4.
- 5.

PART-B

Answer Any Three Questions, Each Not Exceeding Four Pages (3x15=45)

- 6.
- 7.
- 8.
- 9.
- 10.