SYLLABUS
For
Bachelor of Business Administration
(HONS.)
Under
Gauhati University (CBCS)

(This is approved in the Academic Council held on 08.11.2019)

REGULATIONS AND SYLLABI FOR THREE YEAR BBA (HONS.) COURSE IN SEMESTER UNDER CBCS FOR THE STUDENTS ADMITTED W.E.F 2019.

1.The Bachelor of Business Administration Course called the BBA Course hereafter shall comprise of three academic years and each academic year shall consist of two semesters. Each semester shall approximately consist of 19 weeks of teaching, 3 weeks of academic and other formalities including the semester examination and 4 weeks of semester break.

2.Eligibility Criteria: A (10 +2) degree in Arts, Science, Commerce or a Diploma in Engineering with minimum **45%** marks in aggregate from a recognized Board/ Council.

3.Admission Criteria: The selection of eligible applications will be based on the applicant's overall performance in (10+2) examination.

4.Examination:

a) There will be 6 (six) examinations, one at the end of each semester
Duration of the semester period will be as follows:
First, Third, Fifth semester : June to December (July– Summer vacation)
Second, Fourth and Sixth semester : January to May.

b) A candidate for the examination shall be examined as per syllabi where each written paper shall be of 3 hours' duration.

c) A candidate shall not be sent up for a semester examination if he/ she has not attended at least 75% of the classes held for each subject including lectures, seminars, tutorials and case analysis.

d) Each paper shall carry 100 marks, out of which 20 marks shall be allocated to internal evaluation. The minimum marks required for passing the examination shall be **35%** both in internal evaluation and written examination, in each paper separately and **45%** in the aggregate separately for each semester examination.

e) If a candidate fails to secure pass marks in a subject paper in the internal evaluation, he/ she shall be debarred from appearing in the Term end Semester examination and he/ she will have to seek re- admission into that semester when it is offered.

f) A candidate shall submit a Summer Project Report here in after referred to as Report, in duplicate to the Head of the Dept. within 2 weeks of completion of the project; generally by **31st August** in the 5th semester period. The Report shall carry 100 marks in total, out of which 20 marks be allotted for internal evaluation. The remaining 80 marks be divided into 50 marks for evaluation of the text of the report and 30 marks for Viva Voce . The Report shall be prepared under the guidance of a teacher of the Department. Who shall be referred to as the Guide for the purpose. The Guide in consultation with the candidate concerned shall determine the topic and exact title of the Report.
Two examiners to be appointed by the Controller of Examinations shall evaluate each Report. The average of the marks awarded to the candidate on the text part of the Report. The Guide and the external examiner shall conduct the Viva Voce examinations jointly.

The Viva Voce marks obtained by the candidate together with the average marks obtained in the text shall be the final marks awarded to the candidate on the Report.

g) A failed candidate is eligible to appear in a maximum of 2 back papers in Term End semester examination, provided he/ she has secured minimum **45%** marks in aggregate in the concerned examination. A student will be allowed to clear six semesters in maximum five years. He/ She will not be allowed to take more than three chances in any semester.

h) A student who could not appear or failed in any semester, will be allowed to clear the same as follows:
   i. First semester with the regular Third/ Fifth semester.
   ii. Second semester with the regular Fourth/ sixth semester

i) If a candidate secures pass marks in internal evaluation but has not cleared any of the semester examination then he/ she will be allowed to appear in the next semester examination, but his/ her final results after Fourth semester will be kept with held until he/ she clears all the back log.

j) If a candidate fails in a semester examination, the marks secured ny him/ her in internal evaluation in each subject shall be carried over to the next semester examination, provided he/ she obtains the minimum pass marks which shall remain valid for two years only.

Results: A candidate shall be awarded BBA Degree on passing all the six semester examination.

Final results will be worked out by adding up total marks secured in all the six semester examinations. Those candidates who **45%** or more but less than 60 percent in aggregate will be declared as having passed the examination in Second Class anf those securing 60 percent or above will be declared as having passed in First Class.

A candidate will be declared to have passed with Distinction in the appropriate class provided the candidate passes all the semester examinations from First to Sixth regularly, with out keeping any arrear subject at any semester and completes the BBA Course in three academic years from the date of his/ her admission and secures at least 75 percent marks.

BACHELOR OF BUSINESS ADMINISTRATION (HONS.) 3 YEAR DEGREE COURSE UNDER CBCS PROGRAMME

	COURSE STRUCTURE	
	1ST SEMESTER	
BBA-AE-1014	BUSINESS COMMUNICATION (LANGUAGE : ENGLISH)	**AECC-1**
BBA-HC-1026	PRINCIPLES OF MANAGEMENT	**CORE COURSE -1**
BBA- HC-1036	MANAGEIAL ECONOMICS	**CORE COURSE-2**
BBA- HG-1046	MATHEMATICAL TECHNIQUES IN BUSINESS	**GE- 1**
	2ND SEMESTER	
BBA-AE-2014	ENVIRONMENTAL SCIENCE	**AECC-2**
BBA-HC-2026	FINANCIAL ACCOUNTING	**CORE COURSE-3**
BBA- HC-2036	STATISTICS FOR BUSINESS DECISIONS	**CORE COURSE- 4**
BBA- HC-2046	INDIAN ECONOMIC SCENARIO	**CORE COURSE- 5**
BBA- HG-2056	COMPUTER FUNDAMENTALS	**GE-2**
	3RD SEMESTER	
BBA-HC-3016	COST AND MANAGEMENT ACCOUNTING	**CORE COURSE-6**
BBA-HC-3026	HUMAN RESOURCE MANAGEMENT	**CORE COURSE-7**
BBA-HC-3036	PERSONALITY AND PERSONAL SKILL DEVELOPMENT	**CORE COURSE- 8**
BBA- HG-3046	OPERATIONS MANAGEMENT AND CONTROL	**GE-3**
BBA- SE-3054	COMPUTER APPLICATIONS	**SEC-1**
	4TH SEMESTER	
BBA-HC-4016	ORGANIZATIONAL BEHAVIOUR AND INDUSTRIAL PSYCHOLOGY	**CORE COURSE-9**
BBA-HC-4026	FINANCIAL MANAGEMENT	**CORE COURSE-10**
BBA-HC-4036	PRINCIPLES OF MARKETING	**CORE COURSE-11**
BBA- HG-4046	BUSINESS RESEARCH	**GE-4**
	5TH SEMESTER	
BBA-HC-5016	LEGAL ASPECTS OF BUSINESS	**CORE COURSE- 12**
BBA- SE-5024	SUMMER PROJECT	**SEC-2**
BBA-HE-5036 BBA-HE-5046	A student would be free to choose any four papers from one group. In 5th and 6th semester they have to choose two papers in each semester from the group given below. The course offers three groups namely Finance (DSE I), Marketing (DSE II) and Human Resource (DSE III)	**DSE-1 & 2**
	6TH SEMESTER	
BBA-HC-6016	BUSINESS POLICY AND STRATEGY	**CORE COURSE-13**
BBA-HC-6026	TAXATION LAWS	**CORE COURSE- 14**
BBA-HE-6036 BBA-HE-6046	A student would be free to choose any four papers from one group. In 5th and 6th semester they have to choose two papers in each semester from the group given below. The course offers three groups namely Finance (DSE I), Marketing (DSE II) and Human Resource (DSE III)	**DSE 3 & 4**

DSE I : FINANCE

- INTERNATIONAL FINANCE
- INVESTMENT BANKING AND FINANCIAL SERVICES
- INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT
- STRATEGIC CORPORATE FINANCE
- BUSINESS ANALYSIS & VALUATION

DSE II : MARKETING

- CONSUMER BEHAVIOUR
- MARKETING OF SERVICES
- ADVERTISING AND BRAND MANAGEMENT
- RETAIL MANAGEMENT
- PERSONAL SELLING & SALES FORCE MANAGEMENT

DSE III : HUMAN RESOURCE

- HUMAN RESOURCE DEVELOPMENT : SYSTEMS AND STRATEGIES
- MANAGEMENT OF INDUSTRIAL RELATIONS
- TALENT AND KNOWLEDGE MANAGEMENT
- PERFORMANCE AND COMPENSATION MANAGEMENT
- TRAINING AND MANAGEMENT DEVELOPMENT

FIRST YEAR
Semester –I

BBA-AE-1014 BUSINESS COMMUNICATION (LANGUAGE : ENGLISH)
(As per UGC syllabus) **(AECC-1)**

BBA-HC-1026 PRINCIPLES OF MANAGEMENT **(CC-1)**

Unit 1: Evolution of Management- Development of management Thought, Schools or Approaches to Management- The Classical School, The Neo Classical or Human Resource School, The Modern School, Management Thinkers and theorists.

Unit 2: Management Concept- Definition, Meaning, Characteristics, Importance/ significance, Objectives, Nature, Levels of management, Management Vs Administration, managerial Skills and Roles.

Unit 3: Management Principles- Henry Fayol's fourteen principles of management, F.W Taylor's scientific management principles.

Unit 4: Functions Of Management-

i. Planning: Meaning and definition, Characteristics, Objectives, need/ importance, Limitations, Essential Elements of Effective Planning, Process/ Steps in planning, Elements/ Components of Planning, Tools and techniques.
ii. Organizing: Meaning and definition, Characteristics, Objectives, need/ importance, Process, Theories, Formal and informal Organisation, Concept of Organization Structure, Forms of Organization Structure, Authority, Delegation, Centralization, decentralization, Span of Control.
iii. Staffing: Meaning and definition, Characteristics, Need/ Importance, Elements of Staffing Function.
iv. Directing: Meaning and definition, Characteristics, Need/ Importance, Objectives, Techniques of directing.
v. Decision Making: Meaning and definition, Characteristics, need/ importance, Objectives, Classification, Decision making process, Techniques of Decision making.
vi. Motivation: Meaning and definition, Characteristics, Objectives, Need and Importance, Theories- Maslow's Need Hierarchy Theory, McGregor's Theory X and Theory Y, Herzberg's Two factor Theory, Types of motivation, Techniques.
vii. Leadership: Meaning and definition, Importance, Leadership Qualities, Leadership Styles.
viii. Communication: Meaning and definition, Characteristics, Need and Importance, Objectives, Classification of Communication, Barriers to Communication, Measures to Overcome barriers.
ix. Controlling: Meaning and definition, Characteristics, Objectives, Need and Importance, Process, Techniques, Difficulties.
x. Budgeting: Meaning and definition, Characteristics, Objectives, Need and Importance, Techniques.

Unit 5: Concept of Coordination, MBO and MBE.

Unit 6: Emerging Horizons to Management.

- **Suggested Books:**

1. Essentials of Management – Kontz & O'Donnell
2. Functions & Principles of Management- J.K. Jain
3. Management- L.M. Prasad
4. Management: Theory & Practice- C.B. Gupta

BBA- HC-1036 MANAGERIAL ECONOMICS (CC-2)

Unit I: Demand, Supply and Market equilibrium: individual demand, market demand, Individual supply, market supply, market equilibrium; Elasticities of demand and supply: Price elasticity of demand, income elasticity of demand, cross price elasticity of demand, Elasticity of supply;

Theory of consumer behavior: cardinal utility theory, ordinal utility theory (indifference Curves, budget line, consumer choice, price effect, substitution effect, income effect for Normal, inferior and giffen goods), revealed preference theory.

Unit II: Producer and optimal production choice: optimizing behavior in short run (geometry of product curves, law of diminishing margin productivity, three stages of Production), optimizing behavior in long run (isoquants, isocost line, optimal Combination of resources)

Costs and scale: traditional theory of cost (short run and long run, geometry of cot curves, envelope curves), modern theory of cost (short run and long run), economies of scale, economies of scope.

Unit III: Theory of firm and market organization: perfect competition (basic features, Short run equilibrium of firm/industry, long run equilibrium of firm/industry, effect of Changes in demand, cost and imposition of taxes) ; monopoly (basic features, short run Equilibrium, long run equilibrium, effect of changes in demand, cost and imposition of taxes, comparison with perfect competition, welfare cost of monopoly), price discrimination, multiplant monopoly ; monopolistic competition (basic features, demand and cost, short run equilibrium, long run equilibrium, excess capacity) ; oligopoly (Cournot's model, kinked demand curve model, dominant price leadership model, prisoner's dilemma)

Suggested Books:

1. Dominick Salvatore (2009). Principles of Microeconomics (5th ed.) Oxford University Press
2. Lipsey and Chrystal. (2008). Economics. (11th ed.) Oxford University Press
3. Koutosyannis (1979). Modern Micro Economics. Palgrave Macmillan
4. Pindyck, Rubinfeld and Mehta. (2009). Micro Economics. (7th ed.). Pearson.
5. Managerial Economics – H L Ahuja

BBA- HG-1046 MATHEMATICAL TECHNIQUES IN BUSINESS (GE-1)

Unit 1: Arithmetic progression: n^{th} term (general term) of the general A.P. , sum of first n terms of the general AP, arithmetic mean, application of A.P. regarding simple interest.
Geometric Progression : : n^{th} term (general term) of the general G.P. , sum of first n terms of the general GP, arithmetic mean, application of G.P. regarding simple interest.
Unit 2: Logarithms: definitions, laws of logarithms and applications, concept of common logarithm, characteristic and mantissa of logarithms.
Unit 3: Set Theory: definition of set, representation of a set, different types of set, equality of sets, subsets of a set and properties, Union of sets and applications, Intersection of sets and applications, Difference of sets and applications, compliment of a set and its properties, theorems related to cardinal numbers.
Unit 4: Determinants : Minors and cofactors of the elements of a determinant, properties of determinants and its application, solving simultaneous equations with two or three unknown variables by Cramer's Rule.
Matrix: Difference between determinants and matrices, types of matrices, equality of matrices, Matrix addition and scalar multiplication, Matrix multiplication, transpose and Adjoint of a matrix, Inverse of a square matrix, Solution of Linear Equations by Matrix Inversion Method.
Unit 5: Functions: Definition of functions, Algebraic, Logarithmic and Exponential functions, even and odd function.
Unit 6: Calculus: basic concept of differentiation and integration, Application of theorems of Differentiation, value of Average Cost (AC) and Marginal Cost (MC) by derivative formulae, Integration by substitution, Integration by parts, Definite integral and application in business and economics.
Linear Programming Problem: Definition, requirement for a LPP, Basic assumptions of LPP, uses and limitations of LPP, solution of a LPP by graphical method.

- **Suggested Books :**

1. Business of Mathematics :Sancheti & Kapoor
2. Business Mathematics :Zameeruddin, Khanna, Bhambri
3. Quantitative Techniques in Management : N.D.Vora
4. A Textbook Of Business Mathematics : P.L. Hazarika

Semester- II

BBA-AE-2014: ENVIRONMENTAL SCIENCE **(AECC-2)**

(As per UGC syllabus)

BBA-HC-2026: FINANCIAL ACCOUNTING **(CC-3)**

Unit 1: Financial Accounting: Introduction, need and objectives. Generally Accepted Accounting Principles .

Unit 2: Double Entry System of Book-keeping: Books of Original Entry and Books of Final Entry; Journals, Books of Accounts and Ledger Books, Cash Book and Bank Account.

Unit 3: Final Accounts of Sole Proprietorship Firms: Preparation of Trial Balance, Rectification of Errors, Trading and Profit and Loss Account and Balance Sheet.

Unit 4: Accounts for Non-Profit Organization: Receipt and Payment Account and Income and Expenditure Account.

Unit 5: Accounting Information: Meaning of Accounting Information and its sources; Corporate Annual Report and its contents, Books of Account to be maintained by a company; Latest format of Profit and Loss Account and Balance Sheet as per Companies Act,2013.

- **Suggested Books:**

1. Advanced Accountancy- Jain & Narang.
2. Advanced Accountancy- S.N. Maheswari.
3. Accountancy- B.B.Dam, Sujit Sikidar, R.Barman & B.Bora.
4. Accountancy – D.K. Goel, Rajesh Goel, Shelly Goel, Arya Publications.

BBA- HC-2036: STATISTICS FOR BUSINESS DECISIONS (CC-4)

Unit I: Measures of Central Value: Characteristics of an ideal measure; Measures of Central Tendency - Mean median, mode, harmonic mean and geometric mean. Merits, Limitations and Suitability of averages. Relationship between averages. Measures of Dispersion: Meaning and Significance. Absolute and Relative measures of dispersion - Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation, Moments, Skewness, Kurtosis.

Unit II: Correlation Analysis: Meaning and significance. Correlation and Causation, Types of correlation. Methods of studying simple correlation - Scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient, Regression Analysis: Meaning and significance, Regression vs. Correlation. Linear Regression, Regression lines (X on Y, Y on X) and Standard error of estimate.

Unit III: Analysis of Time Series: Meaning and significance. Utility, Components of time Series, Models (Additive and Multiplicative), Measurement of trend: Method of least Squares, Parabolic trend and logarithmic trend; Index Numbers: Meaning and Significance, problems in construction of index numbers, methods of constructing index numbers- weighted and unweighted, Test of adequacy of index numbers, chain index numbers, base shifting, splicing and deflating index number.

Unit IV: Probability: Meaning and need. Theorems of addition and multiplication. Conditional probability. Bayes' theorem, Random Variable- discrete and continuous. Probability Distribution: Meaning, characteristics (Expectation and variance) of Binomial, Poisson, and Normal distribution. Central Limit Theorem.

Suggested Books:

1. S.P. Gupta (S.P.): Statistical Methods, Sultan Chand & Sons, 34th Edition.
2. Richard Levin & David Rubin : Statistics for management, Prentice Hall.
3. Anderson, Sweeny & Williams: Statistics for Business and Economics, South Western.
4. P.L. Hazarika : A textbook of Business Statistics
5. P.K.Mathur : Business Statistics

BBA- HC-2046 INDIAN ECONOMIC SCENARIO (CC-5)

Unit 1: a) Business Environment:- Nature, Significance of Economic, Non-Economic Environment in India, Macro, Micro Environment.
b) Industrial Policy, Monetary Policy.

Unit 2: a) GATT / WTO:- Objectives, Principles, Impact in the India's Industrial and Business Sector.
b) Economic Integration:- Meaning, Types and Importance.
c) Globalization / Liberalization – Concept , Measures.
Unit 3: a) Foreign Collaboration / Capital, Investments- Role of Multinational Corporations – Types, Nature.
b) Role of Foreign Aid and World Bank.
c) Balance of Payments Concepts – Current Account, Capital Account, Dis-equilibrium, Measures , Trade Policy.
Unit 4: a) Government Budget: Types, Components, Fiscal Deficit.
b) Banking and Non-Banking Financial Institutions – Types, Importance.
Unit 5: a) Planning in India: - Achievements, Failures, De-centralized Planning.
b) Small and Medium Scale Industries: Problems and Prospects.
c) Trade Cycle – Meaning and Phases.

- **Suggested Books:**

1. Indian Economy – Dutt & Sundaram
2. Business Environment : H.L. Ahuja

BBA- HG-2056 COMPUTER FUNDAMENTALS **(GE-2)**

Unit 1: Brief history of development of Computers, Generations and its evolution, characteristics of computers, Hardware, software, computer languages.

Unit 2: Criteria for using the computers, main areas of applications. Basic Architecture, Components And Functions Of Computers, Computer Accessories.

Unit3: Types of Computers: Analog, Digital, Hybrid, General purpose and Special purpose computers, Micro Computers, Mini Computers, main frame computers and Super Computers.

Unit 4: Operating System and Office Automation: Booking concept, MS and open source operating systems, Introduction to system management, overview of languages, Compilers, interpreters, Assemblers, LAN, MAN, WAN, WiFi, Communication Channels.

Unit 5: Basic commands in MS Excel, Features, functions and uses of MS word, Mail Merge feature in MS Word, Basic Concepts of MS Power point.

Unit 6: Information Technology: Fundamentals, Perspective, Applications and scope, Introduction to Internet, Browsers, applications and scope.

- **Suggested Books:**

1. Computer Fundamentals by D.P. Nagpal
2. First Course in Computers by Sanjay Saxena
3. Computer Fundamentals by V. Raja Raman
4. Introduction to Computers by Leon & Leon

SECOND YEAR
Semester-III

BBA-HC-3016 COST AND MANAGEMENT ACCOUNTING (CC-6)

Unit 1: Meaning, Nature and Scope of Cost and Management Accounting, Objectives and Functions of Management Accounting. Relationship between Financial Accounting and Cost Accounting and Financial Accounting and Management Accounting.

Unit 2: Cost elements: Material Cost, Labour Cost and overheads, costing method, job costing, contract costing and process costing, Batch costing.

Unit 3: Standard Costing: Variance Analysis

Break-even Analysis: Marginal Costing

Unit 4: Budgets and Budgetary Control: Meaning, Objectives and Limitations of Budgetary control. Types of Budget, Master Budget & Functional Budget, Production Budget, Raw Materials Budget, Sales Budget, Flexible Budget and Cash Budget (Receipts and Payments Method)

- **Suggested Books:**
  1. Cost & Management Accounting- Jain & Narang
  2. Management Accounting- Khan & Jain

BBA-HC-3026 HUMAN RESOURCE MANAGEMENT (CC-7)

Unit I

Human Resource Management: Concept, Functions, roles, skills & competencies, HRD definition,Goals and Challenges. The changing environment of HRM – globalization, cultural environment, technological advances, workforce diversity, corporate downsizing, changing skill requirement, HRM support for improvement programs Work life balance, HR Role In Strategy Formulation & Gaining Competitive Advantage. HRM issues in Indian Organisations.

Unit II

Human Resource Planning: Process, Forecasting demand & supply, Skill inventories Human Resource Information System (HRIS) succession planning, Job analysis – Uses, Methods, Job description & Job specifications. HR accounting and Human Resource Development (HRD) audit concept. Recruitment, Selection & Orientation: internal & external sources, e- recruitment, selection process, orientation process.

Unit III

Training: Concept, Needs, Systematic approach to training, Methods of training. Management development: Concept & Methods. Performance management system: Concept, uses of performance appraisal, performance management methods, factors that distort appraisal, appraisal interview .Career planning: career anchors, career life stages. Compensation: Steps of determining compensation, job evaluation, components of pay structure, factors influencing compensation levels, wage differentials & incentives, profit sharing, gain sharing, employees' stock option plans. Brief introduction of social security, health, retirement & other benefits.

Unit IV

Industrial Relations: Introduction to Industrial Relations, Trade unions role, types, functions, problems, industrial dispute- concept, causes & machinery for settlement of disputes- grievance, concepts, causes & grievance redressal machinery, disciplineconcept, aspect of discipline & disciplinary procedure, Collective bargaining- concept, types, process, problems, essentials of effective collective bargaining .

Suggested Books:

1. De Cenzo, D.A. & Robbins: Fundamentals of Human Resource Management, New York: John Wiley & Sons.
2. Dessler, G: Human Resource Management, Pearson.
3. Monappa & Saiyaddin: Personnel Management,Tata McGraw Hill.
4. Rao, V.S.P.: Human Resource Management- Text and Cases, Excel Books.
5. R. Wayne Mondy & Rober M. Noe: Human Resource Management, Pearson

BBA-HC-3036 PERSONALITY AND PERSONAL SKILL DEVELOPMENT (CC-8)

Unit 1: PERSONALITY – Meaning, Elements/ Determinants, Types, Development of Personality, Concept of Self Esteem, Assertiveness, Interpersonal awareness (JOHARI) , Empathy, Drive Strength, Emotional intelligence, Time management, Stress management, Personal effectiveness, personal grooming, health & hygiene, body language gestures, Commitment Ethics, Growth Motivation.

Unit 2: TEAMS & GROUPS – Meaning of Groups, Features, Types, Theories of Group formation, Reasons of Group formation, Group Performance, Group Roles, Group Norms, Group Cohesion, Problems/ Difficulties of Informal Groups ; Meaning of Teams, Characteristics, Importance, Types, Building Effective Team.

Unit 3: CAREER DEVELOPMENT AND PLANNING – Meaning of Career, Meaning of Career Planning, Need/Importance of Career Planning, Steps in the Career Planning process.

Unit 4: BUSINESS ETIQUETTES & MANNERS – Meaning of Business Etiquettes, Advantages/ Benefits. Etiquette of the written word, Telephone Etiquettes, Business Meetings, Types, Handing business meetings, Sales and Customer Orientation.

Suggested Book:

Organisational Behaviour – S.S.Khanka, Publisher S.Chand.

BBA- HG-3046 OPERATIONS MANAGEMENT AND CONTROL (GE-3)

Unit 1: Production management- definition, scope importance ,functions, system concept of production, types of production system.

Unit 2: Product design and analysis- concept, steps of product design, process planning and design, value analysis, standardization and simplification.

Capacity planning and investment decisions-determination of plant capacity ,capacity planning strategies, equipment selection.

Unit 3: Facility location- factors affecting plant location, facility location problems-single facility location problem, multi facility location problem.

Plant layout and material handling- classification of layout, Group technology ,material handling system.

Unit 4: Material Management and inventory control-Integrated Material Management, components of integrated Material Management, inventory control, models of inventory, purchasing management, store management -ABC analysis, XYZ analysis, VED analysis.

Production planning and control- objectives, importance, production planning and control procedure.

Scheduling -single machine scheduling ,flow shop scheduling- Johnson's model, extension of junction rule, job shop scheduling.

Unit 5: Work study- method study, time study ,work sampling

Quality control -objectives, importance, classification of quality control techniques, control charts, Six Sigma.

- **Suggested books:**

1. Production and operation management-R.Panneerselvam
2. Operations Management and Control- Dr C.B Gupta

BBA- SE-3054 COMPUTER APPLICATIONS **(SEC-1)**

Theory marks=50

Unit 1: Word Processing: Introduction to word processing, Creating and saving a documents, paragraph formatting techniques. working with tables, Spreadsheet: concept of worksheets and workbooks, creating charts and graphics in MS Excel, PowerPoint presentation: Creating graphs, tables, charts, use of animation and multimedia

Unit 2: Database management System:- Definition of Database, Traditional File Approach vs. DBMS approach, Characteristics of the Data Base Approach, DBMS user, Role of a DBA, Advantage and disadvantage of using DBMS, DBMS architecture. ER model as a tool for conceptual design entities, attributes and relationships, weak and strong entities, conversion of ER model into relational schema. ANSI SQL –92 Standards: DDL, DML.

Unit 3: System development life cycle:- System models and types of models, System analysis, feasibility analysis, cost benefit analysis, payback period.

Unit 4: Tally: Basic definition of Tally, Features of Tally, Advantage and disadvantage of Tally. Tally accounting, manual accounting, and financial accounting.

Practical marks=30

Tally.ERP9 Install.
GST in Tally.ERP9.
Interest calculation.
Bill Of Material.
Prepare profit and loss account, Balance sheet

- **Suggested Books:**

1. Computer Application in Business R.Paraeswaram
2. Introduction to database management system C.J. Date
3. Tally ERP9 Training Guide - 4th revised & updated edition Asok K. Nadhani

Semester-IV

BBA-HC-4016 ORGANISATIONAL BEHAVOIOUR AND INDUSTRIAL PSYCHOLOGY

(CC-9)

Unit 1: Introduction: Meaning and concept of OB, Key elements of OB, Nature and Scope of OB, Importance of studying OB, Contributing disciplines to OB, Models of OB.

Unit 2: Individual Behavior: Personality- Concept, Determinants, Types, and Theories: Type theory, Trait theory, Psychoanalytical theory, Social learning theory, Self theory. Development of Personality: Erikson's Eight Life Stages, Influence of Personality in an Organization.

Perception- Meaning, Perceptual process, Factors affecting perception, Improvement of Perception, Application of perception in OB, Difference between perception and sensation.

Learning- Meaning, Determinants of learning, Learning Theories: Classical Conditioning, Operant Learning, Cognitive Theory, Social Learning Theory. Meaning of Reinforcement: Schedules of Reinforcement, Punishment, Effect of Learning on Behaviour.

Attitudes and Values: Concept and Meaning of Attitude, Features, Sources of Attitudes, Types of attitudes at work place, modification of attitudes. Concept and meaning of values, types, factors affecting values.

Unit 3: Interpersonal Behaviour: Concept, Types, Skills for Cooperative Interpersonal Behaviour. Concept of TA: Levels of Self Awareness, Ego States, Life positions, Transaction-Types, Benefits of TA.

Unit 4: Group Behaviour: Meaning of Group, Types of Groups, Reasons for formation of groups, Theories of Group formation, Stages of Group formation and development, Concept of Group Dynamics, Group Behaviour- concept of group norms, group cohesion, group role, role identity, role ambiguity, role conflict, role expectations, Inter-Group Behaviour.

Group Decision making- Meaning, Process, Techniques, Advantages and Disadvantages.

Teams- Concept, Types, Teams Vs Groups, Building and managing effective teams.

Unit 5: Organizational Issues: Organizational Conflicts- Meaning and definition, Sources, Types, Advantages and Disadvantages, Process/ Stages, Conflict Management.

Organizational Culture- Meaning and definition, types, functions, Factors influencing organization culture.

Organizational Change- Concept, Kinds, Resistance to changes, Causes, Overcoming resistance to Change.

Organizational Climate- Concept, Features, Elements.

Unit 6: Industrial Psychology: Meaning, Importance, Scope, Objectives, Characteristics/ Features, History of Industrial Psychology.

- **Suggested Books:**

1. Organizational Behavior by L.M.Prasad
2. Organizational Behaviour by Rakesh Gupta
3. Organizational Behaviour by S.S.Khanka

BBA-HC-4026 FINANCIAL MANAGEMENT (CC-10)

Unit I

Nature of Financial Management: Finance and related disciplines; Scope of Financial Management; Profit Maximization, Wealth Maximization - Traditional and Modern Approach; Functions of finance – Finance Decision, Investment Decision, Dividend Decision; Objectives of Financial Management; Organization of finance function; Concept of Time Value of Money, present value , future value, and annuity.

Unit II

Long -term investment decisions: Capital Budgeting - Principles and Techniques; Nature and meaning of capital budgeting; Estimation of relevant cash flows and terminal value; Evaluation techniques - Accounting Rate of Return, Net Present Value, Internal Rate of Return & MIRR, Net Terminal Value, Profitably Index Method.

Concept and Measurement of Cost of Capital: Explicit and Implicit costs; Measurement of cost of capital; Cost of debt; Cost of perpetual debt; Cost of Equity Share; Cost of Preference Share; Cost of Retained Earning; Computation of over-all cost of capital based on Historical and Market weights.

Unit III

Capital Structures: Approaches to Capital Structure Theories - Net Income approach, Net Operating Income approach, Modigliani-Miller (MM) approach, Traditional approach, Capital Structure and Financial Distress, Trade-Off Theory.

Dividend Policy Decision - Dividend and Capital; The irrelevance of dividends: General, MM hypothesis; Relevance of dividends: Walter's model, Gordon's model;

Leverage Analysis: Operating and Financial Leverage; EBIT -EPS analysis; Combined leverage.

Unit IV

Working Capital Management: Management of Cash - Preparation of Cash Budgets (Receipts and Payment Method only); Cash management technique,

Receivables Management – Objectives; Credit Policy, Cash Discount, Debtors Outstanding and Ageing Analysis; Costs - Collection Cost, Capital Cost, Default Cost, Delinquency Cost, Inventory Management (Very Briefly) - ABC Analysis; Minimum Level; Maximum Level; Reorder Level; Safety Stock; EOQ, Determination of Working Capital.

Readings

1. M.Y. Khan & P.K. Jain: Financial Management Text Problem and Cases, Tata McGraw Hill Pubilshlng Co. Ltd.
2. R. P. Rustogi: Financial Management: Theory Concepts and Practices, Taxmann Publication.
3. I.M. Pandey: Financial Management: Theory and Practices, Vikas Publishing House
4. R.A. Brealey, S.C. Myers, F. Allen& P. Mohanty: Principles of Corporate Finance**,** McGraw Hill Higher Education
5. J.V. Horne & J.M. Wachowicz: Fundamentals of Financial Management Prentice Hall

BBA-HC-4036 PRINCIPLES OF MARKETING (CC-11)

Unit I: Introduction: Nature, Scope and Importance of Marketing, Evolution of Marketing; Core marketing concepts; Company orientation - Production concept, Product concept, Selling concept, Marketing concept, Holistic marketing concept. Marketing Environment: Demographic, economic, political, legal, socio cultural, Technological environment (Indian context); Portfolio approach – Boston Consultative Group (BCG) matrix

Unit II: Segmentation, Targeting and Positioning: Levels of Market Segmentation, Basis for Segmenting Consumer Markets, Difference between Segmentation, Targeting and Positioning;

Unit III: Product & Pricing Decisions: Concept of Product Life Cycle (PLC), PLC marketing strategies, Product Classification, Product Line Decision, Product Mix Decision, Branding Decisions, Packaging & Labelling, New Product Development. Pricing Decisions: Determinants of Price, Pricing Methods (Non-mathematical treatment), Adapting Price (Geographical Pricing, Promotional Pricing and Differential Pricing).

Unit IV: Promotion Mix: Factors determining promotion mix, Promotional Tools – basics of Advertisement, Sales Promotion, Public Relations & Publicity and Personal Selling; Place (Marketing Channels): Channel functions, Channel Levels, Types of Intermediaries: Types of Retailers, Types of Wholesalers.
Marketing of Services - Unique Characteristics of Services, Marketing strategies for service firms – 7Ps.

Readings:

1. Kotler, P. & Keller, K. L.: Marketing Management, Pearson.
2. Kotler, P., Armstrong, G., Agnihotri, P. Y., & Ul Haq, E.: Principles of Marketing: A South Asian Perspective, Pearson.
3. Ramaswamy, V.S. & Namakumari, S.: Marketing Management: Global Perspective-Indian Context, Macmillan Publishers India Limited.
4. Zikmund, W.G. & D' Amico, M.: Marketing, Ohio: South-Western College Publishing.

BBA- HG-4046 BUSINESS RESEARCH **(GE-4)**

Unit I: Nature and Scope of Marketing Research – Role of Marketing Research in decision making. Applications of Marketing Research – marketing research; The Research process – Steps in the research process; the research proposal; Problem Formulation: Management decision problem Vs. Marketing Research problem.

Unit II: Research Design: Exploratory, Descriptive, Causal. Secondary Data Research: Advantages & Disadvantages of Secondary Data, Criteria for evaluating secondary Sources, secondary sources of data in Indian Context, Syndicated Research (in India)

Unit III: Primary Data Collection: Survey Vs. Observations. Comparison of self administered, Telephone, mail, emails techniques. Qualitative Research Tools: Depth Interviews focus groups and projective techniques; Measurement & Scaling: Primary scales of Measurement-Nominal, Ordinal, Interval & Ratio. Scaling techniques paired Comparison, rank order, constant sum, semantic differential, itemized ratings, Likert Scale; Questionnaire-form & design.

Unit IV: Sampling: Sampling techniques, determination of sample size; Data Analysis:

Readings:

1. Zikmund, Babin & Carr: Business Research Methods, South-Western.
2. Cooper & Schindler: Business Research Methods McGraw-Hill Education,
3. Churchill: Marketing Research: Methodological Foundations, Cengage Learning.
4. Aaker, Kumar, Day - Marketing Research. Wiley.
5. Naresh Malhotra – Marketing Research, Pearson.

THIRD YEAR
Semester-V

BBA-HC-5016 LEGAL ASPECTS OF BUSINESS (CC-12)

Unit I:

The Indian Contract Act 1872: Meaning and Essentials of contract; Kinds of contract- Based on: validity, formation & performance, law relating to offer and acceptance, Consideration, competency to contract, free consent, Void agreements, performance of Contracts, discharge of contracts, breach of contracts and quasi contract, Special Contracts: contract of indemnity and guarantee, bailment and pledge, and agency.

Unit II:

Sale of Goods Act 1930: Sale and agreement to sell, implied conditions and warranties, Sale by non-owners, rights of unpaid seller.

Negotiable Instruments Act 1881:

Meaning of negotiable instruments, type of negotiable instruments, promissory Note, bill of exchange, Cheque.

Unit III:

The Companies Act 2013:

Meaning and types, Incorporation, Memorandum & Articles of association, Prospectus, Issue of shares and bonus shares, rights issue, sweat equity, role of Directors, share qualification, company meetings.

The Limited Liability Partnership Act 2008:

Meaning and nature of limited partnership, formation, partners & their relations, extent and limitation of liability.

Unit IV:

Consumer Protection Act 1986:

Objectives and machinery for consumer protection, defects and deficiency removal, rights of consumers.

The Right to Information Act 2005:

Salient features and coverage of the act, definition of terms information, right, record, public authority; obligations of public authorities, requesting information and functions of PIO.

Readings:

1. M.C.Kucchal: Business Law/Mercantile Law, Vikas Publishing.House (P) Ltd.
2. M.C.Kucchal,& Vivek Kucchal: Business Legislation for Management, Vikas Publishing House (P) Ltd.
3. Dr. G. K. Kapoor & Sanjay Dhamija: Company Law and Practice-A comprehensive textbook on Companies Act 2013, latest edition, Taxmann.
4. Avtar Singh: Principle of Mercantile Law, Eastern Book Company
5. Gulshan Kapoor: Business Law, New Age International Pvt Ltd Publishers.
6. Maheshwari & Maheshwari: Principle of Mercantile Law, National Publishing Trust
7. Rohini Aggarwal: Mercantile & Commercial Law, Taxmann.

BBA- SE-5024 SUMMER PROJECT **(SEC-2)**

(Duration 1st July to 15th August)

BBA- HE-5036 **(DSE-1)**

BBA- HE-5046 **(DSE-2)**

A Student can choose any two papers from any one of the 3 groups of Discipline Specific Electives (Finance, Marketing or Human Resource) the detailed syllabus for which are given after syllabus for sixth semester.

Semester-VI

BBA-HC-6016 BUSINESS POLICY AND STRATEGY (CC-13)

Unit I: Nature & importance of business policy & strategy: Introduction to the strategic management process and related concepts; Characteristics of corporate, business & functional level strategic management decisions.
Company's vision and mission: need for a mission statement, criteria for evaluating a mission statement- Goal, Process & Input formulation of the mission statement-Drucker's Performance Area, Bennis's Core Problem; formulation of mission statement.
Unit II: Environmental Analysis & Diagnosis: Analysis of company's external environment Environmental impact on organizations policy and strategy, organisations dependence on the environment, analysis of remote environment, analysis of specific environment- Michael E. Porter's 5 Forces model; Internal analysis: Importance of organisation's capabilities, competitive advantage and core competence, Michael E. Porter's Value Chain Analysis.
Unit III: Formulation of competitive strategies: Michael E. Porter's generic competitive Strategies, implementing competitive strategies- offensive & defensive moves. Formulating Corporate Strategies: Introduction to strategies of growth, stability and Renewal, Types of growth strategies – concentrated growth, product development, Integration, diversification, international expansion (multi domestic approach, Franchising, licensing and joint ventures), Types of renewal strategies – retrenchment and turnaround. Strategic fundamentals of merger & acquisitions.
Unit IV: Strategic Framework: Strategic analysis & choice, Strategic gap analyses, Portfolio analysis – BCG, GE, product market evolution matrix, experience curve, directional policy matrix, life cycle portfolio matrix, grand strategy selection matrix; Behavioural considerations affecting choice of strategy; Culture and Strategic Leadership: Implementing & operationalizing strategic choice, Impact of structure, culture & leadership, functional strategies & their link with business level strategies, Balanced Score Card; Introduction to Strategic control & evaluation, Strategic Surveillance.

Readings:

1. J.A. Pearce & R.B. Robinson : Strategic Management formulation implementation and control, TMH
2. Arthur A. Thompson Jr. & A.J Strickland III : Crafting and executing strategy, TMH

Supplementary Readings

1. Gerry Johnson & Kevan Scholes, Exploring corporate strategies, PHI
2. Upendra Kachru: Strategic Management, Excel books
3. Arthur A. Thompson Jr. and A.J. Strickland: Strategic Management –Concepts and Cases, McGraw-Hill Companies
4. Lawrence R. Jauch & William F. Glueck: Business Policy and Strategic Management (Mcgraw Hill Series in Management).

BBA-HC-6026 TAXATION LAWS **(CC-14)**

Unit 1: Law relating to Income Tax : Basic concepts and definitions, Previous year, Assessment year, Assesses, Person, Agricultural Income, Casual Income, Exempted Incomes, Residential Status and Tax Liability.

Unit 2: Heads of Income: Income from Salaries, Income from House Property, Profits and Gains of Business or Profession, Capital Gains, Income from Other Sources. (Simple Problems)

Unit 3: Computation of Gross Total Income and Total Income, deductions from Gross Total Income of individuals.

Unit 4: Concept of Incidence, Impact and Shifting of Tax ; Tax planning, tax avoidance and tax evasions.

Unit 5: Goods and Services Tax (GST) : Basic concepts, Levy of GST.

- **Suggested Books:**
  1. Direct Taxes – B.B.Dam, Sujit Sikidar, R.Barman, B.Bora.
  2. Students' Guide to GST & Customs Law (Taxmann) – Dr. Vinod K. Singhania
  3. Students' Guide to Income Tax (Taxmann) – Dr Vinod K. Singhania, Dr.Monica Singhania.

BBA- HE-6036 **(DSE-3)**

BBA- HE-6046 **(DSE-4)**

A Student can choose any two papers from the same Discipline Specific Elective group from which he/she has chosen the two DSE papers in semester-V. The detailed syllabus is given below:-

DSE Group I : FINANCE

INTERNATIONAL FINANCE

UNIT-I

Introduction: concept of International trade, International Business, International Finance and differences among them. Theories of International trade, International trade financing in India, Balance of payments (of India)

International Monetary System: Different types of Exchange rate mechanisms- the gold standard, the gold exchange standard, The Bretton Woods System, Current monetary system, European Monetary Union. IMF and World Bank.

UNIT-II

Foreign Exchange Management: Forex market – Wholesale and Domestic market, Quotations- direct, indirect and cross currency; various kinds of transactions and their Settlement dates, forward rates, Swaps, Quotes for various kinds of Merchant Transactions; Early delivery, extension or cancellation of Forward contracts

Exchange Rate determination and Forecasting: Purchasing power parity and Interest rate Parity, relationship between PPP and IRP, reasons for deviation from PPP and IRP; models of exchange rate forecasting- forward rate as an unbiased predictor, the Demand-Supply approach, the monetary approach, the Asset approach, the portfolio balance Approach, other models

UNIT-III

Foreign Exchange Exposures: Financial Accounting and Foreign Exchange- Alternative Currency Translation Methods, Statement of Financial Accounting, Standards No.8, Statement of Financial Accounting Standards No.-52, Transaction Exposure, Managing Accounting Exposure- Managing Transaction and Translation Exposure, Designing a Hedging Strategy, Measuring and managing Economic Exposure- Foreign Exchange Risk and Economic Exposure, Identifying Economic Exposure, Calculating Economic Exposure, Operational Measure of Exchange Risk.

Multinational Financial System- Value of the Multinational Financial System, Intercompany Fund- Flow Mechanisms: Cost and Benefits, Designing a Global Remittance Policy, Transfer Pricing and Tax Evasion. Issue of GDR, ADR Euro bonds and Foreign bonds.

UNIT-IV

International Investment Management: International Portfolio Investment- Issues in Foreign Investment Analysis, International Bond Investing, Strategies for Direct Investment, Bond Investment & Portfolio Investment, Optional International Asset Allocation. International project appraisal- IRR and APV methods; Managing Political Risk- Measuring Political Risk, Country Risk Analysis, Managing Political Risk, Post expropriation Policies.

Multinational Working Capital Management**:** Current Asset Management for the Multinational- International Cash Management, Accounts Receivables Management, Inventory Management.

Text Books:

1. PG Apte: International Finance, TataMcgraw Hill.
2. Alan C. Shapiro: Multinational Financial Management- Prentice Hall

References:

3. Maurice D. Levi: International Finance- The Markets and Financial Management of Multinational Business, Mcgraw Hill.

INVESTMENT BANKING AND FINANCIAL SERVICES

UNIT- 1

Introduction: An Overview of Indian Financial System, Investment Banking in India, Recent Developments and Challenges ahead, Institutional structure and Functions of Investment / Merchant Banking; SEBI guidelines for Merchant Bankers, Registration, Obligations and responsibilities of Lead Managers, Regulations regarding Continuance of Association of lead manager with an issue

UNIT II

Issue Management: Public Issue: classification of companies, eligibility, issue pricing, Promoter's contribution, minimum public offer, prospectus, allotment, preferential Allotment, private placement, Book Building process, designing and pricing, Green Shoe Option; Right Issue: promoter's contribution, minimum subscription, advertisements, Contents of offer document, Bought out Deals, Post issue work & obligations, Investor Protection, Broker, sub broker and underwriters

UNIT III

Leasing and Hire Purchase: Concepts of leasing, types of leasing – financial & operating Lease, direct lease and sales & lease back, advantages and limitations of leasing, Lease Rental determination; Finance lease evaluation problems (only Lessee's angle), Hire Purchase interest &Installment, difference between Hire Purchase & Leasing, Choice Criteria between Leasing and Hire Purchase mathematics of HP, Factoring, forfaiting and its arrangement, Housing Finance : Meaning and rise of housing finance in India, Fixing the amount of loan, repricing of a loan, floating vs. fixed rate, Practical problems on housing finance.

UNIT IV

Venture Capital: Concept, history and evolution of VC, the venture investment process, various steps in venture financing, incubation financing.

Insurance: concept, classification, principles of insurance, IRDA and different regulatory norms, operation of General Insurance, Health Insurance, Life Insurance.

Credit Ratings: Introduction, types of credit rating, advantages and disadvantages of credit ratings, Credit rating agencies and their methodology, International credit rating practices.

Securitization: concept, securitization as a funding mechanism, Traditional and nontraditional mortgages, Graduated-payment mortgages (GPMs), Pledged-Account Mortgages (PAMs), Centralized Mortgage obligations (CMOs), Securitization of non mortgage assets, Securitization in India.

REFERENCES

1. M.Y.Khan: Financial Services, Tata McGraw –Hill.
2. Machiraju: Indian Financial System, Vikas Publishing House.
3. J.C.Verma: A Manual of Merchant Banking, Bharath Publishing House.
4. K.Sriram: Hand Book of Leasing, Hire Purchase & Factoring, ICFAI, Hyderabad.
5. Ennew.C.Trevor Watkins & Mike Wright: Marketing of Financial Services, Heinemann Professional

INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT

Unit I

Basics of risk and return: concept of returns, application of standard deviation, coefficient of variation, beta, alpha. Bonds : present value of a bond, yield to maturity, yield to call, yield to put, systematic risk, price risk, interest rate risk, default risk. Yield curve and theories regarding shape of yield curve. Unsystematic risk and non-risk factors that influence yields. Duration and modified duration, immunization of a bond portfolio. Fundamental analysis: EIC framework; Economic analysis: Leading lagging & coincident macro-economic indicators, Expected direction of movement of stock prices with macro-economic variables in the Indian context; Industry analysis: stages of life cycle, Porter's five forces model, SWOT analysis, financial analysis of an industry; Company Analysis.

Unit II

Share valuation: Dividend discount models- no growth, constant growth, two stage Growth model, multiple stages; Relative valuation models using P/E ratio, book value to market value. Technical analysis: meaning, assumptions, difference between technical and fundamental analysis; Price indicators- Dow theory, advances and declines, new highs and lows- circuit filters. Volume indicators- Dow Theory, small investor volumes. Other indicators- futures, institutional activity, Trends: resistance, support, consolidation, Momentum- Charts: line chart, bar chart, candle chart, point & figure chart. Patterns: head & shoulders, triangle, rectangle, flag, cup & saucer, double topped, double bottomed, Indicators: moving averages. Efficient market hypothesis; Concept of efficiency: Random walk, Three forms of EMH and implications for investment decisions. (No numericals in EMH and technical analysis)

Unit III

Portfolio analysis: portfolio risk and return, Markowitz portfolio model: risk and return for 2 and 3 asset portfolios, concept of efficient frontier & optimum portfolio. Market Model: concept of beta systematic and unsystematic risk. Investor risk and return preferences: Indifference curves and the efficient frontier, Traditional portfolio management for individuals: Objectives, constraints, time horizon, current wealth, tax considerations, liquidity requirements, and anticipated inflation, Asset allocation: Asset allocation pyramid, investor life cycle approach, Portfolio management services: Passive – Index funds, systematic investment plans. Active – market timing, style investing.

Unit IV

Capital asset pricing model (CAPM): Efficient frontier with a combination of risky and risk free assets. Assumptions of single period classical CAPM model. Characteristic line, Capital Market Line, Security market Line. Expected return, required return, overvalued and undervalued assets. Mutual Funds :Introduction, calculation of Net Asset Value (NAV) of a Fund, classification of mutual fund schemes by structure and objective, Advantages and disadvantages of investing through mutual funds. Performance Evaluation using Sharpe's Treynor's and Jensen's measures.

References:

1. Fischer, D.E. & Jordan, R.J.: Security Analysis & Portfolio Management, Pearson Education.
2. Sharpe, W.F., Alexander, G.J. & Bailey, J.: Investments, Prentice Hall of India.
3. Singh,R: Security Analysis & Portfolio Management . Excel Books.
4. Frank K Reilly & Keith C Brown: Investment Analysis and Portfolio Management, Cenage India Pvt. Ltd.

STRATEGIC CORPORATE FINANCE

UNIT-I

Introduction to strategic corporate finance: Strategy Vs Planning, significance of strategy in financial decisions, Different types of financial strategy for Shareholders Wealth Maximization, overall corporate value addition and Economic Value Addition.

Strategic Cost Management: Traditional costing Vs Strategic Costing, Relevant costs Vs Irrelevant costs, Different types of strategic costing and their relevance- Target Costing, Activity based Costing, Life Cycle Costing, Quality Costing, Zero Based Budgeting, Strategic cost reduction techniques and value chain analysis.

Alternative sources of financing – alternative sources of financing, Different approach to infrastructure projects financing- Public Private Partnership (PPP) and its relevance.

UNIT-II

Management Buy-outs: Establishing feasibility of the buy-out, Negotiating the main terms of the transaction with the vendor including price and structure, Developing the business plan and financial forecasts in conjunction with the buy-out team for submission to potential funders, negotiations with potential funders so that the most appropriate funding offers are selected.

Management Buy-ins: Management Buy-in/Buy-outs ("BIMBOs"), Vendor initiated buy-outs/buy-ins.

Valuing Real assets in the presence of risk: tracking portfolios and Real Asset valuation, Different Approaches of Valuing Real Assets, Capital Budgeting and Strategic policy

Real options: Financial and real options compared, various types of real options, the Black-Scholes model, Decision tree analysis, application of Real options, Drawbacks of Real options

UNIT-III

Financial Distress and restructuring: Meaning of Bankruptcy, Factors leading to Bankruptcy, symptoms and predictions of bankruptcy, reorganization of distressed firms, liquidation of firms. Company disposals: retirement sale or the sale of a noncore Subsidiary, planned exit, forceful retirement and other disposals. Exit strategy most appropriate exit route, valuation, timing of sale and tax planning opportunities, Identification of potential purchasers, approaching the potential purchaser, negotiate with potential acquirers and selection of a preferred purchaser, calculation of the various tax implications.

Fundraising: identification of different sources of development capital, determination of capital structure and factors affecting the capital structure, cost of capital and cost saving strategy, production of a business plan and financial forecasts to enable potential funders to assess the proposition. Due Diligence: financial due diligence for both purchasers and financial institutions, good quality "added value" due diligence advice.

UNIT-IV

Company Valuation: an overview of valuation, valuation principles and practices more, the impact of "what if" scenarios, the key financial and commercial factors Affecting the business. Value enhancement tools & techniques, the link between valuation and corporate finance.

Other strategic issues: managing credit ratings, and setting dividend and share Repurchase policy, problem of too much cash. The issues of stock liquidity and Illiquidity, Strategic risk management, the substitutability of capital structure and risk Management choices, such as process control efforts, financial, physical, and Operational hedging, value-based management.

Text Books: (1). Aswath Damodaran: Corporate finance theory and practice; John willey $ sons, Inc (2). Jakhotia: Strategic Financial Management (Vikas Publication)

BUSINESS ANALYSIS AND VALUATION

Unit I

Analysis of Corporate Financial Statements: Income statements and Balance sheets Through ratio analysis and analyzing the Chairman's statement, Directors' report, Management discussion & analysis, report on corporate governance, auditor's report to Evaluate the financial soundness of the company.

Unit II

Cash Flows: Firm cash flows, Earnings, Tax effect, Reinvestment needs; Equity cash Flows: Dividend, Forecasted Cash flows, terminal value estimation approaches. Equity Discounted cash Flow Models-Dividend discount models, extensions of DDM; free cash flow to equity model

Unit III

Introduction to Valuation: Approaches to valuation, Discounted Cash Flow, Relative Valuation, Role of valuation; Discounted Cash flow Valuation: Estimating discount rates cost of equity, cost of equity to cost of capital; Valuation of an asset with guaranteed cash flows, introducing uncertainty into valuation (valuing an asset with default risk & equity risk), valuing an asset with an infinite life.

Unit IV

Firm Valuation Models: Cost of capital approach, adjusted present value approach, EVA, Capital structure and firm value. Relative valuation-popularity and potential pitfalls; reconciling relative and discounted cash flow valuation Equity Multiples; Value Multiples; Valuation of different kinds of companies.
Value of Synergy; operating and financial synergy, Cash and tax benefits, debt capacity, Evidence on synergy, common errors in valuing synergy; Valuing Real options

Text Books:

1. Foster, George *Financial Statement Analysis*, 2nd ed., Pearson Education Pvt Ltd
2. Damodaran, A. (2008). *Damodaran on Valuation, Security Analysis for investment and Corporate Finance* (2nd ed.). Wiley India Pvt. Ltd.

References:

1. Chandra, P. (2011).*Corporate Valuation and Value Creation*, (1st ed). TMH
2. Weston, Chung, Hoag, *Mergers, Restructuring and Corporate Control*, Prentice Hall of India

DSE Group II: MARKETING

CONSUMER BEHAVIOUR

Unit I

Consumer Behaviour: Nature, scope & application: Importance of consumer behaviour in marketing decisions, characteristics of consumer behaviour, role of consumer research, consumer behaviour- interdisciplinary approach. Introduction to 'Industrial Buying Behaviour' Market Segmentation: VALS 2 segmentation profile.

Unit II

Consumer Needs & Motivation: Characteristics of motivation, arousal of motives, Theories of needs & motivation: Maslow's hierarchy of needs, McLelland's APA theory, Murray's list of psychogenic needs, Bayton's classification of motives, self-concept & its Importance, types of involvement. Personality & Consumer Behaviour: Importance of personality, theories of personality- Freudian theory, Jungian theory, Neo-Freudian theory, Trait theory: Theory of self images; Role of self-consciousness. Consumer Perception: Concept of absolute threshold limit, differential threshold limit & Subliminal perception: Perceptual Process: selection, organisation & interpretation. Learning & Consumer Involvement: Importance of learning on consumer behaviour, learning theories: classical conditioning, instrumental conditioning, cognitive learning & Involvement theory. Consumer Attitudes: Formation of attitudes, functions performed by attitudes, models of attitudes: Tri-component model, multi-attribute model, attitude towards advertisement model: attribution theory.

Unit III

Group Dynamics & consumer reference groups: Different types of reference groups, factors affecting reference group influence, reference group influence on products & brands, application of reference groups. Family & Consumer Behaviour: Consumer socialisation process, consumer roles within a family, purchase influences and role played by children, family life cycle. Social Class & Consumer behaviour: Determinants of social class, measuring & characteristics of social class. Culture & Consumer Behaviour: Characteristics of culture, core values held by society & their influence on consumer behaviour, introduction to sub-cultural & cross-cultural influences. Opinion Leadership Process: Characteristics & needs of opinion leaders & opinion receivers, interpersonal flow of communication.

Unit IV

Diffusion of Innovation: Definition of innovation, product characteristics influencing diffusion, resistance to innovation, adoption process. Consumer Decision making process: Process- problem recognition, pre-purchase search influences, information evaluation, purchase decision (compensatory decision rule, conjunctive decision, rule, Lexicographic rule, affect referral, disjunctive rule), postpurchase evaluation; Situational Influences Models of Consumer Decision making: Nicosia Model, Howard-Sheth Model, Howard- Sheth Family Decision Making Model, Engel, Kollat& Blackwell Model, Sheth Newman Gross Model of Consumer Values.

NOTE: Cases & application to marketing will be taught with respect to each topic.

Readings

1. Leon G.Schiffman & Leslie L.Kanuk: Consumer Behaviour, Prentice Hall Publication, latest Edition
2. Solomon, M.R.: Consumer Behaviour – Buying, Having, and Being, Pearson Prentice Hall.
3. Blackwell, R.D., Miniard, P.W., & Engel, J. F.: Consumer Behaviour, Cengage Learning.
4. Hawkins, D.I., Best, R. J., Coney, K.A., & Mookerjee, A: Consumer Behaviour – Building Marketing Strategy, Tata McGraw Hill.
5. Kotler, P. & Keller, K. L.: Marketing Management (Global Edition) Pearson

MARKETING OF SERVICES

Unit I: The emergence of service economy: contributory factors, consumption pattern analysis, economic transformation unique aspects of services: goods, services, products, managerial challenges

Unit II: Marketing mix: concept of value and value drivers, extended framework Service marketing system: production, marketing, human resources, sequential analysis.

Unit III: Service system positioning: service delivery process, blueprinting Service buying behaviour; difference in perspective, risk analysis, decision process.

Unit IV: Service marketing strategy; segmentation, targeting and positioning, market innovation Competitive differentiation; competitive advantage and value chain analysis

Unit V: Service quality; concept, technical and functional quality, Service quality models and measurement Demand and supply imbalances management; challenges and strategies; Service culture; managing by values, recovery and empowerment; Relationship building: relationship marketing, bonding and life time value Service industries: insurance, banking, air transportation, courier, education etc.

Text Books:

1. Fisk, R. P., Grove, S. J., & John, J.: Interactive services marketing. New York. Houghton Mifflin.
2. Glynn, W. J., & Barnes, J. G.: Understanding services management - Integrating marketing, organizational behaviour, operations and human resources management, Prentice Hall.

References:

1. Gronroos, C.: Service Management and Marketing - A customer relationship management approach, New York: John Wiley.
2. Hoffman, K. D., & John, E. G. B.: Marketing of services: Concepts strategies and cases, Thomson-South Western.
3. Shanker, R. (2002). Services Marketing: The Indian perspective, Excel Books.

ADVERTISING AND BRAND MANAGEMENT

Unit I

Advertising need & importance: Definition & growth of modern advertising, advertising & the marketing mix, types & classification of advertisement, advertising spiral; Social & economic aspects of advertising; Marketing communication models: AIDA, hierarchy of effect, innovation adoption model, action first model, quick decision model; Planning framework of promotional strategy

Unit II

How advertising works: Exposure, salience, familiarity, low involvement, central route & Peripheral route & cognitive learning; Positioning strategies ; Associating feelings with a brand; Developing brand personality ; Creating copy strategies: Rational & emotional Approaches, selection of an endorser, creative strategy & style- brand image, execution, USP, common touch & entertainment, message design strategy, format & formulae for Presentation of appeals (slice of life, testimonials, etc.), different types of copy; Art & layout of an advertisement: Principles of design, layout stages, difference in designing of Television, audio & print advertisement

Unit III

Media planning & scheduling: Introduction to broadcast & non -broadcast media; Budgeting decision rule: percentage of sales method, objective to task method, competitive parity, & all you can afford; Key factors influencing media planning; Media decisions: media class, media vehicle & media option; Scheduling: flighting, pulsing, & continuous

Unit IV

Management of sales promotion: Importance & need for sales promotion, planning for consumer schemes & contests, different types of consumer schemes.

Unit V

Introduction to brands and brand management, Concept of a brand, brand evolution, Branding challenges and opportunities, Strategic brand management process.

Unit VI

Identifying and establishing brand positioning and values; Brand building, brand Positioning and values brand repositioning.

Unit VII

Designing and implementing brand strategies; Brand extension. Brand hierarchy Kapfrer. Brand equity, brand personality, brand image, managing brands overtime.
Integrating advertising and brand management
Note: Applied cases would be taken up in class.

Readings:

1. Aaker, Myers &Batra : Advertising Management , Prentice Hall.
2. Wells, Moriarity & Burnett : Advertising Principles & practices , Prentice Hall.
3. Kleppner's Advertising Procedure: W.Ronald Lane, kane Whitehill king and J. Thomas Russell, Pearson Education.
4. George E.Belch& Michael A. Balch : Advertising and Promotion, TMH
5. S.H.H Kazmi and SatishK.Batra : Advertising and sales promotion, Excel books
6. Cowley. D: Understanding Brands, , Kogan Page Ltd
7. Jean Noel Kampferer: Strategic Brand Management, Kapferer Free Press
8. David Aaker: Brand Leadership, Simon & Schuster
9. Wright, Winter, Ziegler: Advertising, Atlantic Publishers & Dist.
10. Sandage, Fryburger,: Advertising Theory & Practice, Ratroll Longman Group

RETAIL MANAGEMENT

Unit I:
Introduction to Retailing, Definition, Characteristics, Evolution of Retailing in India, Retailing in India, Emerging Trends in Retailing, Factors Behind the change of Indian Retail Industry.

Unit II:
Retail Formats: Retail Sales by ownership, On the basis of Merchandise offered, nonstore Based retail mix &Non traditional selling.

Unit III:
Store Planning: Design & Layout, Location Planning and its importance, retailing image mix, Effective Retail Space Management, Floor Space Management.

Unit IV:
Retail Marketing: Advertising & Sales Promotion, Store Positioning, Retail Marketing. Mix, CRM, Advertising in Retailing.

Unit V:
Retail Merchandising: Buying function, Markups & Markdown in merchandise management, shrinkage in Retail merchandise management.

Unit VI:
Merchandise Pricing: Concept of Merchandise Pricing, Pricing Options, Pricing Strategies, Pricing Objectives, Types of Pricing.

Unit VII:
Retail Operation: Elements/Components of Retail Store Operation, Store Administration, Store Manager –Responsibilities, Inventory Management, Management of Receipts, Customer Service, Management of Retail Outlet/Store, Store Maintenance, Store Security.

Readings
1. Cullen & Newman: Retailing – Environment & Operations, Cengage Learning EMEA
2. Berman & Evarv: Retail Management, Perntice Hall.
3. Bajaj, Tuli & Srivastava: Retail Management- Oxford University Publications
4. Gibson G Vedamani: Retail Management: Functional principles & practices, Jaico Publishing House.
5. Harjit Singh: Retail Management, S. Chand Publication.

PERSONAL SELLING AND SALES FORCE MANAGEMENT

Unit I Introduction to Personal Selling; functions of a sales person, qualities of an effective Sales Person; Personal Selling situations.

Unit II Theories of Selling: AIDAS, Right Set of circumstances, Buying formula theory.

Unit III The Selling Process: Preapproach – acquiring product knowledge, acquiring competition and market knowledge, Identifying and qualifying prospects – sources of prospecting, conditions for qualification, Opening a sale – methods of approaching, Sales presentation – presentation strategies and methods, Sales demonstration – planning effective demonstration, use of sales tools, Handling objection – types of objections, determining hidden objections, strategies for handling objections, Closing a sale – trial close, closing techniques, Post sales follow up.

Unit IV Introduction to sales force management: Objectives of Sales management, Role of a sales manager; Managing Sales force – Recruitment, Selection, Training, Compensation and evaluation of sales force; Sales Territory Coverages: Sales Territory Concept, Reasons for establishing sales territories, procedures for selling up sales territories.

Readings:

1. Still, Cundiff & Govani: Sales Management, Prentice Hall of India
2. Charles Futrell: Fundamentals of Selling, McGraw Hill

DSE Group III : HUMAN RESOURCE

HUMAN RESOURCE DEVELOPMENT : SYSTEMS AND STRATEGIES

UNIT - I:
Human Resource Development (HRD) : Concept, Origin and Need,
Relationship between human resource management and human resource development; HRD as a Total System; Activity Areasof HRD : Training, Education and Development; Roles and competencies of HRD professionals.

UNIT - II:
HRD Process: Assessing need for HRD; Designing and developing effective HRD programs; Implementing HRD programs; Evaluating HRD programs.

UNIT- III:
HRD Interventions: Integrated Human Resource Development Systems,
Staffing for HRD; Physical and Financial Resources for HRD. HRD and diversity management; HRD Climate; HRD Audit.

UNIT – IV:
HRD Applications: Coaching and mentoring, Career management and development; Employee counseling; Competency mapping, High Performance Work Systems, Balanced Score Card, Appreciative inquiry. Integrating HRD with technology.

UNIT – V:
Evaluating the HRD Effort; Data Gathering; Analysis and Feedback;
Industrial relations and HRD. HRD Experience in Indian Organizations, International HRD experience, Future of HRD.

Readings:

1. Nadler, Leonard: Corporate human Resource Development, Van Nostrand Reinhold / ASTD, New York.
2. Rao T.V. and Pareek, Udai: Designing and Managing Human Resource Systems, Oxford and IBH Publication Ltd.
3. Rao T.V.: Reading in human Resource Development, Oxford IBH Publication .Ltd.
4. Viramani B.R. and Seth, Pramila: Evaluating Management Training and Development, Vision Books.
5. Rao T.V.: Human Resource Development, Sage publication.
6. Kapur, Sashi: Human resource Development and Training in Practice, Beacon Books.
7. Lynton, Rolf P. and Pareek, Udai: Training for Development, Vistaar publication.
8. Werner J. M., DeSimone, R.L.: Human resource development, South Western.
9. Mankin, D.: Human resource development, Oxford University Press India.
10. Haldar, U. K.: Human resource development, Oxford University Press India.
11. Rao, T.V.: Future of HRD, Macmillan Publishers India.

MANAGEMENT OF INDUSTRIAL RELATIONS :

Unit I -Concept of industrial relations, aspects of industrial relations, conflict and Cooperation, parties in industrial relations, workers employers and government, trade unions, objectives collective bargaining.

Unit II -Workers participation in management, levels of participation, mode of Participation Works Committee, Joint Management councils, Worker Director, Grievance Procedure, Quality Circles.

Unit III Trade Union Act 1926, Immunity granted to Registered Trade Unions, Recognition of Trade Unions . The Industrial Employment (Standing Orders) Act 1946, Scope, coverage, certification process, modification, interpretation, and enforcement. The Industrial Disputes Act 1947, forum for settlement of disputes, instruments of Economic coercion, strikes, lockouts and closure.

Unit IV Salient features, coverage of employees and employers, rules and benefits relating to The Payment of Wages Act 1936, The Payment of Gratuity Act 1972, The Minimum Wages Act 1948,and The Payment of Bonus Act 1965.

Unit V The Factories Act 1948, definition, approval, licensing and registration, health and welfare measures ,employment of women and young persons ,leave with wages and weekly holidays.

Unit VI The salient features ,coverage of employees and employers, and benefits under The Provident Fund and Miscellaneous Provisions Act 1952 and Employees Pension Scheme and Employees State Insurance Act 1948.

References:

1. S C Srivastava: Industrial Relations and Labour Laws, Vikas Publishing House.
2. T N Chhabra: Industrial Relations and Labour Laws, Dhanpat Rai Publishing House.

TALENT AND KNOWLEDGE MANAGEMENT

Unit I

Meaning and importance of talent management, Talent management Grid, Creating talent management system, Strategies of talent management.

Unit II

Competency model, Competency mapping, Role of leaders in talent management, Talent management and competitive advantage.

Unit III

Elements of knowledge management, Advantages of knowledge management, Knowledge management in learning organisations. Types of Knowledge: Tacit and Explicit .Managing knowledge workers.

Unit IV

Knowledge management process, Approaches to knowledge management: Knowledge management solutions, Knowledge creation, Knowledge sharing, Knowledge dissemination, Knowledge management life cycle, Nonaka's model of knowledge. Knowledge capturing techniques: Brainstorming, Protocol analysis, Consensus decision making, Repertory grid, Concept mapping.

Unit V

Knowledge management strategies: Aligning individual needs with organisation, Reward systems for knowledge management, Knowledge audit, Benchmarking, Balance score card, Gap analysis.

Readings

1. Lance A. Berger, Dorothy Berger: Talent management handbook, McGraw Hill New York.
2. Cappeli Peter: Talent on Demand –Managing Talent in an age of uncertainty, Harvard Business press.
3. Awad.E.M and Ghaziri.H.M: Knowledge management, Pearson education International.
4. Stuart Barnes: Knowledge management system theory and practice, Thomson learning.
5. Donald Hislop: Knowledge management in organisations, Oxford University press.
6. Sudhir Warier: Knowledge management, Vikas publishing house.
7. T. Raman: Knowledge management –a resource book, Excel books.

PERFORMANCE AND COMPENSATION MANAGEMENT

Unit I

Introduction- Concept, Philosophy, History from performance appraisal to performance development. Objectives of performance management system; Performance management and performance appraisal; Performance Management process: Performance planning, Process and Documentation of Performance appraisal, Appraisal Interview, Performance Feedback and Counselling.

Unit II

Performance management and reward systems. Performance Coaching ,Mentoring and Counselling, Competency development, Use of technology and e-PMS, International Aspects of PMS. Performance systems trends, Ethical Perspectives in performance appraisal.

Unit III

Introduction to Job Evaluation.Methods of Job Evaluation.Company Wage Policy: Wage Determination, Pay Grades, Wage Surveys, Wage Components. Modern trends in compensation - from wage and salary to cost to company concept, Comparable worth, broadbanding, competency based pay.

Unit IV

Incentives plans for production employees and for other professionals. Developing effective incentive plans, pay for performance,. Supplementary pay benefits, insurance benefits, retirement benefits, employee services benefits. Benefits & Incentive practices in indian industry.

Unit V

Wages in India: Minimum wage, fair wage and living wage. Methods of state regulation of wages. Wage differentials & national wage policy Regulating payment of wages, wage boards, Pay commissions, dearness allowances, linking wages with productivity,.
Special compensation situations: International compensation-managing variations. Expatriate Pay.

Readings:

1. Milkovich & Newman , Compensation, McGraw Hill.
2. T.J. Bergman , Compensation Decision Making, Harcourt, Fort Worth, TX
3. Richard Henderson: Compensation management in a knowledge based world, Prentice Hall.
4. T.N.Chhabra & Savitha Rastogi Compensation management, Sun India Publications.
5. Gary Dessler , Human Resource Management, Prentice Hall.
6. Armstrong's Handbook of Performance Management: An Evidence-Based Guide to Delivering High Performance :Book by Michael Armstrong
7. Herman Aguinis: Performance Management, Prentice Hill.
8. Armstrong, M. & Baron, A: Performance management and development, Jaico Publishing House
9. Armstrong, M., Performance management: Key strategies and practical guidelines, Kogan Page, London.
10. Bagchi, S. N.: Performance management, Cengage Learning India.
11. Bhattacharyya, D.K.: Performance management systems and strategies, Pearson Education.
12. Robert B.: Performance management, McGraw-Hill Education India.

TRAINING AND MANAGEMENT DEVELOPMENT

Unit I - Organization vision & plans, assessment of training needs, setting training objectives, designing training programmes, Spiral model of training.

Unit II - Tasks of the training function: Building support, overall training capacity, Developing materials, strategic planning, networking, designing training programmes.

Unit III -Training methods: On the job training, job instruction training, apprenticeship, coaching, job rotation, syndicate method, knowledge based methods, lecture, conferences, programmed learning, simulation methods, case study, vestibule training, laboratory training, in-basket exercise, experiential methods, sensitivity training, e-training.

Unit IV -Management Development Programme Methods:-Understudy, Coaching, Action Learning, Role Play, Management Games, Seminars, University related programmes, special projects, behavioural modeling, job rotation, case study, multiple management, sensitivity training. Post training: Training evaluation, Training impact on individuals and organizations, Evaluating Programmes, Participants, Objectives.

Unit V- Organisational Development (OD): Definition Foundations of OD, Managing the OD Process, Action Research and OD. OD Interventions: Overview of OD Interventions, Team Interventions Inter-group and Third-Party Peacemaking Interventions. Comprehensive OD Interventions, Structural Interventions and the Applicability of OD, Training Experiences. Issues in Consultant –Client Relationships, System Ramifications, Power, Politics and OD

Readings:

1. Blanchard P.Nick & Thacker James: Effective Training, Systems, Strategies and Practices, Pearson.
2. French Wendell, Bell Cecil and Vohra Veena: Organisation Development, Behavioral Science Interventions for Organisation Improvement, Prentice Hall.
3. Lynton Rolf & Pareek Udai: Training & Development, Prentice Hall.
4. Bhatia S.K.: Training & Development, Deep & Deep Publishers.

Syllabus of

Bachelor of Computer Applications

(CHOICE BASED CREDIT SYSTEM)

This is approved in the Academic Council held on 8/11/2019

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses.

1. Types of courses in CHOICE BASED CREDIT SYSTEM (CBCS)

1.1 Core Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

1.2 Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

1.2.1 Discipline Specific Elective (DSE) Course: Elective courses offered by the main discipline/subject of study are referred to as Discipline Specific Electives.

1.2.2 Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A candidate studies such a course on his own with an advisory support by a teacher/faculty member. The work done will have to be submitted in writing as a dissertation.

1.2.3 Generic Elective (GE) Course: Elective courses that are generic or interdisciplinary by nature are called Generic Electives. Students will have to choose one elective each in the first four semesters from the lists GE1 to GE4 given in this syllabus.

1.3 Ability Enhancement Courses (AEC)

The Ability Enhancement (AE) Courses are the course that leads to Knowledge enhancement. These are of two types.

1.3.1 AE Compulsory Course (AECC): Environmental Studies, English Communication/MIL Communication.

1.3.2 AE Elective Course (AEEC): AEEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. These courses are to be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.

2. BACHELOR OF COMPUTER APPLICATIONS Programme Details

2.1. Programme Objectives:

Students who choose BCA Programme, develop the ability to think critically, logically, analytically and to use and apply current technical concepts and practices in the core development of solutions in the form of Information technology.

The knowledge and skills gained with a degree in Computer Science prepare graduates for a broad range of jobs in education, research, government sector, business sector and industry.

The program covers the various essential concepts in Computer Science. The course lays a structured foundation of Computer fundamentals, Numerical methods, Data structure, Algorithm and Complexity analysis, Software Engineering, Programming Concepts in various

languages(C, C++, Java etc.), Computer Networking, System Administration, Operating System, Computer Architecture, Microprocessor, Web technology, Computer Graphics and Database management system etc.

An exceptionally broad range of topics covering current trends and technologies in computer science: Advanced web technology, Mobile application, Animation, Data mining etc. Also, to carry out the hand on sessions in Computer lab using various Programming languages and tools to have a deep conceptual understanding of the topics to widen the horizon of students' self-experience.

2.2. Programme Learning Outcomes:

The completion of the BCA Programme shall enable a student to:

i) To communicate technical information both orally and in writing
ii) Apply the knowledge gained in core courses to a broad range of advanced topics in computer science, to learn and develop sophisticated technical products independently.
iii) To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis
iv) Identify applications of Computer Science in other fields in the real world to enhance the career prospects
v) Realize the requirement of lifelong learning through continued education and research.
vi) Use the concepts of best practices and standards to develop user interactive and abstract application
vii) Understand the professional, ethical, legal, security, social issues and responsibilities

2.3. Programme Structure:

The BCA programme is a three-year course divided into six-semesters. A student is required to complete 148 credits for the completion of course and the award of degree.

		Semester	**Semester**
Part – I	First Year	Semester I : 22	Semester II : 22
Part – II	Second Year	Semester III: 28	Semester IV: 28
Part – III	Third Year	Semester V:24	Semester VI:24

2.4 Eligibility: The candidate must have passed Higher Secondary or equivalent level examination from Science/Commerce/Arts Stream. Students who have passed the Higher Secondary examination with either Mathematics or Computer Science as one of the subjects obtaining minimum pass mark in the subject should be given preference at the time of admission. Students completing Diploma in CSE/IT from AICTE recognized institutes are also eligible for taking admission. The Colleges may have their own cut-off marks which they found to be reasonable for them and/or hold admission test for the final selection of candidates. Colleges may offer bridge course in Mathematics for admitted students who did not have Mathematics at the HS level.

2.5. Programme Implementation Requirement:

The BCA programme is a three-year course divided into six-semesters. For proper implementation of the UGCBCS programme the following infrastructure are necessary:

a) Sufficient lab facilities with computers and software
b) At least 7 full time faculties.

2.6. Instruction for questions paper setter:

Question Paper setter should set from the prescribed text books, mentioned in the syllabus.

3. Credit allocation (BCA course)

Course	*Credits	
	Theory+Practical	Theory+Tutorial
I Core Course (6 credits)		
(14 papers)	14X4=56	14x5=70
Core Course Practical / Tutorial* (14 Papers)	14x2=28	14x1=14
I. Elective Course (6 credits) (8 Papers)		
A.1. Discipline Specific Elective(4 Papers)	4x4=16	4x5=20
A.2. Discipline Specific Elective Practical/ Tutorial* (4 Papers)	4×2 = 8	4×1 = 4
B.1. Generic Elective/ Interdisciplinary (4 Papers)	4x4=16	4x5=20
B.2. Generic Elective Practical/ Tutorial* (4 Papers)	4x2=8	4x1=4
Optional dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 5th semester		
1.Ability Enhancement Compulsory Courses (AECC) (2 Papers of 4 credit each)	2x4=4	2x4=8
Environmental Science		
English Communication		
2. Skill Enhancement Courses (SEC) (Minimum 2) (2 Papers of 4 credit each)	2x4=8	2x4=8
Total credit	148	148

*Wherever there is practical, there will be no tutorial and vice-versa

CBCS Course Structure for BCA Programme

SEMESTER WISE PLACEMENT OF THE COURSES

Semester	CORE COURSE (14)	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific (DSE) (4)	Elective: Generic (GE) (4)
I	BCA-HC-1016 Introduction to C programming	ENG-AE-1014			Any course from the list GE-1
	BCA-HC-1026 Computer Fundamentals & ICT Hardware				
II	BCA-HC-2016 Mathematics –I	ENV-AE-2014			Any course from the list GE-2
	BCA-HC-2026 Digital Logic Fundamentals				
III	BCA-HC-3016 Software Engineering		SEC -1		Any course from the list GE-3
	BCA-HC-3026 Data Structure and Algorithms				
	BCA-HC-3036 Database Management System				
IV	BCA-HC-4016 Computer Organization and Architecture		SEC -2		Any course from the list GE-4
	BCA-HC-4026 Mathematics-II				
	BCA-HC-4036 Object Oriented Programming in C++				
V	BCA-HC-5016 Java Programming			DSE-1	
	BCA-HC-5026 Operating System			DSE -2	
VI	BCA-HC-6016 System Administration using Linux			DSE -3	
	C14: BCA-HC-6026 Computer Networks			DSE -4	

Paper Code: CIT-HC-1016: Means: CIT (Subject code), HC (Course type: Honours Core), 1(Semester), 01(first paper of the semester), 6(credit).

Skill Enhancement Course (SEC)

SEC 1 (choose one)

(i) BCA-SE-3014: Web Technology
(ii) BCA-SE-3024: Programming with C#
(iii) BCA-SE-3034: Open Source Software

SEC 2 (choose one)

(i) BCA-SE-4014: Animation
(ii) BCA-SE-4024: Mobile Applications
(iii) BCA-SE-4034: Advanced Web Technology

Discipline Specific Electives (DSE)

DSE-1

(i) BCA-HE-5016: Project Work / Dissertation (Credit: 6)

DSE-2 (choose any One)

(i) BCA-HE-5026:Data Mining & Warehousing
(ii) BCA-HE-5036: Computer Oriented Numerical Methods and statistical Techniques
(iii) BCA-HE-5046: Programming in Python

DSE-3 (choose any One)

(i) BCA-HE-6016: Automata Theory and Languages
(ii) BCA-HE-6026: Optimization Techniques
(iii) BCA-HE-6036: Multimedia and Applications

DSE-4 (choose any One)

(i) BCA-HE-6046: Distributed System
(ii) BCA-HE-6056: Microprocessor and Assembly Language Programming
(iii) BCA-HE-6066: Artificial Intelligence

Generic Elective (GE)

GE 1 (choose any One)

(i) BCA-HG-1016: Computer Based Accounting and Financial Management
(ii) BCA-HG-1026: Office Automation

GE 2 (choose any One)

(i) BCA-HG-2016:Basic Electronics
(ii) BCA-HG-2026:Introduction to Bio-Informatics

GE 3 (choose any One)

(i) BCA-HG-3016:Introduction to Indian History
(ii) BCA-HG-3026:Positive Psychology

GE 4 (choose any One)

(i) BCA-HG-4016:Introduction to Dramatic Arts
(ii) BCA-HG-4026:Information Security and Cyber Laws

DETAILED SYLLABUS

BCA-HC-1016: INTRODUCTION TO C PROGRAMMING

4 Lectures, 4 Practical, Credits 6 (4+2)
Theory: 60 Lectures, Practical: 60 Lectures
End Semester Marks:
Theory: 60 Marks, Practical: 20 Marks
Internal Marks:
Sessional: 10 Marks, Practical: 6 Marks, Attendance: 4 Marks

UNIT 1: Overview of C **(10 Lectures)**

Importance of C, sample C program, C program structure, executing C program. Variables, Data Types, Constants: integer constant, real constant, character constant, string constant; Character set, C tokens, keywords and identifiers, variables declaration, Assigning values to variables---Assignment statement, declaring a variable as constant, as volatile.

Operators and Expression: Categories of operator- Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators; arithmetic expressions, precedence and associatively of operators, type conversions, mathematical functions Managing Input and Output Operators: Reading and writing a character, formatted input, formatted output.

UNIT 2: Decision Making and Branching Statement **(8 Lectures)**

if statement, ***if…..else*** statement, nested ***if…. else*** statement, ***switch….case*** statement, ***goto*** statement. Decision Making and Looping: Definition of loop, categories of loops, ***for*** loop ***while*** loop, ***do-while*** loop, ***break*** statement, ***continue*** statement

UNIT 3: Arrays **(6 Lectures)**

Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.

UNIT 4: Functions **(10 Lectures)**

The form of C functions, Return values and types, return statement, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes, Macro substitution, file inclusion.

UNIT 5: Structures and Unions **(8 Lectures)**

Defining, giving values to members, initialization and comparison of structure variables, array of structure, array within structure, structure within structure, structures and functions, unions.

UNIT 6: Pointers **(10 Lectures)**

Definition of pointer, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.

UNIT 7: File Management in C **(8 Lectures)**

Opening, closing and I/O operations on files, random access to files, command line arguments.

Practical / Lab work to be performed

(**N.B:** Student has to perform **any twenty** of the following experiments)

1. Write a program to convert a given temperature value from Fahrenheit scale to Centigrade scale and vice versa.
2. Write a program to display ASCII value of a character.
3. Write a program to check whether a number is perfect or not.
4. Write a program to find out the biggest of three numbers using nested if.
5. A company insures its drivers if either of the following conditions are satisfied
   - Driver is married.
   - Driver is an unmarried, male and above 30 years of age.
   - Driver is unmarried, female and above 25 years of age.

   Write a program to decide if a driver is to be insured using logical operators.
6. Write a program to read a list of positive integers terminated by -1 and display the odd and even numbers separately and also their respective counts.
7. Write a program to read values of n and x and print the value of y using switch case where
   a. y=n+x when n=1
   b. y=1+x/n when n=2
   c. y= n+3x when n=3
   d. y=1+nx when n>3 or n<1.
8. Write a program to n values of sales and then calculate the commission on sales amount where the commission is calculated as follows:
   a. If sales <= Rs.500, commission is 5%.
   b. If sales > 500 but <= 2000, commission is Rs 35 plus 10% above Rs 500.
   c. If sales > 2000 but <= 5000, commission is Rs 185 plus 12% above Rs.2000.
   d. If sales > 5000, commission is 12.5%
9. Write a program to find out minimum, maximum, sum and average of n numbers without using array.
10. Program to find mean and standard deviation (SD) for a set of n numbers without using array.
11. Write a program to find out the roots of a quadratic equation. Use proper testing to find checks for real and complex roots.
12. Write a program to print the digits of a number in words. (eg. if a number 841 is entered through the keyboard your program should print “Eight Four One”.)
13. Write a program to print the PASCAL Triangle up to the n-th row where n is an input to the program.
14. Write a function to return the HCF of two positive integers. Write a main function to read two positive integers and print their HCF and LCM by using the above function.
15. Write a program to convert a decimal number into binary number using function.
16. Write a program to display the result of sine series using function. 17. Write a program to find the sum of the following series 1+x-x^3/3!+x^5/5!-x^7/7!+ . . . . . corrected up to the 3 decimal place.
18. Write a program to read n numbers in a sorted array and insert a given element in a particular position
19. Write functions to compute the factorial of a number using both recursive and non-recursive procedure.
20. Write a program to print the values of ${}^{n}_{r}c$ and ${}^{n}_{r}p$ for given positive integers n≥ r > 0. Use a

function fact(n) to return the factorial of a non-negative integer n.

$^{n}_{r}c$ = n!/r!*(n-r)! $^{n}_{r}p$ = n!/(n-r)!

21. Write a program to display the first n Fibonacci numbers using function.
22. Write a program to display the prime numbers within a given range. Write a function to check whether a given integer is prime or not and use it.
23. Write a program to Multiply two matrices using function
24. Write a program to display the upper Triangle and lower Triangle of a given square matrix using function.
25. Write a function to check if a given square matrix is symmetric or not. Write a main function to implement it.
26. Write a program to read a **m x n** matrix and calculate the Row sum and Column Sum of the matrix
27. Write a function to read in an integer and print the representation of the number using the sign and magnitude representation scheme using 8 bits. The program should check for overflow/under flow conditions. The left most bit is to be used as the sign bit.
28. Write a program to merge two sorted arrays.
29. Write a program to implement selection sort using function.
30. Write a program to count the number of vowels in a string.
31. Write a program to concatenate two strings using function (without using library function).
32. Write a program to convert a string from upper case to lower case and vice versa.
33. Write a program to swap two numbers using function (pass the pointers).
34. Write a program to sort n number of strings in ascending order using pointer.
35. Write a program using pointers to copy a string to another string variable (without using library function).
36. Declare a structure of a student with details like roll number, student name and total marks. Using this, declare an array with 50 elements. Write a program to read details of n students and print the list of students who have scored 75 marks and above.
37. Create a structure to store the following information of employees.
    a. Employee's number, name, pay and date of joining.
    It has been decided to increase the pay as per the following rules:
    Pay <= Rs.3000 : 20% increase
    Pay <= Rs.6000 but > Rs.3000 :15% increase
    Pay > Rs.6000 : no increase
    Write a program to implement the above structure.
38. Write a program to read a text file and count the number of vowels in the text file.
39. Write a program to copy a text file to another file.

REFERENCE BOOKS

1. Byron Gottfried, Schaum, *Outline Programming with C*, Second Edition, Tata McGraw-Hill
2. Yashavant Kanetkar, *Let Us C*, Eighth Edition, BPB Publications.
3. Kernighan and Ritchie, *The C Programming Language*, Second Edition, Prentice Hall, 1998.

BCA-HC-1026: COMPUTER FUNDAMENTALS & ICT HARDWARE

4 Lectures, 4 Practical, Credits 6 (4+2)
Theory: 60 Lectures, Practical: 60 Lectures
End Semester Marks:
Theory: 60 Marks, Practical: 20 Marks
Internal Marks:
Sessional: 10 Marks, Practical: 6 Marks, Attendance: 4 Marks

UNIT 1: (20 Lectures)

Evolution of Computer system, Classification of Computer, Modern Computer, Hardware and Software, Major components of a Digital Computer (A brief introduction of CPU, Main memory, Secondary memory devices and I/O devices) Keyboard, monitor, mouse, printers, Secondary storage devices (floppy disks, hard disks and optical disks), backup system and why it is needed? Bootstrapping a Computer, Number System: Representation of numbers (only a brief introduction to be given) and characters in computer, Binary, Hexadecimal, Octal, BCD, ASCII, EDCDIC and Gray codes, Conversion of bases, Representation of signed integers, Sign and magnitude, 1's complement and 2's complement representation. Arithmetic operations using 2's complement representation and conditions for overflow/underflow and its detection, Assembler, Compiler, Interpreter, Linker and Loader, Definition and concepts of algorithm and its different implementations-pseudo code, flowchart and Computer programs.

UNIT 2: (10 Lectures)

Hard Disk Drive: logical structure and file system, FAT, NTFS. Hard disk tools: Disk cleanup, error checking, de fragmentation, scanning for virus, formatting, installing additional HDD, New trends in HDD, Floppy Disk Drive.

UNIT 3: (10 Lectures)

Optical Media, CDROM, theory of operation, drive speed, buffer, cache, CD-R, CD-RW, DVD ROM, DVD technology, preventive maintenance for DVD and CD drives, Driver installation, Writing-cleaning CD and DVD.

UNIT 4: (10 Lectures)

Processor: Intel processor family. Latest trends in processor, Motherboard, Sockets and slots, power connectors, Peripheral connectors. Bus slots, USB, pin connectors, Different kinds of motherboards, RAM, different kinds of RAM. RAM up gradation, Cache and Virtual Memory concept.

UNIT 5: (10 Lectures)

SMPS, BIOS, Network Interface Card, network cabling, I/O Box, Switches, RJ 45 connectors, Patch panel, Patch cord, racks, IP address.

Practical / Lab work to be performed

1. Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Task
2. Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva.
3. Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
4. Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva
5. Basic commands in Linux
6. Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva
7. Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.
8. The test consists of various systems with Hardware / Software related troubles, formatted disks without operating systems. Installation of antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

REFERENCE BOOKS

1. Anita Goel, *Computer Fundamentals*, Pearson, 2010
2. *Comdex: Hardware and Networking Course Kit*, DreamTech press
3. V. Rajaraman, Neeharika Adabala, *Fundamentals of Computers*, PHI, EEE 6th Edition
4. Ron Gilster, *PC hardware: A beginners Guide*, Tata McGraw Hill
5. E. Balaguruswamy, *Computer Fundamentals and C Programming*, Tata McGraw Hill

BCA-HC-2016: MATHEMATICS –I

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Determinants and Matrices (22 Lectures)

Definition and different types (such as identity matrix, diagonal matrix etc) of matrices, vectors and matrices, Addition, subtraction and multiplication of matrices, Properties of matrix operations, Existence of additive and multiplicative identity and additive inverse matrices, Transpose of a matrix and its properties. Symmetric and skew symmetric matrices, Elementary transformation of a matrix, Invertible matrices, Determinant of a square matrix, minor, cofactor, Adjoint of a matrix and matrix inversion, Determination of rank of a matrix, Eigen values and Eigen vectors of a matrix (Stressing on symmetric matrices), Cayley-Hamilton theorem – Cramer's rule, Consistency of a system of linear non-homogenous equations and existence of solutions (statement only), Simple problems, Solutions of simultaneous linear equations by Gaussian elimination method.

UNIT 2: Complex Numbers (16 Lectures)

Definition and Algebra of complex numbers, Modulus and conjugate of a complex number, Representation of complex numbers - Argrand diagram and polar representation, Roots of linear and quadratic equations in one variable, real roots, irrational roots, complex roots, Relation between the roots and the coefficients.

UNIT 3: Limits and Derivatives (12 Lectures)

Intuitive idea of limits and derivatives, Limits of polynomials and rational functions, Derivatives, Algebra of derivative of a function, Derivative of polynomials and trigonometric functions.

UNIT 4: Calculus (10 Lectures)

Roll's theorem, Lagrange's Mean Value theorem and Taylor's theorem, Meaning of the sign of derivative, indeterminate forms, maxima and minima (single variable).

REFERENCE BOOKS

1. Narayanan S. and Manickavachagam, *Allied Mathematics* Vol.1& Vol.2.
2. M.K. Venkataraman, NPC, *Engineering Mathematics* Vol.1 & Vol.2.

BCA-HC-2026: DIGITAL LOGIC FUNDAMENTALS

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Boolean Algebra and Logic Gates (20 Lectures)

Axiomatic definition of Boolean algebra, Rules (postulates and basic theorems) of Boolean algebra, dual and complement of Boolean expression, Canonical form and Standard form, Sum of product and product of sum form, Conversion between Boolean expression and truth table, Karnaugh map method (upto four variable kmap), Don't care condition, and Quine Mc Cluskey method, Different types of gates, Implementation of logic expression with logic gates.

UNIT 2: Combinational Circuit (12 Lectures)

Adder: half adder, full adder, Subtractors: half subtractor and full subtractor, Magnitude comparator, Decoder, Encoder, Application examples of decoder and encoder, Multiplexer, Demultiplexer, Application examples of multiplexer and Demultiplexer.

UNIT 3: Sequential Circuit (12 Lectures)

Simple RS flip-flop or latch, Clocked RS flip-flop, D flip-flop, JK flip-flop, T flip-flop, Analysis of Clocked Sequential circuits, State Reduction and Assignment, Flip –Flop Excitation tables, Design Procedure for sequential circuits.

UNIT 4: Counters (8 Lectures)

Ripple counters: Binary Ripple Counter, BCD Ripple Counter, and Synchronous Counters: Binary Counter, Binary Up and down Counter, BCD Counter, Counter design using state diagram, state table and state equation.

UNIT 5: Registers (8 Lectures)

Registers: Shift registers (serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out), Registers with parallel Load, Bidirectional shift register with parallel load.

REFERENCE BOOKS

1. M. M. Mano, *Digital Logic and Computer Design*, PHI, 1994
2. C. Bartee, *Computer Architecture and Logic Design*, McGraw Hill, 1991

BCA-HC-3016: SOFTWARE ENGINEERING

(Credit: 5+1=6)(L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Introduction (20 Lectures)

Software Processes & Characteristics, Software life cycle Models: Waterfall, Prototype, Evolutionary and Spiral Models, Software Requirements analysis & specifications: Requirement engineering, requirement, elicitation techniques like FAST, QFD, requirements analysis using DFD, Data dictionaries, ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

UNIT 2: Software Project Planning (10 Lectures)

Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, Risk Management.

UNIT 3: Software Design (10 Lectures)

Data design**,** Architectural design**,** Interface design, Function Oriented Design, Object Oriented Design, Cohesion & Coupling, Classification of Cohesiveness & Coupling, Software Metrics: different types of project matrics

UNIT 4: Software Testing and Maintenance (20 Lectures)

Testing Process, Design of Test Cases, Types of Testing, Functional Testing, Structural Testing, Test Activities, Unit Testing, Integration Testing and System Testing, Debugging Activities, Software Maintenance: Management of Maintenance, Maintenance Process, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation, Software quality Assurance, CASE tools: Analysis tools, design tools, SQA tools, software testing tools.

REFERENCE BOOKS

1. Rajeev Mall "*Software Engineering*" PHI
2. Pressman Roger " *Software Engineering A Practitioners Approach*" Tata McGraw Hill
3. James F. Peters, Witold Pedrycz "*Software Engineering An Engineering Approach*"

BCA-HC-3026: DATA STRUCTURE AND ALGORITHMS

(4+2=6) (L: 4, P: 4, T: 0)

Theory: 60 Lectures, Practical: 60 Lectures

UNIT 1: Definition **(4 Lectures)**

Concept of Data Types, elementary structure, words and their interpretations, packed words,

Arrays: Types, memory representation, address translation functions for one & two dimensional arrays, different examples.

UNIT 2: Linked Structure **(8 Lectures)**

Singly and doubly linked list, circular and non circular, list manipulation with pointers, example involving insertion and deletion of elements and their comparative studies with implementations using array structure

UNIT 3: Stacks and Queues **(6 Lectures)**

Definitions, representation using array and linked list structure, application of stack and queues in simulation, postfix conversion and evolution of arithmetic expressions

UNIT 4: Binary Trees **(12 Lectures)**

Definition, quantitative properties, memory representation, Trees traversal algorithms (recursive and non-recursive), threaded trees, BFS, DFS

UNIT 5: Searching **(10 Lectures)**

Linear and binary search algorithms, performance and complexity, binary search trees (construction, insertion, deletion and search), Concept of optimal binary search trees

UNIT 6: Sorting **(12 Lectures)**

Terminology, sorting algorithms (non recursive, recursive description, Complexity, advantages and disadvantage, implementation), bubble sort, insertion sort, selection sort, tree sort, heap sort, quick sort, merge sort & radix sort, external Sorting.

UNIT 7: Analysis of Algorithm **(8 Lectures)**

Time and Space complexity of algorithms, average case and worst case analysis, asymptotic notation as a measure of algorithm complexity, O and θ notations, Analysis of sorting algorithms- Selection sort, Bubble sort, Insertion sort, Heap sort, Quick sort and analysis of searching algorithms – linear search and binary search.

Practical / Lab work to be performed

(Write programs in C language)

1. Implement binary search and linear search algorithms on arrays.
2. Implement following sorting algorithms:

i) Bubble sorting ii) Insertion sort iii) Heap sort iv) Quick sort v) Merge sort

3. Write a program to create a singly linked list and insert an element at the beginning, end, and at a given position of the linked list.

4. Write a program to create a singly linked list and delete an element from any position of the linked list.
5. Write a program to create a singly linked list. Write functions for
   i. counting the number of elements in a list
   ii. to search for a given element in a list. If the item has been found then it should return the position at which the item was found; otherwise it should return -1 to indicate not found.
6. Write a function to concatenate two linked lists.
7. Write a function to merge two sorted linked lists.
8. Write a program to create a doubly linked list and insert an element at any position.
9. Write a program to create a doubly linked list and delete an element from a given position.
10. Write a program to create a circular linked list and insert / delete an element at any position.
11. Write a program to implement a stack using
    i) array structure
    ii) linked list structure
12. Write a program to implement two stacks using a single array.
13. Write a program to evaluate a postfix expression using stack.
14. Write a program to convert an infix expression into a postfix expression.
15. Write a program to implement a queue using array.
16. Write a program to implement a queue using linked list.
17. Write a program to implement a circular queue using array.
18. Write a program to implement a circular queue using linked list.
19. Write a program to create a binary search tree using link representation and display the elements in preorder, in order and post order using recursive function.
20. Write a program to create a binary search tree using link representation and
    i) search
    ii) delete an item from the binary search tree.

REFERENCE BOOKS

1. Horowitz and Sahani, Narosa, *Data Structure*
2. A.N.Kamthane, *Introduction to Data Structures in C*, Pearson, 2007.
3. Langsam**,** Augentein & Tanenbaum, *Data Structure using C and C++,* PHI
4. S.K.Bandyopadhyay, K.N.Dey, *Data Structures using C,* Pearson.

BCA-HC-3036: DATABASE MANAGEMENT SYSTEM

(Credit: 4+2=6)(L: 4, P: 4, T: 0)

Theory: 60 Lectures, Practical: 60 Lectures

NIT 1: File Structure **(12 Lectures)**

Record storage and primary file organization: memory hierarchies and storage devices, Storage of Databases, Placing file records on disks: Records and its Types, Files, Fixed length records and variable length records, Record Blocking, allocating file blocks on disks, operation on files, Issues in Physical Design: Concept of indexes

UNIT 2: Overview of Database Management System **(8 Lectures)**

Definition of Database, Traditional File Approach vs. DBMS approach, Characteristics of the Data Base Approach, DBMS user, Role of a DBA, Advantage of using DBMS, DBMS architecture, Data independence, ANSI/SPARC 3 level architecture.

UNIT 3: Relational Models **(20 Lectures)**

Fundamental integrity rules: entity integrity, referential integrity, Relational algebra (Select , Project, Cross ,Product , theta join, equi join, natural join, outer join), Set Operation, ANSI SQL – 92 Standard : DDL, DML, SQL constructs(Select .. From… Where… Group by ….. Having… Order by….), Insert, Delete, Update, View, Definition and use, nested quires, Constraints considers(NOT NULL , UNIQUE, Check Primary key, Foreign key)

UNIT 4: Database Design **(20 Lectures)**

Conceptual model, logical model, physical model, ER model as a tool for conceptual design-entities, attributes and relationships, weak and strong entities, conversion of ER model into relational schema. DFD, Normalization: informal design guidelines for relational schemas (overview level), functional dependencies, different types of keys, Normal forms (first, second, third, BCNF), Functional dependency diagram and design of relational database from it. Database connectivity using JDBC.

Practical / Lab work to be performed

Each student should do at least 6 assignments from the following list. They need to connect database using JDBC.

1. Create a table ***Employee*** with the following columns:

   Emp_no (numeric) primary key
   Emp_name (string)
   Join_date (Date)
   Basic_pay_fixed_at (numeric)
   Date_of_birth (Date)

   Insert the following data into the table.

Emp_no.	Emp_name	Join_date	Basic_pay	Date_of_birth
1001	Charles Babbage	01-Jun-2000	8000.00	03-10-1973
1002	George Boole	01-Jul-2001	5000.00	04-12-1972

1003	E.F. Codd	01-Jun-2001	8000.00	06-03-1969
1004	Bill Gates	01-Jul-2003	5000.00	09-10-1995
1005	Tony Greig	01-Aug-2004	8000.00	04-05-1985

2. Create the following two tables and insert data into the tables.

Player (Roll no.→Primary Key)

Roll no.	**Name**
10	Vijay Amrithraj
20	Leander Paes
30	Mahesh Bhupathi
40	Sania Mirza

Match (Match_no→Primary key,Roll no→Foreign key)

Match_no	Roll_no.	Match_Date	Opponent
1	20	10-Jul-2008	Washington
2	30	12-Jan-2008	Sampras
3	20	12-Aug-2008	Borg
4	30	20-Mar-2008	Vijay

Perform the following two operations:

(i) Perform EQUIJOIN operation to retrieve data from both the files.

(ii) Perform OUTERJOIN operation to retrieve the unmatched records.

3. Design an ER diagram for a ***BANK*** database schema. To consider that each Bank can have multiple branches and each branch can have multiple Accounts and Loans for customer. Also to specify the non weak & weak entity types, key attributes & key types, relationship types, instances, constraints and participations.

4. Create a table ***Student*** taking the attributes given bellow Roll_no, Student_name, Address, Date_of_addmission, Class Section and Contact_no. Write appropriate queries to perform the following operations:

a) To insert values in the Student table.
b) To delete values from Student table
c) To list the names of all students which roll_no > 20.
d) To search for students who got admitted before 01-01-2006.
e) To change the name of the student whose roll number is 10 to Amar.

5. Create tables ***Department*** and ***Employee*** with the attributes given below.

Employee (EmpNo , Empname, Address, Dno)
Department (Dno, Dname, Location)
Dno in Employee is a foreign key.

Write appropriate queries to perform the following operations:

a) To insert values in the tables.
b) To retrieve the names and addresses of all Employees working in the Finance department.
c) To print the location where Administration department is located.
d) To delete all information regarding a particular employee.

6. Create table ***Student*** and ***Course*** taking the attributes given bellow.

Student (Roll_no, Name, Semester,
Course_no(Foreign key))

Course (Course_no, Course_name)

Write appropriate queries for the following operations:

a) To retrieve names of all students who are admitted to the course „BCA".

b) To retrieve the names of all students whose course name is „BCA" and who are in the 3rd semester.

c) To display details of all courses in which more than 100 students got admitted.

d) For course being offered, display the course name and number of students admitted to the course.

7. Create tables ***Employee***, ***Department***, ***Location***, ***Works_on***, and ***Project*** taking the attributes given below.

Employee (Fname, Lname, Empno,
Bdate, Address, Salary, Dnumber)
Department (Dname,Dnumber,Mgrno)
Locations(Dnumber, DLocation)
Works_on(Empno, Pnumber, Hours_per_day)
Project(Pname, Pnumber, Location, Dnumber (Foreign))
Dependent(Empno, Dependent_name, Sex, DOB, Relationship)

Write appropriate queries for the following operations:

a) Retrieve the names and addresses of all employees who work in the Finance department.

b) To retrieve the names of all employees who works on all the projects controlled by department number 6

c) For each department, print the name of the department and the name of the manager of the department.

d) Retrieve the location where the Administration department is located.

e) For every project located in Mumbai list the project number, the controlling department and department manger's name and address.

f) Find out how many employees are there in each department.

g) Find the total salary of all employees of the "Research" department, as well as the maximum, minimum and average salary in this department

h) Retrieve the name of all employees who have no dependent.

i) Alter the "Employee" table by deleting the coloumn Bdate.

j) Retrieve the Fname, Lname of all employees whose salary is higher than average salary.

k) For each department retrieve the department number, the number of employee in the department and their average salary.

l) Retrieve the name of all employees who have two or more dependent

m) Retrieve the details of all employees who works on project number 1,2,3

8. Create Table

Client_master (Client_no, name, address, Bdue)
Product_master(P_number, Description, saleprice, costprice)
Sales_master(Salesmno, Sname, Addres, Salamnt, Remarks)
Sales_order(O_no, Client_no, Odate, Delyaddr, Salesmno)
Sales_order_detail(Order_no, Product_no, Qtyorder, product_rate, Qty_dispatched)

Write appropriate queries to perform the following operations:

i) List name of all clients having ‘a’ as the second letter in their names.
ii) Retrieve the description and total Qty sold for each product.
iii) Find product no. and description of non moving products (i.e product not being sold).
iv) For each product being sold, list the product number and the total amount (in Rs.) sold.
v) List all client who stay in ‘Bangalore’ or Mumbai
vi) List the clients who stay in a city whose First letter is ‘M’
vii) Find the names of clients who had purchased the item ‘Trouser’.
viii) Find out if ‘T-Shirt’ has been ordered by any client and if so print the details of the client.
ix) List details of all products whose unit price is more than Rs. 5000.00.
x) Calculate the total amount (in Rs.) purchased by each client that has purchased items amounting more than Rs. 20000.

9. Create table

Author (Author_id, Name, City, Country)
Catalog (Book_id, Title, Author1_id, Author2_id, Publisher_id, Category_id, Year, Price)
Publisher (Publisher_id, Name, City, Country)
Order_details(Order_no, Book_id, Quantity)
Category (Category_id, Description)
Order_summary (Order_no,Member_id,Odate,Amount,Ostatus)
Member(Member_id, Name, Address, Contact)

Assume that all books have at most two authors. Write appropriate queries to perform the following operations:

a) Retrieve the title, author, and publisher names of all books published in 1999 and 2006.
b) Retrieve the title of all books whose one author is ‘A Tanenbum’.
c) Get the details of all books whose price is greater than the average price of the books.
d) Get the names of all the books for which an order has been placed.
e) Get the names of all authors who have more than ten books in the catalog.
f) Get the details of the authors whose books are being sold from the book club.
g) Get the title and price of all books whose price is greater than the maximum of the category average.

REFERENCE BOOKS

1. C.J. Date, *Introduction to database management system.*
2. Elmasri, Navathe, *Fundamentals of data base management system*
3. Bipin C. Desai; *An introduction to Database systems*; Galgotia publications.
4. S.K.Singh; *Database Systems - Concept, Design and Applications*, Pearson Education.

BCA-HC-4016: COMPUTER ORGANIZATION AND ARCHITECTURE

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Introduction **(12 Lectures)**

Functional units of a computer, basic instructions (zero, one, two, three address, interconnection of functional units, bus structure, memory locations, memory addresses, memory operations, instruction and instruction sequencing (straight line sequencing and branching), Fixed and floating point representation of numbers, Normalized floating point representation and arithmetic operations using normalized floating point numbers, IEEE standard for binary floating point representation, Addressing modes, stack, subroutine, I/O instructions

UNIT 2: Register Transfer Logic **(10 Lectures)**

Introduction, inter-register transfer, arithmetic micro-operation, logic micro-operation, shift micro-operation, Conditional control statements, fixed point binary data, instruction code, design of a simple computer.

UNIT 3: Processor Logic Design **(8 Lectures)**

Processor organization, design of arithmetic and logic circuit, status register, design of accumulator.

UNIT 4: Control Logic Design **(8 Lectures)**

Hardware control, micro-programmed control block diagram, symbolic micro-program, micro-programmed CPU organization

UNIT 5: I/O Subsystem **(12 Lectures)**

Program controlled I/O, Interrupts: enabling and disabling interrupts, handling interrupts from multiple sources (priority control), DMA.

UNIT 6: Memory Subsystem **(10 Lectures)**

Semiconductor memory, SRAM, DRAM, ROM, speed size and cost, Cache memory, mapping functions

REFERENCE BOOKS

1. M.Morris Mano, *Digital logic and Computer Design*, PHI publication
2. Hamachar, Vranesic and Zaky, *Computer Architecture*.
3. William Stallings, *Computer Organization and Architecture*; Pearson.

BCA-HC-4026: MATHEMATICS-II

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Sets, Relations and Functions (12 Lectures)

Sets, relations, properties of binary relations, closures of relation, equivalence relations, equivalence classes and partitions, Partial ordering relations and lattices, Functions, one-to-one and onto, principles of mathematical induction

UNIT 2: Graph theory (12 Lectures)

Basic Definition of graph, Connectivity of graph, cut point's cycles, Hamiltonian graphs, trees, different characterization of trees, bipartite graph, Algorithms on graph, Breadth first search, Depth first search

UNIT 3: Combinatorics (10 Lectures)

Basic of counting principles, principle of inclusion-exclusion, application of inclusion and exclusion, Pigeonhole principle, generalized Pigeonhole principle and its application, permutations and combinations, permutations with repetitions, combinations with repetitions, permutations of sets with indistinguishable objects.

UNIT 4: Matrices (8 Lectures)

Row and column operations, vectors and matrices, partitioning of matrices, representing relations using matrices, Determinant of a square matrix, minor, cofactor, the Cayley-Hamilton theorem, inverse of a matrix, product form of inverse. Rank of a matrix, Solutions of simultaneous linear equations, existence of solutions and solution by Gaussian elimination, Eigen values and Eigen vectors.

UNIT 5: Logic (12 Lectures)

Connectives, truth tables, Normal forms- CNF, DNF, Converting expressions to CNF and DNF, Theory of inference, Propositional calculus, Boolean Algebra, Predicate calculus (only introduction), predicates and quantifiers

UNIT 6: Vector Space (6 Lectures)

Fields (definition with a few examples), definition and examples of vector spaces, Properties of linearly independent and dependent set of vectors, Basis and dimension of a vector space, Examples of finite dimensional vector spaces Elementary properties of R^n as a vector space

REFERENCE BOOKS

1. *Elements of Discrete Mathematics*, C. L. Liu, Mc-Graw Hill International Ed.
2. *Discrete Mathematics and its Applications*, K. H. Rosen, Mc-Graw Hill International Ed.
3. *Discrete Mathematics structures with applications to Computer Science*, J. P. Tremblay and R. Manohar, Mc-Graw Hill
4. *Discrete Mathematics*, N. Ch.SN Iyengar, K.A. Venkatesh, V. M. Chandrasekaran, P. S. Arunachalam, Vikash Publishing House Pvt Ltd.

BCA-HC-4036: OBJECT ORIENTED PROGRAMMINF IN C++

(Credit: 4+2=6)(L: 4, P: 4, T: 0)

Theory: 60 Lectures, Practical: 60 Lectures

UNIT 1: Introduction to object oriented programming (10 Lectures)

Origins of C++, Basic Concepts of Object Oriented Programming, Benefits of OOP, Applications of OOP, Introduction to C++, Structure of a Simple C++ program, Output operator, Input operator, Cascading of I/O operators, Tokens- keyword, identifiers, constants, strings and operators. Basic data types, User defined data types, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator & applications, Member dereferencing operators, Memory Management operators, new and delete, Control Structures-simple if, if else, nested if, switch, while do, break and continue statements, Introduction to Functions-Function Prototyping, Call by reference, Return by reference, Inline functions, Default arguments, Const arguments.

UNIT 2: Classes and objects (12 Lectures)

Introduction - Defining a class-Class Vs structures, Creating objects, Accessing class members, Defining member functions- Outside the class definition, Inside the class definition, Outside functions as inline, Nesting of member functions, Private member functions, Memory allocation for objects, Array-Declaring an array-accessing elements of an array, Array of objects, Friendly functions, Constructors and destructors, Basic Concepts of constructors, Default constructor, Parameterized constructor, Multiple constructors in a class, Constructor with default arguments, Dynamic initialization of objects, Copy constructor, Dynamic constructors,Destructors

UNIT 3: Function and operator overloading (10 Lectures)

Overloading Concepts Function Overloading: Functions with different sets of parameters, default and constant parameters, Rules for overloading operators, Defining operator overloading, Overloading Unary operators, Prefix and Postfix operators overloading, Overloading Binary operators, Overloading relational operators, Overloading using friend functions, Overloading subscript operator, Pitfalls of operator overloading, Type conversion-Basic to Class, Class to Basic

UNIT 4: Inheritance (12 Lectures)

Introduction-Defining derived classes, Types of inheritances, Making a private member inheritable, multilevel inheritance, multiple inheritance, Hierarchical inheritance, Hybrid inheritance, Virtual base classes, Abstract classes, Constructors in derived classes, nesting of classes, polymorphism-Compile time and Runtime polymorphism, Pointers to objects, this pointer, Pointer to derived classes, Virtual functions, Rules for virtual functions, Pure virtual functions.

UNIT 5: Streams (8 Lectures)

C++ stream classes-put() and get() functions, getline() and write() functions, Overloading << and >>operators, Formatted Console I/O operations, ios class functions-width(), precision(), fill(), setf() and unsetf(), Formatting flags, Manipulators, User defined manipulators.

UNIT 6: Files **(8 Lectures)**

Introduction-Stream classes for files, Opening files using constructor, Opening files using open(), File modes, Detecting end of file-eof(), Sequential input and output-put() and get()-Reading and writing objects-read() and write()-Random Access files-Manipulating file.

Practical / Lab work to be performed

1. Define a class named *triangle* to represent a triangle using the lengths of the three sides. Write a constructor to initialize objects of this class, given the lengths of the sides. Also write member functions to check

   (a) if a triangle is isosceles

   (b) if a triangle is equilateral

   Write a main function to test your functions.

2. Define a structure *employee* with the following specifications.

   empno : integer

   ename : 20 characters

   basic, hra, da : float

   calculate() : a function to compute net pay as basic+hra+da with float return type.

   getdata() : a function to read values for empno, ename, basic, hra, da.

   dispdata() : a function to display all the data on the screen

   Write a main program to test the program.

3. Define a class *circle* to represent circles. Add a data member *radius* to store the radius of a circle. Write member functions area() and perimeter() to compute the area and perimeter of a circle.

4. Define a class *complex* with two data members *real* and *imag* to represent real and imaginary parts of a complex number. Write member functions

   rpart() : to return the real part of a complex number

   ipart() : to return the imaginary part of a complex number

   add() : to add two complex numbers.

   mul() : to multiply two complex numbers.

   Write constructors with zero, one and two arguments to initialize objects. (*This is an example of polymorphism.*)

5. Define a class *point* with two data members *xordinate* and *yordinate* to represent all points in the two dimensional plane by storing their x co-ordinate and y co-ordinate values. Write member functions

   dist() : to return the distance of the point from the origin.

   slope(): to return the slope of the line obtained by joining this point with the origin.

   Write constructors with zero, one and two arguments to initialize objects. Also write a friend function to compute the distance between two points.

6. Define a class *string* with the following data members char *p; int size; and write member functions to do the following (without using library function) and using dynamic memory allocation.

   - Length of the string
   - Compare two strings

- Copy one string to another
- Reverse the string

Write suitable constructors and destructors. Also write a copy constructor for the class.

7. For the class *complex* defined in 4 above, overload the <<, >>, + and * operators in the usual sense. Also overload the unary – operator.
8. For the class *string* defined in 6 above, overload the <<, >> and + operators where + is to be used for concatenating two strings.
9. Define a class *time* to store time as hour, minute and second, all being integer values. Write member functions to display time in standard formats. Also overload the ++ and -- operators to increase and decrease a given time by one second where the minute and hour values will have to be updated whenever necessary.
10. Define a class to store matrices. Write suitable friend functions to add and multiply two matrices.
11. Write a class based program implementing static members.
12. Define a class *student* with the following specification:

    rollno : integer sname : 20 characters

    Derive two classes *artst* and *scst*. The class *artst* will represent students belonging to arts stream and the class scst will represent students belonging to science stream. The artsst class will have additional data members *ph, hs, en* and as to store marks obtained by a student in three subjects Philosophy, History, English and Assamese. The class *scst* will have additional data members *ph, ch, ma and en* to store marks obtained in Physics, Chemistry, Mathematics and English. Write the following member functions in the classes artst and scst ctotal() : a function to calculate the total marks obtained by a student takedata() : function to accept values of the data members showdata() : function to display the marks sheet of a student .
13. Define an abstract base class *printer*. Derive three classes *laser-printer, line-printer* and *inkjet-printer*. The derived classes will have data members to store the features of that particular printer. Write pure virtual function display() in the base class and redefine it in the derived classes.
14. Define a abstract base class *figure* and add to it pure virtual functions

    display() : to display a figure
    get() : to input parameters of the figure
    area() : to compute the area of a figure
    perimeter() : to compute the perimeter of a figure.

    Derive three classes *circle, rectangle* and t*riangle* from it. A circle is to be represented by its radius, rectangle by its length and breadth and triangle by the lengths of its sides. Write a main function and write necessary statements to achieve run time polymorphism.
15. Write an interactive program to compute square root of a number. The input value must be tested for validity. If it is negative, the user defined function *my_sqrt()* should raise an exception.
16. Define a class *rational* to store rational numbers as a pair of integers, representing the numerator and denominator. Write a member function for setting the values of the numerator and denominator. This function should raise an exception if attempt is made to set a zero value as the denominator and in such cases it should be set to 1.
17. Write a class template for storing an array of elements. Overload the << and >> operators. Write a member function to sort the array in descending order.

18. Write a class template for representing a singly linked list. Write functions for inserting, deleting, searching and for displaying a linked list. Write a main function to test it on a linked list of integers and characters.

REFERENCE BOOKS

1. Schildt Herbert, *The Complete Reference C++*, Tata McGraw Hill, 4th Edition, 2003.
2. Deitel & Deitel, *C++ How to program*, Pearson Education Asia, 6th Edition, 2008.
3. Bjarne Stroustrup, *The C++ Programming Language,* Special Edition, Pearson Education, 2004.
4. M. T. Somashekara, D. S. Guru, *Object-Oriented Programming with C++,* 2nd Edition, PHI, 2012.

BCA-HC-5016: JAVA PROGRAMMING

(Credit: 4+2=6)(L: 4, P: 4, T: 0)

Theory: 60 Lectures, Practical: 60 Lectures

UNIT 1: JAVA language basics **(12 Lectures)**

Basic features, Java virtual machine concepts Creation of JAVA, executing a java program using command line arguments, The primitive data types and Variables, Java Key words, integer and floating point data type, character and Boolean types, declaring and initialization variables, Type conversion and casting

UNIT 2: Operators and Control Statements **(12 Lectures)**

Java operators - Arithmetic operators, Bitwise operators, Relational operators, Boolean logical operators, Assignment operator, Conditional operator, if and switch statements, iteration statements, jump statements.

UNIT 3: Classes and Methods **(15 Lectures)**

Class fundamentals, Objects, Constructors, this keyword, finalize () method, Overloading methods, garbage collection, Returning objects, introducing access control, understanding static, introducing final, introducing nested and inner classes, String operations, Character Extraction, Comparing, Searching & Modifying the strings, Data conversion using valueOf(), StringBuffer

UNIT 4: Inheritance **(12 Lectures)**

Inheritance basics, using super, creating a multilevel hierarchy, method overriding, dynamic method dispatch, using abstract classes, using final with inheritance Packages and interfaces Packages, access protection, importing packages, interfaces Multithread programming, The JAVA thread model, creating a thread, creating a multiple thread, Using is Alive() and join (), Inter thread communication, suspending, resuming and stopping threads, using multithreading.

UNIT 5: Exception handling **(12 Lectures)**

Exception handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java's built-in Exceptions, Input/output: Java I/O classes and interfaces, file, the stream classes, byte streams, character streams, console class. Applet class: Applet basics, applet architecture, simple applet skeleton, applet displaying methods, Event handling: Two event handling mechanisms, delegation event model, event classes, source of events, event listener interface

Practical / Lab work to be performed

Each student should do at least 10 assignments from the following list.

1. Design a class to represent a bank account and include the following data members –

Data Members: name of the depositor, account number, type of a/c, balance amount in the a/c

Methods: to assign initial values, to deposit an amount, to withdraw an amount after checking the minimum balance (Rs.1000), to display the name of the depositor and balance.

2. Write an applet programming to print the first name, last name, sex, address, mobile no. and pin code of an end user passing parameters.

3. Write an applet programming to create three buttons and draw a rectangle on clicking the first button, a solid rounded rectangle on clicking the second button and a solid circle and an arc on clicking the third button.

4. Write an applet program to draw the following shapes –

a) A straight line b) A polygon d) A solid oval e) A solid rounded rectangle f) A polyline

5. Write a program to create 3 – threads for execution with different priorities.

6. Write a program to create three threads for execution of the natural nos. less than 5 using synchronization concept.

7. Write a program to – a) Print the name of the thread, and its priority

b) Change the name of the current thread to "JAVA"

c) Display the detail of the current thread

8. Write a java program for a class teacher that contains two fields name and qualification. Extend the class to department that contains data members deptno and deptname. An interface name as college contains one field name of the college. Using the above classes and interface get the appropriate information and display them.

9. Design three classes person, employee and student using the concept of inheritance. Each class should have a constructor of its own properties as name, age, gender and common method showdata().

10. Write a program to create a class shape with properties length and breadth. Extend the class to rectangle and square, and find the area of the rectangle and the square. Use input() method to take input using keyboard.

11. Write a program to create an array of employee name and salary related to the employee. If the salary is greater than Rs.10,000 raise an exception "Salary is greater than Rs.10,000", otherwise display the required information.

12. Write a program to find the square root of a number. If the input value is negative, raise a user defined exception "The number is a negative number".

13. Write a program to create three StringBuffers. The first one takes no parameters, second one takes an integer value and the third one sets an initial value "Java". Find the content, length and capacity for the StringBuffers.

14. Write a java program to input a string and converts the string to lower case and upper case. Also find the substring from 5 to end, from 0 to 5, from 3 to 7, and from 5 to 5.

15. Write a java program to create a class, library that contains the field, bookno, Extend the class, library to book having fields author and title, and then extend the class, book to issue. Create an interface, language that contains a field, lang. Implement the interface for the class, book. Use appropriate methods for the classes and interface.

REFRERENCE BOOKS

1. Herbert Schildt, *The Complete Reference*, Seventh Edition, Tata McGraw Hill, 2007.
2. Bruce, Eckel, *Thinking in Java*, Third edition, Pearson Education, 2005

BCA-HC-5026: OPERATING SYSTEM

(Credit: 4+2=6)(L: 4, P: 4, T: 0)

Theory: 60 Lectures, Practical: 60 Lectures

UNIT 1: Introduction (6 Lectures)

Basics of Operating Systems: Definition – Generations of operating systems, Types of Operating Systems (definition only): Mainframe, Batch, Multiprocessor, Distributed, Multitasking, Real time, Parallel and Time sharing.

UNIT 2: Processes (6 Lectures)

Process: Concept of a Process, Process States, Process creation, Process termination, Context switching, Thread: Concept of thread, Design issues of thread, Types of threads, Benefits of threads, Basic Concept of multithreading.

UNIT 3: Process Synchronization (6 Lectures)

Basic concept of Inter-Process communication, Race condition, Critical-Section, Mutual exclusion, semaphore, Mutex, Different ways to achieve mutual exclusion- Disabling interrupt, Test-and-Set Lock, Peterson's solution using semaphore, Brief discussion on classical IPC problem (example Dinning philosopher problem).

UNIT 4: Scheduling (6 Lectures)

Basic Concepts of scheduling, Scheduling objectives, pre-emptive and non pre-emptive scheduling, Scheduling criteria – CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Basic concepts on batch, interactive and real-time scheduling algorithm, Scheduling algorithms-FCFS, SJF, RR, priority scheduling, Goals of scheduling algorithms.

UNIT 5: Deadlocks (6 Lectures)

Definition, Deadlock characteristics , Methods for Handling Deadlocks, Deadlock Prevention, Deadlock detection and Recovery, Deadlock Avoidance using Banker's Algorithm.

UNIT 6: Memory management (6 Lectures)

Memory allocation in Multiprogramming, Relocation and Protection, Swapping, Virtual memory: Basics of Virtual Memory, Logical versus Physical address space, Paging and Concept of Segmentation, Page fault, Page table and its entries, Demand paging, TLB, Page replacement algorithms: LRU, Optimal, NRU, FIFO, Second chance, Clock, NFU, Working set.

UNIT 7: File system (6 Lectures)

File concepts, File naming, File types(directory, regular, device), File attributes, Operations on file, Access Methods – Sequential, Random access, Directory in UNIX, Hierarchical directory structure, Relative path and Absolute path, Operation on directories, Disk layout, Disk partition, File system layout, Disk block allocation- Contiguous allocation, Linked list allocation, FAT, i-nodes, File system security

UNIT 8: I/O management **(6 Lectures)**

Basic principles and overall structure of I/O management subsystem, Device controllers, Layers of the I/O subsystem-interrupt handler's device driver, device independent I/O software and user space I/O software.

Practical / Lab work to be performed

Each student should do at least 12 assignments from the following list.

1. Write a program to create a child process that starts looping and then terminates.
2. Write a program to show that the child can be set up to ignore a signal from its parent.
3. Write a program to show that a process can ignore a signal.
4. Write a program to create a thread in which prints "We are proud to be Indians" and terminates.
5. Write a program to demonstrate how to "wait" for thread completions by using the P thread join routine. Threads are explicitly created in a joinable state.
6. Write a program to create a thread in which print "We are proud to be Indians" and pass multiple arguments using structure during its creation.
7. Write a program to compute the dot product of two vectors and also show the use of mutex variable.
8. Write a program to create threads, the main thread creates three threads. Two of these threads increment a counter variable while third thread watches the value of the counter variable. When the counter variable reaches a predefined limit, the waiting thread is signalled by one of the incrementing threads. The waiting thread "awakens" and then modifies the counter. The program continues until the incrementing threads reach a final value and also print the final value.
9. Write a program to show attaching and detaching shared memory.
10. Write a program to show the communication between two processes through shared memory.
11. Write a program to show how two processes can talk to each other using wait() and signal() operations applied on semaphore.
12. Write a program in which a parent process accepts a list of integers to be sorted. Parent process uses the fork system call to create a new process called a child process. Both the processes use shared memory for the list of integers. Now use the parent process to sort the integers using bubble sort and the child process to sort the integers using selection sort. Use semaphore variable for process synchronization.
13. Write a program to implement Banker's Algorithm for multiple resource type each.
14. Write a program to simulate Dining Philosophers Algorithm

REFERENCE BOOKS

1. Tannenbaum, *Operating Systems*, PHI, 4th Edition, 2000
2. Silbersachatz, Galvin, *Operating System Concepts*, Person, 5th Edition, 2001
3. William Stallings, *Operating System*, Prentice Hall of India, 4th Edition, 2003

BCA-HC-6016: SYSTEM ADMINISTRATION USING LINUX

(Credit: 4+2=6)(L: 4, P: 4, T: 0)

Theory: 60 Lectures, Practical: 60 Lectures

UNIT 1: Introduction (8 Lectures)

Introduction to System Administration, Role and power of System Administrator, Basic Features of the Linux operating system, A brief Overview of the most popular Linux Distributions - Red Hat Enterprise Linux (RHEL), Ubuntu, Debian, Fedora, SUSE), Installation Requirements, Partitioning the Hard drive in Linux, Installing the Linux system, Installing and Configuring software in linux, Linux kernel and device drivers, System Startup and Shutdown. Standard I/O, Standard error, Redirection and Piping

UNIT 2: Linux file system (12 Lectures)

Basics of Linux file system - File system types (ext3, ext4, xfs, jfs, ReiserFS, iso9660 etc.), three basic types of files (ordinary or regular, special or device and directory), I-nodes and file attributes, Absolute and Relative path names. File system Mounting and Unmounting, Organization of the file tree, Standard directories and their contents.

UNIT 3: Basic Linux Commands (12 Lectures)

Files and Directory handling Commands - ls, cd, cp, mv, rm, mkdir, rmdir, Commands for Creating and Viewing ordinary files – cat, more, pg, Filter Commands – wc, head, tail, cut, tr, grep (with regular expressions), Setting user and group ownership of files and Access permissions – chmod, chown, chgrp commands, Study of different Linux Shells (sh, bash, csh, zsh), Environment variables, Shell script basics (examples of some simple shell programming).

UNIT 4: Process Creation (8 Lectures)

Basic commands for starting and stopping processes, Basic process attributes and their role in Access control, Examining the list of running processes on the system and understand the data presented there, Background process, Job control, Cron tab file format, Backup and Restore procedure, Submit a print job, check the status of a print job, cancel a print job, Configuring the Print Queue, Selecting the Print Driver, Editing the Printer configuration.

UNIT 5: General User Administration (10 Lectures)

Understanding the „root„ account, Becoming a Superuser (su), A limited su (sudo) Managing user accounts - Adding a new user, Modifying and Removing User accounts, Changing Password, System monitoring and logging, Monitoring memory usage, disk space usage and I/Oactivity.

UNIT 6: Networking in Linux (10 Lectures)

The rules governing IP address classes and netmasks, Network Address, Netmask and Gateway, configuring Interface with ifconfig, ping, netstat, traceroute, telnet. Understanding the significance of the /etc/services file and well known port numbers, Basics of configuring

NFS, NIS, DNS, FTP, Squid Proxy, DHCP server, iptables and firewall, Basic Network SecurityIssues

Practical / Lab work to be performed

Each student should do at least 15 assignments from the following list.

1. Installation of Linux Operating System and partitioning the disk.
2. Installing software packages in linux OS using GUI as well as command line.
3. Changing the default run level of a system
4. Mounting and unmounting a removable media.
5. Finding the list of all running processes and redirect the output in a file.
6. Use of different kill signals to kill a running process.
7. Bringing a process from back ground to fore ground and vice-versa.
8. Adding and managing user accounts.
9. Monitoring disk space quota and memory usage and redirect the output in a file.
10. Backup and restoring a file.
11. Compression and extracting a file. Use command line.
12. Configuring a network interface and assigning a default route.
13. Scheduling job using crontab.
14. Changing the ownership and access permission of file or directory. Use command line.
15. Copy, move and rename a file.
16. Configuring a ftp server
17. Assigning address of DNS
18. Use of ssh, telnet, netstat, ping, route commands.
19. Use grep, awk, sed commands.
20. Use of redirection and piping.
21. Monitoring and managing system log information.
22. Basics of firewall using iptables.
23. Basics of configuring http server.
24. Managing different services in linux.
25. Monitoring the traffic going through a network interface.
26. Write shell script to
    a. Find factorial of a given number
    b. Convert a decimal number to hexadecimal number

REFERENCE BOOKS

1. Sumitabh Das, *UNIX: Concepts and Applications*, Tata McGraw Hill, 4th Edn.
2. Satish Jain, *Basics of OS, Unix and Shell Programming*, BPB Publications, (A8-R4 Revised Syllabus).
3. Mark G Sobell, *A Practical Guide to Linux*, Prentice Hall, 2nd Edition

BCA-HC-6026: COMPUTER NETWORKS

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Physical Layer (8 Lectures)

Data communications: components, Network criteria, physical structures, network models, categories of networks, interconnection of networks, inter network Protocols and standards: protocols-standards-standards organizations- internet standards Network models: Layered tasks, OSI model, layers in the OSI model, TCP/IP protocol suite.

UNIT 2: Digital Transmission (10 Lectures)

Digital to digital conversion: Line coding, line coding schemes, block coding - analog to digital conversion, PCM, transmission modes: serial transmission, parallel transmission, Analog Transmission: Digital to analog conversion: FSK-ASK-PSK, Analog to Analog conversion: Amplitude modulation, Frequency modulation, phase modulation, Multiplexing: Frequency division multiplexing, Time division multiplexing, Transmission Media Guided media: Twisted pair cable, coaxial cable, fiber optic cable Unguided media: radio waves – microwaves-infrared.

UNIT 3: Data Link Layer (12 Lectures)

Error correction and detection: Introduction, block coding, linear block code, cyclic codes checksum, Data link Control: protocols, simplest protocol, stop and wait protocol, stop and wait automatic repeat request, go back n automatic repeat request, selective repeat, automatic repeat request, piggybacking, Multiple Access: Random access, Aloha, CSMA, CSMA/CD, CSMA/CA Controlled access: reservation, polling, token passing, Channelization:FDMA,TDMA,CDMA.

UNIT 4: Network Layer (12 Lectures)

Wired LANs: Ethernet: IEEE standards, standard Ethernet- fast Ethernet, Wireless LANS: IEEE 802.11 architecture, MAC sublayer addressing mechanism, physical layer-Bluetooth: architecture Bluetooth layers-radio layer-baseband layer-L2CAP-other upper layers. Network Layer: IPV4 addresses, IPV6 Addresses, Internet Protocol: IPv4 &IPv6 Address mapping protocols: ARP – RARP.

UNIT 5: Transport Layer (10 Lectures)

Routing protocols: Unicast routing protocols: distance vector routing, Link State routing, Multicast Routing protocols (Any two) Transport Layer: Process to process delivery, UDP/ TCP, Congestion control and QOS: Data traffic, congestion, congestion control, quality of service techniques to improve quality of service.

UNIT 6: Application layer & Network Security (8 Lectures)

DNS: Name space, domain name space, distribution of name space, Electronic mail Architecture, FILE transfer: FTP WWW and HTTP: Architecture, web documents, HTTP, Network Security: Introduction, definitions, two categories, symmetric key cryptography, traditional ciphers, asymmetric key cryptography

REFERENCE BOOKS

1. Behrouz A Forouzan, *Data communication and networking*, McGraw-Hill, 5th edition, 2011.
2. Stalling W, *Data and Computer Communication*, PHI (EEE), 5ed.
3. Andrew S Tanenbaum, *Computer Networks*, PHI publications, 5th edition, 2011.

BCA-SE-3014: WEB TECHNOLOGY

(Credit: 2+2=4) (L: 2, P: 4, T: 0)

Theory: 20 Lectures, Practical: 20 Lectures

UNIT 1: Overview of the World Wide Web and the internet (2 Lectures)

A brief history of TCP/IP and the Internet, Internet services-email, telnet, ftp , Internet components, the birth of web, web page, home page, web site, Web browsers-Netscape navigator and IE, Web browser helper applications, Introduction to web servers and their architecture, Review of some popular web servers like Apache, Nginx, Litespeed, Tomcat etc.

UNIT 2: Inside the firewall AND Linking database to the Web (3 Lectures)

Firewall, proxy server, overview of intranet security, web server security, username/password authentication, COM, DCOM, CORBA, JDBC, ODBC- CGI, ASP and PHP, Dynamic page creation and advantages

UNIT 3: HTML editors and tools (5 Lectures)

Basic HTML, HTML tags, creating list in HTML, hyperlinks, multimedia, HTML forms, tables in HTML, frames in HTML, image maps, style sheets in HTML. DHTML, XML-Introduction, syntax, DTD

UNIT 4: Java Script (10 Lectures)

Client side Scripting languages, Creating interactive documents using JavaScript

Practical / Lab work to be performed

HTML ***(At least 15 assignments have to be done from this group)***

1. Create a HTML document consisting of HTML heading, paragraphs and images.
2. Create a HTML document and insert comments in the HTML source code and insert horizontal lines.
3. Construct HTML document to set the font of a text, size of the font, style of the font.
4. Create a HTML document to show how to create hyperlinks.
5. Create a HTML document to use an image as a link.
6. Create a HTML document to open link in a new browser window.
7. Create a HTML document to jump to another part of a document (on the same page).
8. Create a HTML document to insert images from another folder or another server.
9. Create an image-map, with clickable regions.
10. Create a HTML document with all table elements (Table, Caption, Table Row, Table Data element, Table Heading Element, THEAD, TFOOT, TBODY)
11. Create HTML document to make an unordered list, an ordered list, different types of ordered lists, different types of unordered lists, Nested list, Definition list.

12. Create HTML form with the all FORM elements (text fields, password field, Checkboxes, Radio buttons, Select elements, Drop-down list with a pre-selected value, Textarea (a multiline text input field) and buttons.
13. Create HTML document with all Frame elements (FRAMESET, FRAME, NOFRAMES, and INLINE FRAME).
14. Create a HTML document to add AUDIO and VIDEO.
15. Create a HTML document to aligning images (Let the image float to the left/right of a paragraph)
16. Create a HTML document to jump to a specified section within a frame
17. Construct a HTML document with CSS to Set the background colour of a page.
18. Construct a HTML document with CSS to set an image as the background of a page.
19. Construct HTML document with CSS to Set the text color of different elements and align the text.
20. Construct HTML document to set different colours to visited/unvisited links, Specify a background colour for links

XML ***(At least 2 assignments have to be done from this group)***

21. Construct an XML document that contain information about products of an organization and check the validation of the XML document using DTD.
22. Construct an XML document that contain information of 5 students (such as roll no., name , address, class) and check the validation of the XML document using DTD.
23. Construct an XML document that contain details of 10 books and check the validation of the XML document using DTD.

JavaScript ***(At least 10 assignments have to be done from this group)***

24. Write a program in javasrcript to accept a name from the user and display the same name in an alert box.
25. Write a program in javasrcript to display a message in a confirm box.
26. Write a program in javasrcript to display the message “time is running out” in the status bar.
27. Write a program in JavaScript to enter marks of a student and find his/her grade according to the following: if marks>=90 then grade A if marks>=80 then grade B if marks>=70 then grade C if marks>=60 then grade D otherwise, fail.
28. Write a program in JavaScript to create a button and when the button is clicked the message “Hello World” is displayed on an alert box.
29. Write a program in JavaScript to accept 2 nos. from the user and show the working of all arithmetic operators.
30. Write a program in JavaScript to accept 2 strings and concatenate them.
31. Write a program in JavaScript to display the current date and time.
32. Write a program in JavaScript to find the length of an array.
33. Write a program in JavaScript to check whether a string is palindrome or not.
34. Write a program in JavaScript that responds to a mouse click anywhere on the page (using mouse click).

35. Write a program in JavaScript to display the contents of a check box in a alert box.
36. Write a program to validate a form in the user id and password forms.
37. Write a program in JavaScript to create a welcome cookie, Button animation, Image map with added JavaScript Simple timing, Timing event in an infinite loop.

REFERENCE BOOKS

1. Bayross*, Web Enable Commercial Application Development Using HTML, DHTML, JavaScript, Perl, CGI*, BPB publications, 2000.
2. J. Jawoskri, *Mastering JavaScript*, BPB publications, 1999.
3. Margaret Levine Young – *Internet - The Complete Reference* - Millennium Edition – TMT Edition -1999.
4. Harley Hahn - *The Internet – Complete Reference* – Second Edition - TMH Edition.

BCA-SE-3024: PROGRAMMING WITH C#

(Credit: 2+2=4) (L: 2, P: 4, T: 0)

Theory: 20 Lectures, Practical: 20 Lectures

UNIT 1: Creation of C# (4 Lectures)

C# family tree,, Relationship in .NET Framework, CLR, Managed vs. unmanaged code, CLS ; **Overview of C#:** Object oriented programming, executing the program in IDE & command line compiler; **Data types, Literals and variables:** Important data type, integers, floating- point, the decimal type, characters, the bool type; Literals; Variables, type conversion & casting, type conversion in Expressions.

UNIT 2: Operators (5 Lectures)

Arithmetic operators, Relational & Logical operators, Assignment operators, Bitwise operators, **Control Statements:** IF statements, Switch Statement, For loop, While loop, Do- while l loop, foreach loop, Break, Continue, goto, **Classes, Objects and Methods:** Class fundamentals, creation of objects, Methods, Constructors and Destructors, new operator, this keyword.

UNIT 3: Arrays & strings (5 Lectures)

One-dimensional array, Multi-dimensional array, Jagged arrays, Strings, **Closer look at methods & classes:** Method overloading, overloading constructors, the Main() method, Recursion, **Operator overloading:** Operator overloading fundamentals, Operator overload on built-in types, overloading relational operators, logical operators, Enabling short-circuit operators.

UNIT 4: Inheritance (3 Lectures)

Basics, Member access & inheritance, Virtual Methods and overriding, Abstract Classes, **Interfaces, Structures & Enumerations:** interfaces, interface references, interfaces can be inherited,Structures.

UNIT 5: Exception Handling (3 Lectures)

Exception handling fundamentals, using multiple catch statements, catching all exception, nesting try blocks, throwing an exception, using finally, **I/O:** The Stream classes, console I/O.

Practical / Lab work to be performed

Each student should do at least 20 assignments from the following list

1. Write a program to check whether the Entered Number is Even or Odd
2. Write a program to Swap 2 Numbers
3. Write a program to Get a Number and Display the Sum of the Digits
4. Write a program to Display the Date in Various Formats
5. Write a program to illustrate the Use of Access Specifies
6. Write a program to Illustrate Left Shift Operations
7. Write a program to Compare Two Dates
8. Write a program to demonstrate Polymorphism
9. Write a program to Demonstrate Multilevel Inheritance

10. Write a program to Illustrate Single Inheritance
11. Write a program to Illustrate Multilevel Inheritance with Virtual Methods
12. Write a program to get the Length of the Array
13. Write a program to reverse an Array
14. Write a program to perform a Selection Sort
15. Write a program to Perform Bubble Sort
16. Write a program to Perform Matrix Addition
17. Write a program to Perform Matrix Subtraction
18. Write a program to Demonstrate Properties of the Class
19. Write a program to Create Obsolete Class
20. Write a program to Demonstrate Pass by Value Parameter
21. Write a program to Combine Two Delegates
22. Write a program to Illustrate Array of Delegates
23. Write a program to Display Results using Delegates
24. Write a program to Create Generic Delegate
25. Write a program to Illustrate Predicate
26. Write a program to Illustrate Actions
27. Write a program to create a Progress Bar Control
28. Write a program to Create Input Box and Display the Text
29. Write a program to Create Radio Button and Demonstrate its Use
30. Write a program to Illustrate Elapsed Event
31. Write a program to Demonstrate Use of Clone
32. Write a program to Demonstrate Trigger Concept
33. Write a program to Create Stop Watch
34. Write a program to Demonstrate IndexOutOfRange Exception
35. Write a program to Demonstrate DivideByZero Exception
36. Write a program to create a File
37. Write a program to Read the Contents of the File
38. Write a program to create a Directory
39. Write a program to Illustrate Handling an Event Declared in an Interface
40. Write a program to Demonstrate IDumpable Interface
41. Write a program to Demonstrate iList Interface
42. C# Program to Demonstrate iDictionary Interface
43. Write a program to create a Simple Thread
44. Write a program to kill a Thread
45. WAP in C# which takes your information (name, age , address, marks etc) as input and print your information.
46. Design an interface for GUI calculator and implement logic for calculator.

REFERENCE BOOKS

1. Herbert Schildt, *TheComplete Reference*. C# 2.0, Tata McGraw-Hill Edition 2006.
2. Jesse Liberty. *Learning C#,* O"reilly publications,2002.

BCA-SE-3034: OPEN SOURCE SOFTWARE

(Credit: 2+2=4) (L: 2, P: 4, T: 0)

Theory: 20 Lectures, Practical: 20 Lectures

UNIT 1: LaTeX **(8 Lectures)**

Installation of LaTeX, Understanding Latex compilation, Basic Syntax, Writing equations, Matrix, Tables, Page Layout – Titles, Abstract Chapters, Sections, References, Equation references, citation, List making environments, Table of contents, Generating new commands, Figure handling, table & figure numbering, List of figures, List of tables, Generating index, Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tilez listing, Classes: article, book, report, beamer, slides, Applications: Writing Resume, Writing question paper, Writing articles/ research papers, Presentation using beamer

UNIT 2: Scilab **(8 Lectures)**

Introduction to scilab, Installation of Scilab (windows & Linux), Basic syntax, Mathematical Operators, Predefined constants, Built in functions. Complex numbers, Polynomials, Vectors, Matrix operations (functions like inv(), spec(), zeros(), ones(), eye(), rand(), Handling these data structures using built in functions. Programming : Functions , Loops(for & while) , Conditional statements , Handling .sci files , Installation of additional packages e.g. optimization, Graphics handling: 2D, 3D , Generating .jpg files , Function plotting, Data plotting , Applications: Numerical Linear Algebra (Solving linear equations, eigen values etc.) solving Ordinary Differential Equations, Numerical Analysis – iterative methods , GUI in scilab, Plotting 2D graphs, Comparison with C / C++/ Matlab

UNIT 3: Python **(4 Lectures)**

Introduction to Python, The procedure to install Python, How to open Python console, Basic Python commands.

Practical / Lab work to be performed

Each student should do at least 8 assignments from the following list.

1) Calculate the value of x using the following formula in scilab

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

where a, b and c are constants.

2) Write a code to check if a number is less than 10, if yes, then display `< 10', if it is greater than 10, then display `> 10', else display the square of the number.

3) Write code to check if a given number n is less than or equal to 10, if yes, display its square.

4) Write a for loop to display all the even numbers between 1 to 50.

5) Write a program to find the sum of a list of numbers.

6) Write a program using while loop to display odd numbers in the range 1 to 25.

7) if $A=\begin{bmatrix} 1 & 4 & 0 \\ -1 & 5 & 8 \\ 4 & 5 & 6 \end{bmatrix}$

a. Find A(:,:)

b. Extract the 2nd column of A

8) Determine the determinant and eigen values of the matrix, A2 + 2* A where A is define in Q.No 7.

9) Define a 3x3 matrix A with all elements equal to 1. Multiply 1st and 2nd row with scalars, 3 and 4 respectively, and determine the determinant of the resultant matrix.

10) A = [2 3 1; 4 6 5; 1 3 6] Use a suitable sequence of row operations on A to bring A to upper triangular form.

11) Solve the following differential equations using Scilab and plot the dependent variable vs independent variable.

a. $\frac{dy}{dx} + \frac{y}{x} = -x^3; (x > 0)$

b. $cos\ (x)\frac{dy}{dx} + sin(x)y = x^2 : y(0) = 4$

12) plot sin(x) versus x.(Put a title: “Sine", and labels, `x axis' and `y axis')

13) Plot sin(x) and cos(x) on the same window.

REFERENCE BOOKS

1. http://fossee.in or http://scilab.in
2. http://spoken-tutorial.org/NMEICT-Intro
3. Reliable web resources as recommended by class teacher.

BCA-SE-4014: ANIMATION

(Credit: 2+2=4) (L: 2, P: 4, T: 0)

Theory: 20 Lectures, Practical: 20 Lectures

UNIT 1: Multimedia and Flash Preliminaries (6 Lectures)

Multimedia - understanding multimedia; experiencing and interacting with the message.

The Multimedia Computer and its components - multimedia hardware standards, the sound card, video card, the CD-Rom/DVD drive, Multimedia Software - types and examples of multimedia software, animation, interactive programming, audio and video software, the place of Adobe Premiere and Macromedia Flash; other commonly used post production software like Adobe After Effects, Combustion, etc. Introduction to Flash – the different aspects and uses of Flash; the Flash interface – the different windows, panels, the toolbox; Flash help system and how to use it, Working with Flash Tools – Flash tools and how to use them: navigation and viewing tools, selection tools, drawing tools; strokes and fills in Flash and how to create and edit them; tools and panels for working with colours in Flash; text in Flash, different types of text blocks and how to work with them.

UNIT 2: Drawing in Flash (4 Lectures)

Working with graphic objects in Flash – selecting, moving, transforming, grouping, stacking, and aligning objects; breaking apart objects and groups, **Drawing in Flash:** panels used for drawing in Flash, techniques for creating different types of basic and advanced shapes, masks; editing and modifying the shapes; importing artwork and bitmaps into Flash; type effects such as masked text, drop shadowed text and embossed text.

UNIT 3: Animation (4 Lectures)

Animating in Flash – animation tools: the timeline and how to work with it, the library panel, symbols and instances, the movie explorer panel and its uses; Different methods of animation in Flash: frame by frame animation, tweening – shape tweening and techniques for refining shape tweens; motion tweening, motion tweening effects; motion along a path; animating using masks, editing animations, **Movie clips** - their uses, how to create them and edit them, nested movie clips; Flash buttons and how to create and animate them, **Animation using timeline effects** – how to add a timeline effect and edit its settings.

UNIT 4: Video, Audio and Exporting (3 Lectures)

Working with Video and Sound: Video - overview of working with video in Flash and supported formats; sound – overview of working with audio in Flash, supported formats, adding sounds to a document and to buttons, sound editing controls, **Publishing and Exporting Flash movies and images** – Publishing Flash movies and images into formats such as SWF, HTML, GIF, JPEG, PNG and QuickTime; exporting Flash movies as image sequences and clips.

UNIT 5: Action Script (3 Lectures)

ActionScript: Introduction to ActionScript, basics syntax and data types, elements of writing and debugging scripts; Using ActionScript for interaction in a Flash movie – events and event handlers; simple Flash movies using basic event handling and navigation – creating product kiosks, interactive web pages and elementary animation using ActionScript, **Flash Learning Interactions**:

creating e-learning content using Flash learning interactions, different Flash learning interactions, using them and configuring them in a Flash movie.

Practical / Lab work to be performed

The list of the experiments will be prepared by the respected teacher of the course.

REFERENCE BOOKS

1. Macromedia Flash User Manual
2. Macromedia Flash online help system

BCA-SE-4024: MOBILE APPLICATIONS

(Credit: 2+2=4) (L: 2, P: 4, T: 0)

Theory: 20 Lectures, Practical: 20 Lectures

UNIT 1: Overview **(5 Lectures)**

A little background about mobile technologies, Introduction to mobile devices and Administration, Mobile devices vs. desktop devices, Power Management, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store, Development environments Different mobile technologies – Android, Windows, IOS, Black Berry, series 40, Bada, Benefits and drawbacks of Smartphone programming, Overview of Android, How it all got started, Why Android different and important, Android Stack overview, Linux kernel, native libraries, App framework, Apps, SDK overview, platforms, tools, versions. Creating and setting up custom Android emulator.

UNIT 2: Get Started with Android **(5 Lectures)**

Install the android SDK, Install base tools, install SDKs and Add-ons, Install apache Ant, Emulator and Device. Get know Eclipse, Build, install and Run the Application in your Emulator or Device, Project Structure, Creating Applications and Activities: Introducing the Application Manifest, Using the Manifest Editor, The Android Application Life Cycle, Application Priority and Process States. Creating an Activity: The Activity Life Cycle, Designing User interface, Designing by declaration, creating the opening screen, using alternate resources, implementing an about box, applying a theme, adding a menu, adding settings, debugging with log messages, debugging with debugger, The Android Widget Toolbox, Layouts, Creating and Modifying Views, Creating and Using Menus, Android Menu System

UNIT 3: **(4 Lectures)**

Intents, Broadcast Receivers, Adapters, and Connecting to an Internet Resource, Using Activities as Dialogs Exploring 2D graphics and Multimedia Learning the basics, adding Graphics to existing apps, handling input, learn to change the final improvements, Playing audio, Playing Video, Adding sound to existing app, Storing local Data, Reading/writing local data, Accessing the Internal File system, Accessing SD card.

UNIT 4: **(3 Lectures)**

Location and Sensing: SMS Messaging, Displaying MAPS Location Data, Monitoring and Tracking a Location, **Putting SQL to work:** Introducing SQLite, In and Out of SQLite, Hello Database, Data Binding, using content provider, implementing content provider, **Preparing and Publishing:** Preparing app for publishing, Deploying APK files, uploading in Market.

UNIT 5: Accessing Android Hardware **(3 Lectures)**

Using the Media APIs, Playing Media Resources, Recording Multimedia, Using the Camera, Controlling Camera Settings, Using the Camera Preview, Taking a Picture, Introducing the Sensor, Android Telephony, Making Phone Calls, Monitoring Phone State and Phone Activity, Monitoring Data Connectivity and Activity, Accessing Phone Properties and Status,

Controlling the Phone, Controlling Device Vibration, **Web Apps and Android compatibility:** Using Web view, Introducing HTML5

Practical / Lab work to be performed

Each student should do at least 15 assignments from the following list

1. Create “Hello World” application. That will display “Hello World” in the middle of the screen in the red color with white background.
2. To understand Activity, Intent
    i. Create sample application with login module.(Check username and password)
    ii. On successful login, go to next screen. And on failing login, alert user using Toast.
    iii. Also pass username to next screen.
3. Create login application where you will have to validate EmailID (UserName). Till the username and password is not validated, login button should remain disabled.
4. Create and Login application as above. On successful login, open browser with any URL.
5. Create an application that will pass some number to the next screen, and on the next screen that number of items should be display in the list.
6. Understand resource folders:
    i. Create spinner with strings taken from resource folder.
    ii. On changing spinner value, change image.
7. Understand Menu option.
    i. Create an application that will change color of the screen, based on selected options from the menu.
8. Create an application that will display toast (Message) on specific interval of time.
9. Create a background application that will open activity on specific time.
10. Create an application that will have spinner with list of animation names. On selecting animation name, that animation should affect on the images displayed below.
11. Understanding of UI:
    i. Create an UI such that , one screen have list of all the types of cars.
    ii. On selecting of any car name, next screen should show Car details like: name, launched date, company name, images(using gallery) if available, show different colors in which it is available.
12. Understanding content providers and permissions:
    i. Read phonebook contacts using content providers and display in list.
13. Read messages from the mobile and display it on the screen.
14. Create an application to call specific entered number by user in the Edit Text
15. Create an application that will create database with table of User credential.
16. Create an application to read file from asset folder and copy it in memory card.
17. Create an application that will play a media file from the memory card.
18. Create an application to make Insert, update , Delete and retrieve operation on the database.
19. Create an application to read file from the sd card and display that file content to the screen.
20. Create an application to draw line on the screen as user drag his finger.
21. Create an application to send message between two emulators.
22. Create an application to take picture using native application.
23. Create an application to pick up any image from the native application gallery and display it on the screen.
24. Create an application to open any URL inside the application and clicking on any link from that URl should not open Native browser but that URL should open the same screen.

REFERENCE BOOKS

1. Ed Burnette, *Hello, Android: Introducing Google's Mobile Development Platform,* Pragmatic. Bookshelf (2009), ISBN-13: 978-1934356173.
2. Jerome (J.F) DiMarzio , *Android - A programmer's Guide*, Tata McGrew Hill ,2010, ISBN: 9780071070591. 3 Charles Petzold, *Programming Windows Phone*, Microsoft Press,2010

BCA-SE-4034: ADVANCED WEB TECHNOLOGY

(Credit: 2+2=4) (L: 2, P: 4, T: 0)

Theory: 20 Lectures, Practical: 20 Lectures

UNIT 1: Web Development Techniques (12 Lectures)

Server Side Scripting with PHP: Variable declaration, conditionals and loops, error handling with try-catch, vardump, etc. , Integrating PHP in HTML and vice-versa, understanding popular libraries like Date-Time, Math, String etc., Working with PHP superglobals, PHP-HTML form handling, Session & Cookies, File Handling in PHP, Connection of PHP to MySQL DB, PHP CRUD operation with MySQL DB, **Server Side Scripting with JSP:** Brief overview of Java, JSP Fundamentals – Environment Setup, Syntax, Architecture, Lifecycle, Debugging etc., JSP Form Processing and File Handling, Working with JDBC, Java Beans, **Intermediate Web Development Techniques:** Understanding AJAX, Working with XML Documents using PHP & JSP, Understanding JSON, JSON parsing and serialization using PHP, JSP and JavaScript

UNIT 2: Current Trends in Web Technology (8 Lectures)

Understanding Popular Architecture Paradigms – MVC, MVP and MVVM, their components and their utilization, Introduction to popular PHP based web Content Management Systems, Wordpress and Drupal(7+), Introduction to MVC paradigm using any open-source PHP framework like Symfony, Laravel etc, Introduction to Server Side JavaScript with NodeJS

Practical / Lab work to be performed

(Tasks should be carried out in both PHP and JSP)

1. Create an HTML form to take an integer value as input. Whenever use submits the form with the integer number, the next page should display the multiplication table of that particular number in an HTML table. Please perform the necessary JavaScript validation at the form for integer value and null values.
2. Write a script to read a text file from the 'uploads' directory inside the server root and show its content inside a 'div' in an HTML page. Please make sure that the script reads only '.txt' files. Additionally, the name of the file should be suffixed with 'processed' once the script completes reading it. For e.g. if the name of the text file is 'abc.txt', then after reading and displaying the file, the script should rename this file as 'abc-processed.txt'.
3. Write a script to read all images (.gif, .jpeg, .png extensions only) inside a folder in the server root and display them as a slideshow (using JavaScript) in an HTML page.
4. Write a small project showing user registration and login functionality. The system should make use of sessions for data storage. The password field should be encrypted. Use MySQL for data storage.
5. Write a script to fetch JSON data from any Weather Forecast Website with JSON API (like OpenWeatherMap) and show today's weather data for your city/town/village with current date.
6. Write an HTML form where a user can submit their image with a short description of the image and his/her name. On submitting the form, the next page should display the image followed the description in a paragraph ending with a hyphen (-) and the user's name. The backend script should accept only JPEG pictures under 500KB. Perform appropriate JavaScript validation.

7. Write a simple AJAX script which takes input from and HTML form and makes a POST request to a backend script. The backend script should return back the data which will be displayed below the HTML form inside a ‘div’.

REFERENCE BOOKS

1. David Flanagan, *JavaScript: The Denitive Guide*, O'Reilly, 2nd Edition, 2011.
2. Jason Lengstorf, *PHP for Absolute Beginners*, APress, 2009.
3. Herbert Schildt, *The Complete Reference*, Seventh Edition, Tata McGraw Hill, 2007.

BCA-HE-5016: PROJECT WORK/DEISSERTATION (Credit: 6)

The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses. The objective of the project is to train the student to independently search, identify and study real-life important topics in CS/IT; to develop skills among students in a particular field of CS/IT; and to expose students to the world of technology, innovation, and research. The problem should be such that the students get a chance to explore one or two technologies in depth and grab good command over those technologies after successful completion of the project. Application problems, if found interesting and arisen at the demand of a particular situation, may also be assigned; but typical information management systems with just two or three simple database tables and/or data- entry forms are to be discouraged.

The group size should be maximum three (03) students. Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes. The work will have to be submitted in the form of a dissertation.

A maximum of Four (04) projects would be assigned to one teacher.

BCA-HE-5026: DATA MINING AND WAREHOUSING

(Credit: 5+1=6)(L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Introduction to Data Warehousing (12 Lectures)

Need for Data Warehousing, Basic elements of Data Warehousing, differences between Database Systems and Data Warehouse. Data Warehouse Architecture and its components, Infrastructure and metadata. Data Design and Data Representation - Principles of dimensional modelling, advanced topics- data extraction, transformation and loading, data quality, OLAP in Data Warehouse, Data warehousing and the web. Implementation and Maintenance: Physical design process, Data Warehouse deployment, growth and maintenance.

UNIT 2: Introduction to Data Mining Introduction (8 Lectures)

Basics of data mining, Different definitions of Data Mining and related concepts, Data mining process, Data preparation, data cleaning and data visualization. KDD process, Data mining techniques: Clustering, Association rules and Decision trees.

UNIT 3: Clustering (15 Lectures)

Concept of Similarity and distance, Euclidean distance, Manhattan distance, Cosine similarity, Jaccard coefficient, Partitional versus Hierarchical Clustering, different types of data in clustering, Partitional clustering methods – k-means, k-medoids, PAM, CLARA, CLARANS. Hierarchical clustering methods – BIRCH, CURE, Density based clustering methods-DBSCAN.

UNIT 4: Rule Mining (15 Lectures)

What is an association rule? Mining association rules, frequent sets and border sets, algorithms for mining association rules – Apriori algorithm, Pincer-Search algorithm, Border algorithm.

UNIT 5: Classification (10 Lectures)

Introduction, Clustering versus Classification, decision tree construction principle, decision tree generation algorithms – CART, ID3.

REFERENCE BOOKS

1. A.K. Puzari, *Data Mining Techniques*, University Press.
2. J. Han and M. Kamber. *Data Mining: Concepts and Techniques*. Morgan Kaufman. 2001.
3. P. Tan, M. Steinbach and V. Kumar, *Introduction to Data Mining*, Pearson Education (LPE); 2009.

BCA-HE-5036: COMPUTER ORIENTED NUMERICAL METHODS AND STATISTICAL TECHNIQUES

(Credit: 4+2=6)(L: 4, P: 4, T: 0)

Theory: 60 Lectures, Practical: 20 Lectures

UNIT 1: Representation of numbers **(4 Lectures)**

Floating point representation, single and double precision, round off errors and truncation errors

UNIT 2: Solution of non-linear equation **(7 Lectures)**

Bisection method, Newtons method, Regula Falsi method.

UNIT 3: Solution of simultaneous linear equation **(12 Lectures)**

Basic elimination method, Gaussian elimination method, Gauss Jordan method, method of successive approximation.

UNIT 4: Ordinary differential equation **(6 Lectures)**

Euler's method, Runge Kutta method.

UNIT 5: Interpolation **(8 Lectures)**

Newton's interpolation, Lagrange's interpolation, Newton's divided difference method.

UNIT 6: Numerical integration **(11 Lectures)**

Trapezoidal rule, Simpson's 1/3rd and Simpson's 3/8th rule.

UNIT 7: Statistical methods **(12 Lectures)**

Measure of central tendency: Mean, Median and Mode, Probability, probability distribution, Binomial, Poison and normal distribution, Mathematical expectations, moments, correlation, regression.

REFERENCE BOOKS

1. M.K.Jain, S.R.K.Iyenger, R.K.Jain, — *Numerical methods for Scientific and Engineering Computation*, Wiley Easterns.
2. K.E. Atkinson, —*An introduction to numerical analysis*, J.Willey and Sons.

Practical / Lab work to be performed

(N.B: Student has to perform **any six** of the following experiments**)**

1. Find the roots of the equation by bisection method.
2. Find the roots of the equation by Regula–Falsi method.
3. Find the solution of a system of nonlinear equation using Newton's method.
4. Find the solution of simultaneous linear equations using Gauss Elimination method.

5. Find the solution of system of equations using Gauss-Jordan method.
6. Evaluate the approximate value of finite integrals using Simpson's 1/3rd and Simpson's 3/8th rule.
7. Implement Runge Kutta method for ordinary differential equations.
8. Implement Newton's interpolation method.

Note: Programming is to be done in any one of Computer Algebra Systems:
MATLAB / MATHEMATICA / MAPLE.

Reference Books

1. Laurence V. Fausett, Applied Numerical Analysis, Using MATLAB, Pearson, 2/e (2012)
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012)
3. Steven C Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata McGraw Hill, 2/e (2010)

BCA-HE-5046: PROGRAMMING IN PYTHON

(Credit: 4+2=6)(L: 4, P: 4, T: 0)

Theory: 60 Lectures Practical: 60 Lectures

UNIT 1: Planning the Computer Program (4 Lectures)

Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation

UNIT 2: Techniques of Problem Solving (6 Lectures)

Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming

UNIT 3: Overview of Programming (4 Lectures)

Structure of a Python Program, Elements of Python

UNIT 4: Introduction to Python (6 Lectures)

Python Interpreter, Using Python as calculator, Python shell, Indentation Atoms, Identifiers and keywords, Literals, Strings, Operators(Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)

UNIT 5: Creating Python Programs (8 Lectures)

Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass), Defining Functions, default arguments, Errors and Exceptions

UNIT 6: Iteration and Recursion (8 Lectures)

Conditional execution, Alternative execution, Nested conditionals, the return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, the while statement, Tables, Two-dimensional tables

UNIT 7: Strings and Lists (8 Lectures)

String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

UNIT 8: Object Oriented Programming (4 Lectures)

Introduction to Classes, Objects and Methods, Standard Libraries

UNIT 9: Data Structures (6 Lectures)

Arrays, list, set, stacks and queues.

UNIT 10: Searching and Sorting (6 Lectures)

Linear and Binary Search, Bubble sort, Selection sort and Insertion sort.

Practical / Lab work to be performed

(N.B: Student has to perform **any 12** of the following experiments**)**

1. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature.
2. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x).
3. Write a program that reads an integer value and prints ―leap year‖ or ―not a leap year.
4. Write a program that takes a positive integer n and then produces n lines of output shown as follows. For example enter a size: 5

```
*
**
***
****
*****
```

5. Write a function that takes an integer n as input and calculates the value of 1 + 1/1! + 1/2! + 1/3! + … + 1/n
6. Write a function that takes an integer input and calculates the factorial of that number.
7. Write a function that takes a string input and checks if it is a palindrome or not.
8. Write a list function to convert a string into a list, as in list ('abc') gives [a, b, c].
9. Write a program to generate Fibonacci series.
10. Write a program to check a number is Armstrong or not
11. Write a program to check whether the input number is even or odd.
12. Write a program to print all even number between a range(for example between 1 and 100).
13. Write a program to print all prime number between a range(for example between 1 and 100).
14. Write a program to compare three numbers and print the largest one.
15. Write a program to print factors of a given number.
16. Write a method to calculate GCD of two numbers.
17. Write a program to create Stack Class and implement all its methods. (Use Lists).
18. Write a program to create Queue Class and implement all its methods. (Use Lists)
19. Write a program to implement linear and binary search on lists.
20. Write a program to sort a list using insertion sort and bubble sort and selection sort.

REFERENCE BOOKS

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.or 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
4. http://docs.python.org/3/tutorial/index.html
5. http://interactivepython.org/courselib/static/pythonds
6. http://www.ibiblio.org/g2swap/byteofpython/read/

BCA-HE-6016: AUTOMATA THEORY AND LANGUAGES

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Finite Automata (10 Lectures)

DFA, NFA, NFA with ε-moves, Equivalence of DFA and NFA, Reduction of the number of states in finite automata

UNIT 2: Regular Languages and Regular Grammar (12 Lectures)

Concept of languages and grammar, Regular expressions, Connection between regular expressions and regular languages, Regular grammars, Right and Left-Linear Grammars, Equivalence between Regular languages and Regular grammars.

UNIT 3: Properties of Regular Languages (13 Lectures)

Closure under simple set operations- union, intersection, concatenation, complementation and star closure, Decision algorithms for emptiness, finiteness and infiniteness, equality, Proof of non regularity using Pigeonhole principle and using pumping lemma for regular languages.

UNIT 4: Context Free languages (15 Lectures)

Context-free grammars, leftmost and rightmost derivations, derivation trees, Parsing and Ambiguity in grammars and languages, Simplification of Context free Grammars- removing useless productions, empty-productions and unit-productions. Normal forms- Chomsky and Greibach normal forms, Pumping Lemma for CFL, Using Pumping Lemma to show that certain languages are not Context free

UNIT 5: Pushdown Automata (10 Lectures)

Definition and language accepted (acceptance by empty stack and final state and their equivalence), Pushdown Automata and Context free languages. Deterministic PDA and Deterministic Context free Languages.

REFERENCE BOOKS

1. Peter Linz, *An introduction to Formal Languages and Automata*, 5th Edition, Narosa.
2. J. E. Hopcroft and J. D Ullman: *Introduction to Automata Theory, Languages and Computation,* Addison Wesley Publ., New York.

BCA-HE-6026: OPTIMIZATION TECHNIQUES

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Introduction to Operation Research (6 Lectures)

Origin and Development of OR, Nature and Features of OR, Applications of OR, Opportunities and Shortcomings of OR.

UNIT 2: Linear Programming Techniques (12 Lectures)

Mathematical Formulation of the Problem, Graphical Solution Method, The simplex algorithm, the two phase algorithm, Duality theorem, revised simplex algorithm, revised simplex method versus simplex method.

UNIT 3: Transportation Problem (12 Lectures)

General transportation problem, Transportation table, Duality and Loop in Transportation Problem, Formulation of Transportation Problem, Solution of Transportation Problem (North West Corner's method and Vogal's Approximation method)

UNIT 4: Assignment Problem (8 Lectures)

Mathematical Formulation of the problem, Assignment method, Special cases in assignment problem, the travelling salesman problem

UNIT 5: Network Scheduling by PERT/CPM (8 Lectures)

Introduction, Rules of Network Construction, Critical Path Analysis, Distinction between PERT/CPM.

UNIT 6: Simulation (8 Lectures)

Simulation models, even type of simulation, Generation of random numbers, Monte Carlo techniques, and simulation techniques applied to queues

UNIT 7: Information Theory (6 Lectures)

A measure of Information, Entropy-the expected information, Entropy as a measure of Uncertainty, Properties of Entropy function

REFERENCE BOOKS

1. K. Swarup, P.K.Gupta, M.Mohan, *Operations Research*, S.Chand & Sons, NewDelhi
2. K.V.Mittal & G Mohan, *Optimization Methods*, Wileys

BCA-HE-6036: MULTIMEDIA AND APPLICATIONS

(Credit: 4+2=6) (L: 4, P: 4, T: 0)

Theory: 60 Lectures Practical: 60 Lectures

UNIT 1: Multimedia (6 Lectures)

Introduction to multimedia, components, uses of multimedia, multimedia applications, virtual reality

UNIT 2: Text (4 Lectures)

Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext

UNIT 3: Images (6 Lectures)

Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural light & colors, computerized colors, color palettes, image file formats.

UNIT 4: Sound (6 Lectures)

Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats

UNIT 5: Video (8 Lectures)

How video works, analog video, digital video, video file formats, video shooting and editing.

UNIT 6: Animation (10 Lectures)

Principle of animations, animation techniques, animation file formats.

UNIT 7: Internet and Multimedia (6 Lectures)

www and HTML, multimedia on the web – web servers, web browsers, web page makers and site builders.

UNIT 8: Making Multimedia (14 Lectures)

Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware- Macintosh and Windows production Platforms, Hardware peripherals- Connections, Memory and storage devices, Multimedia software and Authoring tools.

Practical / Lab work to be performed

(N.B: Student has to perform **any seven** of the following experiments**)**

Practical exercises based on concepts listed in theory using Flash/ GIMP/ PhotoShop/ Animation Tools/ Image Editors/ Video Editors. **Optional**

Implement the followings using Flash-

1. Create an animation using the tools panel and the properties panel to draw the following – Line, pe, oval, circle, rectangle , square, pencil , brush , lasso tool
2. Create an animation using text tool to set the font, size , color etc

3. Create an animation using **Free transform tool** that should use followings-Move Objects

Skew Objects Stretch Objects Rotate Objects Stretch Objects while maintaining proportion Rotate Objects after relocating the center dot

4. Create an animation using layers having following features-Insert layer, Delete layer, guide layer, Mask layer.
5. Modify the document (changing background color etc.)using the following tools

Eraser tool Hand tool Ink bottle tool Zoom tool Paint Bucket tool Eyedropper tool

6. Create an animation for bus car race in which both starts from the same point and car wins the race.
7. Create an animation in which text Hello gets converted into GoodBye (using motion/shape tweening).
8. Create an animation having five images having fade-in fade-out effect.
9. Create an scene to show the sunrise (using multiple layers and motion tweening)
10. Create an animation to show the ripple effect.
11. Create an animation (using Shape tweening and shape hints) for transforming one shape into another.
12. Create an animation for bouncing ball (you may use motion guide layer).

REFERENCE BOOKS

1. Tay Vaughan, *Multimedia: Making it work*, TMH, Eighth edition, 2011
2. Ralf Steinmetz and KlaraNaharstedt, *Multimedia: Computing, Communications Applications*, Pearson, 2012
3. Keyes, *Multimedia Handbook*, TMH,2000.
4. K. Andleigh and K. Thakkar, *Multimedia System Design*, PHI, 2013

BCA-HE-6046: DISTRIBUTED SYSTEM

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Introduction (12 Lectures)

Introduction, definition of a distributed system, goals, Making Resources Accessible, Distribution, Transparency, Openness, Scalability, Types of distributed systems, Distributed Computing Systems, Distributed Information Systems, Distributed Pervasive Systems

UNIT 2: Communication (8 Lectures)

Remote procedure call, basic rpc operation, parameter passing, asynchronous rpc, Message-oriented communication, message-oriented transient communication, message-oriented persistentcommunication

UNIT 3: Synchronization (8 Lectures)

Clock synchronization, physical clocks, global positioning system, clock synchronization algorithms, Logical clocks, lamport's logical clocks, Mutual exclusion, a centralized algorithm, a centralized algorithm, a distributed algorithm, a token ring algorithm

UNIT 4: Election Algorithms (12 Lectures)

Global positioning of nodes, election algorithms, Traditional Election Algorithms, Elections in Wireless Environments, Elections in Large-Scale Systems

UNIT 5: Consistency and replication (12 Lectures)

Introduction, Reasons for Replication, Replication as Scaling Technique, data-centric consistency models, Continuous Consistency, Continuous Consistency, client-centric consistency models, Eventual Consistency, Monotonic Reads, Consistency protocols, Primary-BasedProtocols

UNIT 6: Fault tolerance (8 Lectures)

Introduction to fault tolerance, Basic Concepts, Failure Models, Failure Masking by Redundancy, process resilience, Agreement in Faulty Systems.

REFERENCE BOOKS

1. Andrew S. Tanenbaum, Maarten Van Steen, *Distributed Systems: Principles and Paradigms*, 2nd Edition, Printice-Hall of India, 2008
2. Coulouris, G, Dollimore J, Kindberg T, Blair G, *Distributed System: Concept and Design,* 5th Edition, Pearson Education
3. Tanenbaum S Andrew, *Distributed Operating Systems,* 5th Edition*,* Pearson Education Asia, 2010
4. SinghalMukesh, ShivaratriG Niranjan, *Advanced Concepts In Operating Systems Distributed Data Base And Multiprocessor Operating Systems*, McGraw-Hill, Inc., 2009

BCA-HE-6056: MICROPOROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

(Credit: 4+2=6)(L: 4, P: 4, T: 0)
Theory: 60 Lectures, Practical: 60 Lectures

UNIT 1: Internal Organization of 8085A microprocessor (12 Lectures)
User Programmable registers, PC, SP, accumulator, flags, data bus, address bus, control bus, instruction word size, opcode format, data format, memory addressing, I/O addressing, address decoding for memory and I/O.

UNIT 2: 8085A microprocessor architecture (12 Lectures)
Pinout of 8085A microprocessor, multiplexed address/data bus, control and status signal, demultiplexing of control signals, other signals, bus timings, fetch decode and execute cycle, timing diagram for opcode fetch memory read and memory write, interfacing memory and I/O.

UNIT 3: Assembly Language Programming in 8085A Microprocessor (12 Lectures)
Complete instruction set in detail, programming examples, logic operation, counters and time delays, stack and subroutine, processing arrays, bit manipulation.

UNIT 4: Interfacing (12 Lectures)
In and OUT instruction, decoding addresses, Interfacing LED, relay, seven segment display, switch, keyboard

UNIT 5: Interrupts (12 Lectures)
Vectored interrupts, interrupt priorities, general purpose programmable peripheral devices, 8255A control and status registers, programming 8255A, introduction to 8279, 8254 and 8237 (block diagrams and basic functions).

Practical / Lab work to be performed

Each student should do at least 8 assignments from the following list.

1. Write a program to add two 8 bit numbers & store it in a memory location 8820h.
2. Write a program to copy a block of memory from one location 8820h to another location 8840h.
3. Write a program to perform the addition of two 16 bit numbers.
4. Write a program to add two numbers & store it in a register e.
5. Write a program to load two unsigned numbers in register b & c. Subtract b from c. If the result is in 2's complement, convert the result in absolute magnitude & display it.
6. Write a program to find the difference of two numbers & store the result in a memory location 8830h.
7. Write a program to find the larger / smaller of two given numbers.
8. Write a program to subtract two numbers and add it to a given memory location.
9. Write a program to perform x+y–5, where x and y are 16–bit numbers.
10. Write a program to find 2"s complement of a number.

REFERENCE BOOKS

1. Ramesh S. Gaonkar: *Microprocessor Architecture, Programming and Application with the 8085*, PENRAM INTL. PUBLISHING (INDIA) PVT. LTD., sixth edition
2. D.A.Godse A.P.Godse: *Microprocessor Techniques, Technical publications*, Fourth revised edition,2008
3. B.Ram**,** *Microprocessor and Microcomputer*

BCA-HE-6066: ARTIFICIAL INTELLIGENCE

(Credit: 4+2=6)(L: 4, P: 4, T: 0)

Theory: 60 Lectures Practical: 60 Lectures

UNIT 1: Introduction (6 Lectures)

Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

UNIT 2: Problem Solving and Searching Techniques (20 Lectures)

Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

UNIT 3: Knowledge Representation (20 Lectures)

Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs.

Programming in Logic (PROLOG)

UNIT 4: Dealing with Uncertainty and Inconsistencies (8 Lectures)

Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

UNIT 5: Understanding Natural Languages (6 Lectures)

Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

Practical / Lab work to be performed

(N.B: Student has to perform **any ten** of the following experiments**)**

1. Write a prolog program to calculate the sum of two numbers.
2. Write a prolog program to find the maximum of two numbers.
3. Write a prolog program to calculate the factorial of a given number.
4. Write a prolog program to calculate the nth Fibonacci number.
5. Write a prolog program, insert_nth(item, n, into_list, result) that asserts that result is the list into_list with item inserted as the n^{th} element into every list at all levels.
6. Write a Prolog program to remove the n^{th} item from a list.
7. Write a Prolog program, remove n^{th} (Before, After) that asserts the After list is the Before list with the removal of every n^{th} item from every list at all levels.
8. Write a Prolog program to implement append for two lists.
9. Write a Prolog program to implement palindrome (List).
10. Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.

11. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List.
12. Write a Prolog program to implement sumlist(List,Sum) so that Sum is the sum of a given list of numbers List.
13. Write a Prolog program to implement two predicates evenlength(List) and oddlength (List) so that they are true if their argument is a list of even or odd length respectively.
14. Write a Prolog program to implement reverse (List, Reversed List) that reverses lists.
15. Write a Prolog program to implement maxlist (List, Max) so that Max is the greatest number in the list of numbers List using cut predicate.
16. Write a Prolog program to implement GCD of two numbers.
17. Write a prolog program that implements Semantic Networks/Frame Structures.

REFERENCE BOOKS

1. DAN.W. Patterson, *Introduction to A.I and Expert Systems*, PHI, 2007.
2. Russell & Norvig, *Artificial Intelligence-A Modern Approach*, LPE, Pearson Prentice Hall, 2nd edition, 2005.
3. Rich & Knight, *Artificial Intelligence,* Tata McGraw Hill, 2nd edition, 1991.
4. W.F. Clocksin and Mellish, *Programming in PROLOG*, Narosa Publishing House,3rd edition, 2001.
5. Ivan Bratko, *Prolog Programming for Artificial Intelligence*, Addison-Wesley, Pearson Education, 3rd edition, 2000.

BCA-HG-1016: COMPUTER BASED ACCOUNTING AND FINANCIAL MANAGEMENT

(Credit: 4+2=6) (L: 4, P: 4, T: 0)

Theory: 60 Lectures, Practical: 60 Lectures

UNIT 1: Accounting **(20 Lectures)**

Definition, function, objective, need, advantage, events and transaction, double entry system of book keeping, Books of accounts: classification of books of accounts, meaning of journal, journalizing of transactions, ledger and ledger posting, closing of books of accounts and preparation of trial balance, Cash book: single column, double column and triple column, depreciation, Financial statements: Trading, Profit and Loss Account and BalanceSheet.

UNIT 2: Tally **(20 Lectures)**

Versions of Tally, Features of Tally, ERP Features, Data Directory and Tally switching between screen areas, Company creation: Create/ Alter/Select/Close/Delete, Introduction on F11 features & F12 configuration, Basic Accounting: Accounting Info Ledger/Group (Single & Multiple) Create/Display/Alter/Delete, Accounting Voucher: Types of Voucher, Configuring Voucher, Voucher Creation, Entering/Altering & Deleting, Basic of Tally Inventory: "Integrated A/c with Inventory" Create/Display/Alter/(Single & Multiple) : Group, Category, Go down, Units (Simple/Compound), Invoicing :Purchase & Sales in Invoice format, Debit Credit notes/ Discount/Description, Inventory Voucher

UNIT 3: Advanced Accounting **(20 Lectures)**

Bill wise Details: Transaction wise Bill By Bill for trading & non trading organization, Interest Calculation: Simple & Advance parameters Interest calculation on outstanding Balances, use of vouchers class, Adjustment entries, BRS: Simple & Advanced, Multiple Currencies: Create of different currencies, voucher entries, Adjustment entries on for ex gain / loss, Cost Center & Cost Categories: (By using purchase, Sales, Receipt, Payment voucher) Create / Alter / Display, Advance Inventory- Actual/Different Billed Qty, O'Value, Batch wise, Alternate Units, BOM, Price List , Budget & Control : Create / Alter, Budget for group / ledger / cost Center, Scenario Mgt : Create / Alter / Delete. Transactions, Administration: Security control, Tally Audit, Housekeeping: Group company, Split company Export Data, ODBC, Printing: Company printing option, Setting toa Bill.

Practical / Lab work to be performed

(N.B: Student has to perform **any ten** of the following experiments**)**

1. Create Multiple Ledger of the following Account Heads:

Bank Charges ; Basic Pay ; Bonus ; Bonus Paid ; Business Promotion Expenses; Commission Paid ; Conveyance; Depreciation on Air Conditioner ; Depreciation on Building; Depreciation on Computers; Depreciation on Furniture & Fixtures; Depreciation on Motor Car; Depreciation on Plant & Machinery; Discount; Donation; Electricity Charges; Employers Contribution to Provident Fund ; Freight Outward; Insurance Premium ; Interest Due; Interest

& Finance Charge; Interest on Bank Overdraft ; Interest on Partner's Capital A/c ; Interest on

Unsecured Loans ; Legal Fees ; Miscellaneous Expenses ; Office Rent ; Office Repairs & Maintenance ; Printing & Stationery ; Rent ; Rent Due ; Travelling Expenses.

2. Make necessary entries in Tally in the books of Galaxy Enterprise:
   (a) Introduced Cash Rs 10,00,000, Furniture worth Rs1,00,000 , Computer worth Rs 86,000, Machinery Rs 1,20,000 into the business on 1st Jan,2010
   (b) Opened a Current A/c with Bank of Baroda with Rs 1,00,000 on 2nd Jan,2011
   (c) Purchased goods on 6th Jan'2010 from Sridhar Stores on credit Rs 2,25,000
   (d) Sold goods for Cash Rs 1,20,000 to Maitree Stores on 7th Jan,2010
   (e) Sold goods to Sankar on credit for Rs 34,000 on 9th Jan'2010
   (f) Paid Rent advance Rs 25,000 by Cheque No 345671 on 10th Jan'2010
   (g) Withdrew from bank Rs 5,000 for office expenses on 18th Jan'2010
   (h) Purchased stationery items on 22nd Jan, 2010 for office use from Radhika Stationeries for Rs 1,500
   (i) Received Advance from Jagat for supply of goods worth Rs 12,000
   (j) Paid salary to office staff Rs10,000 by Cheque 345672 on 31st Jan, 2010

3. Make Data Entries for the following transactions:
   (a) Withdrew Rs 1,00,000 cash from SBI on 6th Jan ,2011
   (b) Deposited Rs 40,000 in HDFC Bank on 9th jan, 2011
   (c) Transferred Rs 20,000 from HDFC Bank to SBI on 12th jan , 2011
   (d) Paid Rs 4,300 as Insurance charges through HDFC Bank on 18th Jan, 2011
   (e) Received Rs 3,25,000 from ABC Co. Ltd. On 23rd Jan, 2011 against our sales through Cheque and it has been deposited in SBI
   (f) Sales worth Rs 5,50,000 made on credit to Vikas Group on 29th jan,2011
   (g) Provision towards Employers PF Contribution Rs 78,000 made on 31st jan,2011
   (h) Purchased Machinery Rs 1,00,000 from Sunder Enterprise (INPUT VAT 12.5%)

4. Enter the following transactions in Tally in the books of Computer Solutions:
   (a) Purchased on 8th April, 2009 HCL Celeron 15 Nos @ Rs 14,000; HCL PIV 15 Nos @ Rs 21,000 from Next Generation Systems (Input VAT @ 4%)
   (b) Sold on 10th April, 2009 to Fortune Computer Services 10 Nos HP Laserjet Series 1010 @ Rs 12,000 (Output VAT @ 12.5%)
   (c) Received from Fortune Computer Services Rs 80,000 on 25th April, 2009
   (d) Paid to Next Generation System Rs 2,00,000 vide Cheque No 357602 of HDFC Bank

5. Record the following transactions in Tally in the books of Hind Computers:
   (a) Returned one Wireless Keyboard Rs 250 to Super Buzz (Input VAT 4%) on 13th August , 2010
   (b) Returned from Computer Junction BM PIV Rs 500 on 16th August, 2010 (CST 4%)
   (c) Transferred 10Nos CD ROM Disks (1 Box @ Rs 265/Box) from Stores to Defective Goods Stores on 31st August, 2010

6. Prepare a Cash Book from the books of ABC Enterprise:
   (a) Cash Balance on 1st April 2010 Rs 4,00,000
   (b) Opened a Current Account with UCO Bank on 5th April , 2010 with Rs16,000
   (c) Purchased goods for Cash Rs 2,50,000 on 6th April , 2010
   (d) Sold goods for Cash Rs 1,25,000 on 8th April , 2010
   (e) Paid for Travelling Expenses Rs 2,300 on 10th April, 2010
   (f) Paid for Staff Welfare Rs 1,200 on 16th April, 2010

(g) Introduced Additional Capital Rs 50,000 on 20th April, 2010
(h) Withdrew from Bank for Office Cash Rs 2,000 on 27th April, 2010
(i) Sold goods for Rs 65,000 on 28th April, 2010 and payment received by Cheque 15,000 and balance in Cash

7. Prepare a Double Column Cash Book from the following transactions of XY Ltd:
(a) On 1st Jan, 2010 Cash in Hand Rs 5,00,000 and Cash at SBI Rs 2,30,000
(b) On 4th Jan, 2010 Goods purchased for cash Rs 1,24,000
(c) On 8th Jan, 2010 Goods sold for cash Rs 2,25,000
(d) Deposited into SBI an amount of Rs 1,10,500
(e) Paid rent to landlord Rs 24,000 by Cheque no 234675
(f) Withdrew from SBI Rs 30,000 for purchase of Furniture
(g) Received payment of Rs 30,000 from Amit Kothari, a customer by Cheque
(h) Withdrew from SBI Rs 23,000 for office cash

8. Make relevant Voucher Entries from the following transactions:
(a) On 1st April, 2010 India Infotech received a Bill (vide No. 001) from Pheonix Agencies for Rs. 5,00,000 towards the Advertisement services rendered.
(b) On April 8, 2010, payment of Rs. 4,95,000 is made towards bill no. Bill-001 to Pheonix Agencies for the purchase of Advertisement services, vide cheque no. 254781
(c) On May 6, 2010, Universal Infotech, paid TDS of Rs. 5,000 towards Advertisement Expenses, vide cheque no. 056330 for the month of April, 2010.

9. Show how would you deal with the following Bills in Tally :
(a) On 7th May, 2010, India Infotech received a bill (vide no. 911) from Gautam Bishnu & Associates for Rs. 1,12,360 inclusive of other charges of Rs. 12,360 towards the auditing services provided(TDS Rs10,000)
(b) On 8th May, 2010 India Infotech received a bill (vide No. 696) from Digitech Computers for Rs. 25,000 towards commission charges
(c) On 12th May, 2010 India Infotech received a bill (vide No. 874) from Digitech Computers for Rs. 40,000 towards commission charges
(d) On 14th May, 2010 India Infotech deducted tax Rs 2,500 towards Commission Expenses for the transaction dated 8th May and Rs 4,000 towards transaction dated 12th May.

10. Prepare a Bank Reconciliation Statement of Digitech Solutions on 31st December, 2010
(a) Balance as per Bank Book on 31st Dec,2010 Rs 32,000
(b) Cheque deposited into UBI Rs 13,000 on 27th Dec , 2010 cleared by bank on 31st Dec, 2010 omitted to be recorded in Cash Book
(c) Withdrew from UBI Rs 2,000 for office cash on 28th Dec'2010 but omitted to be recorded in Cash Book
(d) Service Charge debited by UBI Rs 200 not credited in Cash Book
(e) Bank Interest Rs 568 credited by UBI not recorded in Cash Book
(f) Dividend from UTI Rs 12,450 credited by UBI not recorded in Bank Book
(g) Direct deposit by Ravi, a customer Rs 3,400 into our UBI A/c not recorded in Cash Book

11. Choose the Correct Answer:

(i) What kind of procedure is used while operating the key F1?

(a) ALT and F1

(b) CTRL and F1

(c) SHIFT and F1

(d) F1

(ii) By default how many Groups and Ledgers does Tally have?

(a) 22 Groups and 2 Ledgers

(b) 28 Groups and 3 Ledgers

(c) 28 Groups and 2 Ledgers

(d)) 26 Groups and 3 Ledgers

(iii) To toggle back to the „Main Area" , the short cut key is

(a) CTRL and M (b) CTRL and A (c) CTRL and I (d) CTRL and N

(iv) Ledger Menu comes under

(a) Accounts Info

(b) Inventory Info

(c) Accounting Vouchers

(d) Inventory Vouchers

(v) To change the current period press

(a) F1

(b) ALT and F1

(c) F2

(d) ALT and F2

12. Fill in the Blanks:

(a) To display the „Change Voucher Type press ----------

(b) The shortcut key to view detailed „Profit & Loss A/c is ----------

(c) To record the Voucher in 'Sales' press ----------

(d) To shut an Activated Company press ----------

(e) The shortcut key used to get the 'Stock Journal Voucher' screen is ----------

13. Show relevant Voucher Entry in Tally:

(a) You have purchased an item at a rate of Rs.100 on 8th April, 2010 however by mistake your supplier had billed you at a rate of Rs.95. Now your supplier issues a debit note for balance of Rs. 5 plus vat and other applicable duty Rs 6.

(b) You have agreed to pay a purchase invoice of Rs 1,00,000 within 1 month time to your supplier Geeta Stores. However, you couldn't manage to pay and your supplier agreed for a delayed payment at an interest rate of @2. p.m. for the same

14. The total gross salary payable by X Ltd for the month of January 2010 is Rs. 3,00,000. Out of above, basic salary which is eligible for Provident Fund contribution @ 12% is Rs.2,00,000. X Ltd is also required to pay a sum @12% from the basic salary before the same is disbursed to employee. Apart of this, it is also required to pay @1.61% (of basic pay additional amount as per below :

@1.10% towards PF administration fees;

@0.50% towards Employees Deposit linked insurance scheme and

@0.1% towards EDLI administration charges

Show how you would record the above transactions in Tally.

15. BX Ltd purchased a machinery for Rs 5,00,000. To use this machine company requires a platform, pipe connections, electrical connections, fabrication works etc. at the cost of Rs. 1,00,000. On the expense of Rs. 1,00,000 tax to be deducted at source. The Company made a contract with Arun Contractors for electrical and fabrication work. On 10-8-2010 BX Ltd received bill for Rs. 60,000 from Arun contractors towards electrical and fabrication work. Record the above transaction

REFERENCE BOOKS

1. K.R.Das, K.M. Sinha, K.S.Paul Choudhury, G.G.banik; *Accountancy* (for H.S. first year); LBS Publication.
2. B.B. Dam; *Accountancy* (for H.S. first year).
3. A.K.Nadhani, K.K.Nadhani; *Implementing Tally - 9;* BPB Publication, Delhi.
4. N. Agarwal and S. Agarwal; *Comdex Tally - 9 Course Kit (with CD).*
5. A.K. Nandhani; *Tally - 9, Training Guide*, BPB Publication.

BCA-HG-1026: OFFICE AUTOMATION

(Credit: 4+2=6)(L: 4, P: 2, T: 0)
Theory: 20 Lectures, Practical: 60 Lectures

UNIT 1: Word Processing **(15 Lectures)**

Introduction to Word Processing , Features , Learning document window, Creating , Saving & Closing a document, Opening an Existing document , Editing a Document , Formatting Features (Paragraph Formats, Aligning text & paragraph, Border and Shading, Header & Footers, Bullet & Numbering) , Inserting & Editing a Table , Inserting Picture, Checking & Spelling Correction, Page Setup , Print Preview , Printing a document , Mail Merge , Document Template & Wizards.

UNIT 2: Spreadsheet **(15 Lectures)**

Introduction to Spreadsheet, creating, saving and editing a workbook, Inserting, deleting Worksheets, Opening & Moving around in existing worksheets, working with Formula & Cell referencing, Functions, working with ranges - creating, editing and selecting ranges, Format Feature: AutoFormat Feature, Changing alignment, Character styles, Date Format, Border & Colors etc. Previewing & Printing a worksheet, Creating Charts & Graphs. Database in worksheet, macro, linking and embedding

UNIT 3: Presentation Tools **(15 Lectures)**

Creating & saving Presentations , Opening an existing Presentation, Working in different views, Working with slides, Adding and Formatting Text, Formatting Paragraphs, Checking Spelling and correcting typing mistakes , Adding clip art and other pictures, Inserting Animation, Designing slide shows, Running and controlling slide show, Printing Presentation.

Portable Document Format: storing, creation, conversion.

UNIT 4: DTP Software **(15 Lectures)**

Local language pack in Office Packages: installation and use, Document design using any DTP package, Graphics design and manipulation using any currently available package

Practical / Lab work to be performed

(N.B: Students have to perform the following experiments and are encouraged to work in the Linux platform**)**

1. Create a new folder and do the following:

- Make a word processing document in it.
- Make a Spreadsheet document in it.
- Make a new folder in it
- Rename the initial folder
- Move the initial folder
- Copy the initial folder.
- Delete the initial folder

2. Implement the various well known features of the operating system such as Painting, System tools, Entertainment tools etc.
3. Implement various display properties by right clicking on the Desktop.
4. Explore the taskbar
5. Set the wall paper and screen saver.
6. Set the data/time.

Word Processing Tool

1. Create a document and
a. Put Bullets and Numbers
b. Apply various Font parameters.
c. Apply Left, Right, and Centre alignments.
d. Apply hyperlinks
e. Insert pictures
f. Insert ClipArt
g. Show the use of WordArt
h. Add Borders and Shading
i. Show the use of Find and Replace.
j. Apply header/footers
2. Create any document and show the use of File→versions.
3. Create any document and show the difference between paste and paste special.
4. Create a document to show the use of Washout/Watermark.
5. Implement the concept of mail merge.
6. Implement the concept of macros.
7. Implement the concept of importing a file/document.
8. Implement the concept of merging the documents.
9. Crate a student table and do the following:
a. Insert new row and fill data
b. Delete any existing row
c. Resize rows and columns
d. Apply border and shading
e. Apply merging/splitting of cells
f. Apply sort
g. Apply various arithmetic and logical formulas.
10. Create your resume using General Templates.

Spreadsheet Tool

1. Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using:-
i) Copy/Paste
ii) Embedding
iii) Linking
2. The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3. Create 4th worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The 4th worksheet should contain college name as the first line. Make it bold, italic and center it.

3. Using a simple pendulum, plot 1-T and 1-T^2 graph.

I	t1	t2	t3	Mean(t)	T=t/20	T^2
70						
80						
90						
100						

4. Consider the following employee worksheet:-

Full (First Name Last)	Grade 1/2/3	Basic Salary	HRA	PF	Gross	Net	(VA) Vehicle Allowance

HRA is calculated as follows:

Grade	HRA %(of Basic)
1	40%
2	35%
3	30%

Gross = Basic + HRA + VA Net = Gross –PF

PF is 8% for all Grades

VA is 15000, 10000 and 7000 for Grades 1, 2 and 3.

i) Find max, min and average salary of employees in respective Grade

ii) Count no. of people where VA>HRA

iii) Find out most frequently occurring grade.

iv) Extract records where employee name starts with "A" has HRA>10000

v) Print Grade wise report of all employees with subtotals of net salary and also grand totals. Use subtotal command.

vi) Extract records where Grade is 1 or 2 and salary is between 10000 and 20000 both inclusive.

5. In a meeting of a marketing department of an organization it has been decided that price of selling an item is fixed at Rs40. It was resolved to increases the sell of more of more items and getting the profit of Rs40,000/.Use Goal Seek of find out how many items you will have to sell to meet your profit figure.

6. To study the variation in volume with pressure for a sample of an air at constant temperature by plotting a graph for P – V and P-I/V. Sample observations are:-

Pressure(P)	Volume (V)	I/V	PV	P/V
75	20			
78.9	19			
83.3	18			
88.2	17			

7. Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of

students in class is 50).

8. Create the following worksheet(s) containing an year wise sale figure of five salesmen in Rs.

Salesman	2002	2003	2004	2005
MOHAN	10000	12000	20000	50000
MITRA	15000	18000	50000	60000
SHIKHA	20000	22000	70000	70000
ROHIT	30000	30000	100000	80000
MANGLA	40000	45000	125000	90000

Apply the following Mathematical & Statistical functions:

i) Calculate the commission for each salesman under the condition :-

a) If total sales is greater than Rs. 3, 00,000/-, then commission is 10% of total sale made by the salesman.

b) Otherwise, 4% of total sale.

ii) Calculate the maximum sale made by each salesman.

iii) Calculate the maximum sale made in each year.

iv) Calculate the minimum sale made by each salesman.

v) Calculate the minimum sale made in each year.

vi) Count the no. of sales persons.

vii) Calculate the cube of sales made by Mohan in the year 2002.

viii) Find the difference in sales by salesman Mitra between the year 2002 and 2003. Find the absolute value of difference.

ix) Also calculate the Mode, Stddev, Variance, Median for the sale made by each salesman.

ix) Calculate the year wise Correlation coefficient between the sales man Mohan and Mitra year wise

9. The following table gives an year wise sale figure of five salesmen in Rs.

Salesman	2000	2001	2002	2003
S1	10000	12000	20000	50000
S2	15000	18000	50000	60000
S3	20000	22000	70000	70000
S4	30000	30000	100000	80000
S5	40000	45000	125000	90000

v) Calculate total sale year wise.

vi) Calculate the net sales made by each salesman

vii) Calculate the commission for each salesman under the condition :-

a) If total sales is greater than Rs. 4, 00,000/-, then commission is 5% of total sale made by the salesman.

b) Otherwise, 2% of total sale.

viii) Calculate the maximum sale made by each salesman.

ix) Calculate the maximum sale made in each year.

x) Draw a bar graph representing the sale made by each salesman.

xi) Draw a pie graph representing the sale made by salesmen in year 2001.

10. Consider the following worksheet for APS 1st year students:-

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S.No.	Name	PH	CH	BY	MT	CS	Total Marks	%	Grade
1									
2									

Grade is calculated as follows:-

If % >=90 Grade
A If % >=80 & <90 Grade B
If % >=70 & <80 Grade C If
% >=60 & <70 Grade D
Otherwise students will be declared fail.

i) Calculate Grade using if function
ii) Sort the data according to total marks
iii) Apply filter to display the marks of the students having more than 65% marks.
iv) Draw a pie chart showing % marks scored in each subject by the topper of the class.
v) Draw the doughnut chart of the data as in (iv)
vi) Enter the S.No. of a student and find out the Grade of the student using VLOOKUP.
vii) Extract all records where name
a) Begins with "A"
b) Contains "A"
c) Ends with "A"

Presentation Tool

1. Make a presentation of College Education System using
a. Blank Presentation
b. From Design Template
c. From Auto Content Wizard
2. Make a presentation on "Wild Life" and apply the following:
a. Add audio and video effects
b. Apply various Color Schemes
c. Apply various animation schemes.
d. Apply Slide Show

REFERENCE BOOKS

1. Anita Goel, Computer Fundamentals, Pearson, 2012

BCA-HG-2016: BASIC ELECTRONICS

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Circuit Concepts and Circuit Analysis (20 Lectures)

Voltage and Current Sources Resistors: Fixed and Variable resistors, Color coding of resistors, resistors in series and parallel Inductors: Fixed and Variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction Capacitors: Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of Dielectric Constant, Dielectric strength, Energy stored in a capacitor, Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic capacitor, capacitors in series and parallel Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node Analysis, Mesh Analysis RC Circuit, RL Circuit, RLC Circuits Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. Voltage-Current relationship in Resistor, Inductor and Capacitor Passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

UNIT 2: Analog Electronics (20 Lectures)

PN Junction Diode, Construction and characteristics, Zener Diode, Half wave, full wave and bridge rectifier, Clipping and clamping circuit, regulated power supply, basic transistor action, Transistor current components and amplification. Transistor configurations: Common Base (CB), Common Emitter (CE) and Common Collector (CC) configuration, I-V characteristics, Concept of feedback, negative and positive feedback, Negative feedback, advantages and disadvantages of negative feedback, Barkhausen criteria for oscillations

UNIT 3: Digital Electronics (20 Lectures)

Decimal, Binary, Hexadecimal and Octal number systems, base conversions, Truth Tables of OR, AND, NOT, XOR, XNOR, Universal (NOR and NAND) Gates, Basic postulates and fundamental theorems of Boolean algebra, Combinational Logic Analysis and Design, Adder, Subtractor, Encoder and Decoder, Multiplexers and Demultiplexers, Sequential logic design, Latches and Flip flops, S-R Flip flop, J-K Flip flop, T and D type Flip flops, Introduction to registers and counters

REFERENCE BOOKS

1. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, *Engineering Circuit Analysis*, Tata McGraw Hill(2005)
2. R. L. Boylestad, L. Nashelsky, K. L. Kishore, *Electronic Devices and Circuit Theory*, Pearson Education (2006).
3. J. Millman and C. Halkias, *Integrated Electronics*, Tata McGraw Hill (2001).
4. David A. Bell, *Electronic Devices & Circuits,* Oxford University Press, Fifth edition
5. M. Morris Mano, *Digital System Design*, Pearson Education Asia,(Fourth Edition)

BCA-HG-2026: INTRODUCTION TO BIO-INFORMATICS

(Credit: 5+1=6) (L: 5, P: 0, T: 1)
Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Introduction (10 Lectures)
Definition and History of Bioinformatics, Internet and Bioinformatics, Applications of Bioinformatics

UNIT 2: Biological Databases (12 Lectures)
Sequence and structural with special emphasis on NCBI, EBI, DDBJ, PDB and SwissProt

UNIT 3: Theoretical Aspects of Sequence Analysis (12 Lectures)
Needleman-Wunsch and Smith-Waterman methods of global and local alignments between sequences

UNIT 4: Molecular Phylogeny (14 Lectures)
Properties and types of phylogenetic trees with special emphasis on tree building methods (UPGMA, Neighbour joining, Maximum parsimony, Maximum likelihood)

UNIT 5: Biocomputing in Genomics and Proteomics (12 Lectures)
Introduction to softwares and tools for sequence analysis and assembly (BLAST, FASTA, CLUSTAL W, MEGA), 2D gels and NMR and Crystallographic data

REFERENCE BOOKS

1. *Bioinformatics Basics, Application in biological science and medicine*, Lukas K Buehler, Hooman H Rashidi
2. *Biological sequence analysis,* R. Dubin, S R Reddy, A Keogh, G Hutchison
3. *Bioinformatics: sequence & Genome analysis,* D W Mount
4. *Bioinformatics: A practical guide to the analysis of genome and proteins,* A D Barbados, B F Francis Ouellette
5. *Introduction to Bioinformatics,* Arthur M Lesk

BCA-HG-3016: INTRODUCTION TO INDIAN HISTORY

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: **(12 Lectures)**

Features of Indus Valley Civilization, Condition of India in Vedic period, Maurya dynasty with reference to Asoka's administration

UNIT 2: **(12 Lectures)**

Gupta Period: Samudragupta and Chandragupta II, Harshavardhana-relation with Kamrupa, visit of Hiuen Tsang

UNIT 3: **(12 Lectures)**

Foundation of Muslim rule in India: Iltutmish, Balban, Alauddin Khalji, and Muhammad-Bin-Tughluq, Rise of Mughal power in India: Akbar and Aurangzeb, Sivaji: character and achievements

UNIT 4: **(12 Lectures)**

Arrival of Europeans and establishment of British power after Battle of Plassey, Revolt of 1857

UNIT 5: **(12 Lectures)**

Birth of Indian National Congress and Swadeshi Movement, Non-Cooperation Movement and Civil Disobedience Movement, Quit India Movement and independence

REFERENCE BOOKS

6. *Modern Indian History*, B L Grover, S L Grover
7. *Medieval India: from Sultanate to Mughals-Mughl Empire*, Satis Chandra
8. *History of Ancient India*, K C Choudhury
9. *Ancient India in Historical Outline*, D N Jha

BCA-HG-3026: POSITIVE PSYCHOLOGY

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Introduction (10 Lectures)

Positive psychology: Definition; goals and assumptions; Brief history of Positive psychology, Relationship with other fields of psychology, Scope of positive psychology.

UNIT 2: Positive emotions (6 Lectures)

Positive emotions: concept and theory; Cultivating positive emotions; Relevance of positive emotions.

UNIT 3: Happiness and Well-Being (17 Lectures)

Happiness- hedonic and Eudemonic approaches; Well- being: negative vs positive functions; Subjective well –being: Emotional, social and psychological well-being, Martin Seligman's model of well-being and happiness: PERMA model

UNIT 4: Positive Cognitive States: Resilience and Optimism (17 Lectures)

Resilience: perspectives; Sources of resilience in childhood, adulthood and later life; Optimism- How optimism works; variation of optimism and pessimism; Explanatory or attributional style of explaining life events.

UNIT 5: Applications of Positive Psychology (10 Lectures)

Positive schooling: Components; Positive coping strategies, Mental health: Moving toward balanced conceptualization; Mindfulness, Essential steps to mindfulness.

REFERENCE BOOKS

1. Snyder, C.R. & Lopez, S.J. (2002). *Handbook of positive psychology.* (eds.). New York: Oxford University Press.
2. Baumgardner, S.R & Crothers, M.K.(2009). *Positive Psychology.* U.P: Dorling Kindersley Pvt Ltd.
3. Carr, A. (2004). *Positive psychology, The science of happiness and human strengths.*New York: Routledge.
4. Singh, A.(2013).*Behavioral science: Achieving behavioral excellence for success.* New Delhi: Wiley India Pvt ltd.

BCA-HG-4016: INTRODUCTION TO DRAMATIC ARTS

(Credit: 5+1=6) (L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: General Cultural Aspects

Cultural History of India, Knowledge of major epics like Ramayana, Mahabharata, their content, character and relevance to Indian Theatrical practice, An Acquaintance with Indian Mythology

UNIT 2: The Natyashatrric Tradition

Through knowledge of Bharata's Natyashastra, its relevance to and influence on Indian Classical Theatre, The four 'Abhinayas', aim and nature of Sanskrit natya according to Bharata and later Commentators, the concepts of Natya, Nritya and their characteristics in the earliest and medieval theories, the types of theatre and their construction according to Natyashastra

UNIT 3: Theatre Techniques & Design

Introduction to acting, Introduction to theatre techniques and design, Forms and elements of theatre: Classical and contemporary, Stylised and Naturalistic, Types of theatre: dance, musical, puppet, mime, mask etc, Types of stages: proscenium, thrust, round, open etc., stage and its requirement: properties, costume, make-up, light etc.

UNIT 4: Theatre History, Literature & Aesthetics

Introduction to Shakespeare's works, special reference Macbeth and Othello, Indian Theater, Introduction, special reference to Mohan Rakesh's "Adheadhure", Dharamvir Bharati's "Andhayug" and Vijay Tendulkar's "Ghasiramkotwal", Introduction to Assamese Theatre, special reference to Jnanadaviram Barua's "Ram Navami", Hemchandra Barua's "kaniyar Kirtan", Jyotiprasad Agarwala's "Karengor Ligiri", Arun Sarma's "Aahar" and "Sri Nibaran Bhattacharya"

REFERENCE BOOKS

1. *An Actor* Prepares by Constantin Stanislavski
2. *Building A Character* by Constantin Stanislavski
3. *Creating A Role* by Constantin Stanislavski

BCA-HG-4026: INFORMATION SECURITY AND CYBER LAWS

(Credit: 5+1=6)(L: 5, P: 0, T: 1)

Theory: 60 Lectures, Tutorial: 15 Lectures

UNIT 1: Course Introduction **(8 Lectures)**

Computer network as a threat, hardware vulnerability, software vulnerability, importance of data security

UNIT 2: Digital Crime **(4 Lectures)**

Overview of digital crime, criminology of computer crime

UNIT 3: Information Gathering Techniques **(8 Lectures)**

Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session hijacking

UNIT 4: Risk Analysis and Threat **(10 Lectures)**

Risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, authentication and access control, computer forensics and incident response

UNIT 5: Introduction to Cryptography and Applications **(10 Lectures)**

Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Substitution Cipher (Caeser), Transposition Cipher (Rail-Fence), Public key cryptography (Definitions only), Private key cryptography (Definition and Example), Cyber forensics, Steganography

UNIT 6: Safety Tools and Issues **(10 Lectures)**

Firewalls, logging and intrusion detection systems, Windows and windows XP / NT security, Unix/Linux security, ethics of hacking and cracking

UNIT 7: Cyber laws to be covered as per IT 2008 **(10 Lectures)**

- Chapter 1: Definitions
- Chapter 2: Digital Signature and Electronic Signature
    - [Section 43] Penalty and Compensation for damage to computer, computer
- [Section 65] Tampering with Computer Source Documents
- [Section 66 A] Punishment for sending offensive messages through communication service etc.
- [Section 66 B] Punishments for dishonestly receiving stolen computer resource or communication device
- [Section 66C] Punishment for identity theft
- [Section 66D] Punishment for cheating by personating by using computer resource
- [Section 66E] Punishment for violation of privacy
- [Section 66F] Punishment for cyber terrorism
- [Section 67] Punishment for publishing or transmitting obscene material in electronic form

• [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form[Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form

• [Section 72] Breach of confidentiality and privacy

REFERENCE BOOKS

1. M. Merkow, J. Breithaupt, Information Security Principles and Practices, Pearson Education
2. G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning, 2010
3. A. Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008
4. Anderson, Ross, Security engineering, John Wiley & Sons, 2008 (Freely available online)

B.Sc. Biotechnology (Professional) Syllabus- CBCS

This is approved in the Academic Council held on 08.11.2019

Department of Biotechnology,

GAUHATI UNIVERSITY

Gopinath Bordoloi Nagar, Guwahati 781014, Assam, India.

CHOICE BASED CREDIT SYSTEM (CBCS)

B.Sc. (Honours/Professional) Biotechnology

COURSE STRUCTURE

	Type	CORE	AEC	SEC	DSE	GEN
	Credit	6 (60T+ 40P)	4 (100T)	4 (60T + 40P)	6(4T+2P) 60T + 40P	6 (5T + 1P) 80T + 20P
Semester I		C1(BIT-HC-1016)	AECC1 (ENG-AE-1014)			GE-1 (BIT-HG-1036)
		C2(BIT-HC-1026)				
Semester		C3(BIT-HC-2016)	AECC1 (ENG-AE-1014)			GE2 (BIT-HG-2046)
		C4(BIT-HC-2026)				
Semester III		C5 (BIT-HC-3016)		SEC-1 (BIT-SE-3014)		GE-3 (BIT-HG-3016)
		C6 (BIT-HC-3026)				
		C7 (BIT-HC-3036)				
Semester		C8 (BIT-HC-4016)		SEC-2 (BIT-SE-4014)		GE-4 (BIT-HG-4016)
		C9 (BIT-HC-4026)				
		C10 (BIT-HC-4036)				
Semester V		C11 (BIT-HC-5016)			DSE-I (BIT-HE-5016)	
		C12 (BIT-HC-5026)			DSE-2 (BIT-HE-5026)	
Semester VI		C-13 (BIT-HC-6016)			DSE-3 (BIT-HE-6016)	
		C-14 (BIT-HC-6026)			DSE-4 (BIT-HE-6026)	

LIST OF PAPERS:

Semester I	C1	BIT-HC-1016	Biochemistry & Metabolism	6 credits (60T + 40P marks)
	C2	BIT-HC-1026	Cell Biology	6 credits (60T + 40P marks)
	AECC1	ENG-AE-1014	English/ EVS/ MIL communication	4 credits
	GE1	BIT-HG-1036	Biotechnology & Human Welfare	(5 + 1P) credits (80T + 20P marks)
Semester II	C3	BIT-HC-2016	Mammalian Physiology	6 credits (60T + 40P marks)
	C4	BIT-HC-2026	Plant Physiology	6 credits (60T + 40P marks)
	AECC1	ENG-AE-1014	English/ EVS/ MIL communication	4 credits
	GE2	BIT-HG-2046	Developmental Biology	(5 + 1P) credits (80T + 20P marks)
Semester III	C5	BIT-HC-3016	Genetics	6 credits (60T + 40P marks)
	C6	BIT-HC-3026	General Microbiology	6 credits (60T + 40P marks)
	C7	BIT-HC-3036	Chemistry-I	6 credits (60T + 40P marks)
	SEC1	BIT-SE-3014	Enzymology	4 credits (60T + 40P marks)
	GE3	BIT-HG-3016	Bioethics and Biosafety	(5 + 1P) credits (80T + 20P marks)
Semester IV	C8	BIT-HC-4016	Molecular Biology	6 credits (60T + 40P marks)
	C9	BIT-HC-4026	Immunology	6 credits (60T + 40P marks)
	C10	BIT-HC-4036	Chemistry-II	6 credits (60T + 40P marks)
	SEC2	BIT-SE-4014	Industrial Fermentations	4 credits (60T + 40P marks)
	GE4	BIT-HG-4016	Entrepreneurship Development	(5 + 1P) credits (80T + 20P marks)
Semester V	C11	BIT-HC-5016	Bioprocess Technology	6 credits (60T + 40P marks)
	C12	BIT-HC-5026	Recombinant DNA Technology	6 credits (60T + 40P marks)
	DSE1	BIT-HE-5016	Bioinformatics	(4+2P) credits (60T + 40P marks)
	DSE2	BIT-HE-5026	Ecology & Environmental Management	(4+2P) credits (60T + 40P marks)
Semester VI	C13	BIT-HC-6016	Bio-Analytical Tools	6 credits (60T + 40P marks)
	C14	BIT-HC-6026	Genomics & Proteomics	6 credits (60T + 40P marks)
	DSE3	BIT-HE-6016	Biostatistics	(4+2P) credits (60T + 40P marks)
	DSE4	BIT-HE-6026	Dissertation/ Project	(4+2P) credits (60T + 40P marks)

CONTENT:

BIOCHEMISTRY AND METABOLISM

UNIT I: Introduction to Biochemistry: (20 Periods)

History of biochemistry- from the first enzyme purified to the first protein structure elucidated, and seeds of synthetic biology. Acids, bases, weak acids, pH,K_a, biological buffers, biological significance of normality, molarity, osmosis, diffusion and other phenomena involved in maintaining cellular morphology, cellular structure and dimension.

Amino acids & Proteins**:** Structure & Function. Structure and properties of Amino acids, Types of proteins and their classification, Forces stabilizing protein structure and shape. Different Levels of structural organization of proteins, Protein Purification. Denaturation and renaturation of proteins. Fibrous and globular proteins.

Carbohydrates: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides. Bacterial and fungal cell wall polysaccharides, Glycoprotein's and their biological functions.

UNIT II (10 Periods)

Lipids: Structure and functions –Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebrosides, gangliosides,Prostaglandins, Cholesterol.

Nucleic acids: Structure and functions: Nitrogen, physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, purines & pyrimidines. Double helical model of DNA structure.Forces stabilizing DNA structure. Forms of DNA. DNA denaturation and renaturation. Introduction to nucleic acid metabolism.

UNIT III (15 Periods)

Carbohydrates Metabolism: Reactions, energetics and regulation. Glycolysis: Fate of pyruvateunder aerobic and anaerobic conditions. Pentose phosphate pathway, Gluconeogenesis, Glycogenolysis and

glycogen synthesis. TCA cycle, Electron Transport Chain, Oxidative phosphorylation. ß-oxidation of fatty acids.

UNIT IV **(15 periods)**

Bioenergetics and thermodynamics, Laws of thermodynamics and biology, concepts of free energy, Gibb's free energy, entropy, phosphoryl group transfer and ATP synthesis, oxidation and reduction reactions in biology: Photosynthetic electron transfer, Calvin cycle, TCA cycle, electron transfer chain (oxidative phosphorylation). Reducing and oxidising agents (oxidants and antioxidants), and free radicals in biology.

PRACTICALS

1. Preparation of buffers.
2. Principles of Colorimetry**:**
   a. Verification of Beer's law, estimation of protein.
   b. To study relation between absorbance and % transmission.
3. Concept of standard curve, preparation of standard curve of Glucose.
4. Estimation of blood glucose by glucose oxidase method.
5. Quantification of proteins, carbohydrates and fats.
6. To study activity of any enzyme under optimum conditions.
7. To study the effect of pH, temperature on the activity of salivary amylase enzyme.
8. Separation of Amino acids by paper chromatography/TLC

SUGGESTED READING

1. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
2. Buchanan, B., Gruissem, W. and Jones, R. (2000) Biochemistry and Molecular Biology of Plants.American Society of Plant Biologists.
3. Nelson, D.L., Cox, M.M. (2004) Lehninger Principles of Biochemistry, 4th Edition, WH Freeman and Company, New York, USA.
4. Hopkins, W.G. and Huner, P.A. (2008) Introduction to Plant Physiology. John Wiley and Sons.
5. Salisbury, F.B. and Ross, C.W. (1991) Plant Physiology, Wadsworth Publishing Co. Ltd.

Contact person: Dr Mohammad Imtiyaj Khan, 9844162330, imtiyaj@gauhati.ac.in.

CELL BIOLOGY

UNIT I **(10 Periods)**

Cell: Introduction and classification of organisms by cell structure, compartmentalization of eukaryotic cells, cell fractionation. Cell Membrane, its organization (Fluid Mosaic Model) and permeability, membrane as a dynamic entity, and transport across the membrane. An insight into the organization of the trans-membrane proteins.

UNIT II **(15 Periods)**

Membrane Vacuolar system, cytoskeleton, cytoplasmic streaming and cell motility: Structure and function of microtubules, Microfilaments, Intermediate filaments.

Endoplasmic reticulum: Structure, function including role in protein segregation. Golgi complex: Structure, biogenesis and functions including role in protein secretion.

UNIT III **(15 Periods)**

Lysosomes: Vacuoles and microbodies: Structure and functions Ribosomes: Structures and function. Mitochondria: Structure and function, Genomes, biogenesis. Chloroplasts: Structure and function, genomes, biogenesis

UNIT IV **(10 Periods)**

Nucleus: Structure and function, chromosomes and their structure.

UNIT IV **(10 Periods)**

Extracellular Matrix: Composition, molecules that mediate cell adhesion, membrane receptors, receptor ligand interactions and their function. Signal transduction- basic concept. Basics of apoptosis.

PRACTICALS

1. Demonstration of dialysis/plasmolysis/de-plasmolysis and the effect of temperature and organic solvents on semi permeable membrane.
2. Demonstration of different stages of mitosis in onion root tip.
3. Study of structure of any phytoplankton, zooplankton, diatom, blue green algae, algae and yeast.
4. Microtomy: Fixation, block making, section cutting, staining of animal tissues/plant tissue.
5. Preparation of Nuclear, Mitochondrial & cytoplasmic fractions.

SUGGESTED READING

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.

2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition.Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition.
4. ASMPress & Sunderland, Washington, D.C.; Sinauer Associates, MA.
5. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
6. T. Devasena 2012. Cell Biology. Oxford University Press.

Contact person: Debasish Borbora, debasish.borbora@gauhati.ac.in (9577472620)

BIOTECHNOLOGY AND HUMAN WELFARE

UNIT I **(10 Periods)**

Protein engineering for industry: food, pharmaceutical, beverage, tanning and textile.

UNIT II **(10 Periods)**

N_2 fixing microbes for sustainable agriculture. Plant-microbe interaction, stress response in plants, qualitative improvement of livestock.

UNIT III **(15 Periods)**

Polyaromatic hydrocarbons, polycyclic biphenyls, non-chlorinated organic pollutants, biodegradation, bioremediation, degradation of hydrocarbons and agricultural wastes, bioplastics, biopolymers and biosurfactants.

UNIT IV **(12 Periods)**

Biotechnology in forensic science, criminology, paternity determination using various methods of DNA finger printing.

UNIT V **(13 Periods)**

Biotechnology in modern medicine- overview, therapeutic agents, vaccines, gene therapy, diagnostics, monoclonal antibodies, anti-venoms and chemotherapeutic agents.

PRACTICALS

(Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.)

1. Ethanolic fermentaion using yeast.
2. Isolation of *Rhizobium*/*Azotobacter*/*Azospirillum*, etc from soil/plant parts.
3. Microscopic observation of infected plant parts (sugarcane/rice/brinjal/legumes).
4. Estimation of residual halogens (chlorine/fluorine) in waste water/effluent.
5. Human DNA isolation from buccal swab/hair/urine using isolation kit.
6.visit to advanced laboratory/Universities.

SUGGESTED READING

1. Sateesh MK (2010) Bioethics and Biosafety, I. K. International Pvt Ltd.
2. Sree Krishna V (2007) Bioethics and Biosafety in Biotechnology, New age international

Publishers

Contact person: Dr. Sujoy Bose, Department of Biotechnology, GU

SEMESTER II

MAMMALIAN PHYSIOLOGY

UNIT I: Digestion and Respiration (15 Periods)

Digestion: Mechanism of digestion & absorption of carbohydrates, Proteins, Lipids and nucleic acids. Composition of bile, Saliva, Pancreatic, gastric and intestinal juice

Respiration: Exchange of gases, Transport of O2 and CO2, Oxygen dissociation curve, Chloride shift.

UNIT II: Circulation (15 Periods)

Composition of blood, Plasma proteins & their role, blood cells, Haemopoisis, Mechanism of coagulation of blood. Mechanism of working of heart: Cardiac output, cardiac cycle, Origin & conduction of heart beat.

UNIT III: Muscle physiology and osmoregulation (15 Periods)

Structure of cardiac, smooth & skeletal muscle, threshold stimulus, All or None rule, single muscle twitch, muscle tone, isotonic and isometric contraction, Physical, chemical & electrical events of mechanism of muscle contraction.

Excretion: modes of excretion, Ornithine cycle, Mechanism of urine formation.

UNIT IV: Nervous and endocrine coordination (15 Periods)

Mechanism of generation & propagation of nerve impulse, structure of synapse, synaptic conduction, saltatory conduction, Neurotransmitters. Mechanism of action of hormones (insulin and steroids)

Different endocrine glands– Hypothalamus, pituitary, pineal, thymus, thyroid, parathyroid and adrenals, hypo & hyper-secretions.

PRACTICALS

1. Finding the coagulation time of blood
2. Determination of blood groups
3. Counting of mammalian RBCs
4. Determination of TLC and DLC
5. Demonstration of action of an enzyme
6. Determination of Haemoglobin

SUGGESTED READING

1. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia

PTE Ltd. /W.B. Saunders Company.
2. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition. John wiley & sons,Inc.

Contact person: Dr. Sujoy Bose, Department of Biotechnology, GU

PLANT ANATOMY AND PHYSIOLOGY

UNIT I: Anatomy (10 Periods)

The shoot and root apical meristem and its histological organization, simple & complex permanent tissues, primary structure of shoot & root, secondary growth, growth rings, leaf anatomy (dorsi-ventral and isobilateral leaf)

UNIT II: Plant water relations and micro & macro nutrients (12 Periods)

Plant water relations: Importance of water to plant life, diffusion, osmosis, plasmolysis, imbibition, guttation, transpiration, stomata & their mechanism of opening & closing.

Micro & macro nutrients: criteria for identification of essentiality of nutrients, roles and deficiency systems of nutrients, mechanism of uptake of nutrients, mechanism of food transport

UNIT III: Carbon and nitrogen metabolism (20 Periods)

Photosynthesis- Photosynthesis pigments, concept of two photo systems, photphosphorylation, calvin cycle, CAM plants, photorespiration, compensation point

Nitrogen metabolism- inorganic & molecular nitrogen fixation, nitrate reduction and ammonium assimilation in plants.

UNIT IV: Growth and development (18 Periods)

Growth and development: Definitions, phases of growth, growth curve, growth hormones (auxins, gibberlins, cytokinins, abscisic acid, ethylene)

Physiological role and mode of action, seed dormancy and seed germination, concept of photoperiodism and vernalization

PRACTICALS

1. Preparation of stained mounts of anatomy of monocot and dicot's root, stem & leaf.
2. Study of stomatal distribution/Index in different leaves.
3. Demonstration of opening & closing of stomata
4. Demonstration of guttation on leaf of any plant.
5. Separation of photosynthetic pigments by paper chromatography.
6. Demonstration of aerobic respiration.
7. Study of root nodules.

SUGGESTED READING

1. Dickinson, W.C. 2000 Integrative Plant Anatomy. Harcourt Academic Press, USA.
2. Esau, K. 1977 Anatomy of Seed Plants. Wiley Publishers.
3. Fahn, A. 1974 Plant Anatomy. Pergmon Press, USA and UK.
4. Hopkins, W.G. and Huner, P.A. 2008 Introduction to Plant Physiology. John Wiley and Sons.
5. Mauseth, J.D. 1988 Plant Anatomy. The Benjammin/Cummings Publisher, USA.
6. Nelson, D.L., Cox, M.M. 2004 Lehninger Principles of Biochemistry, 4th edition, W.H. Freeman and Company, New York, USA.
7. Salisbury, F.B. and Ross, C.W. 1991 Plant Physiology, Wadsworth Publishing Co. Ltd.

8. Taiz, L. and Zeiger, E. 2006 Plant Physiology, 4th edition, Sinauer Associates Inc .MA, USA

Contact person: Dr. Pranjan Barman, Department of Biotechnology, GU, pranjan.barman@gauhati.ac.in.
(Call +91 9859947743)

DEVELOPMENTAL BIOLOGY
5 credit (L) + 1 T

UNIT I: Gametogenesis and Fertilization **(10 Periods)**
Definition, scope & historical perspective of development Biology, Gametogenesis, Spermatogenesis, Oogenesis, Differentiation of eggs, spermatogenesis, Definition, mechanism, types of fertilization. Different types of eggs on the basis of yolk.

UNIT II: Early embryonic development **(20 Periods)**
Cleavage: Definition, types, patterns & mechanism Blastulation: Process, types & mechanism Gastrulation: Morphogenetic movements– epiboly, emboly, extension, invagination, convergence, de-lamination. Formation & differentiation of primary germ layers, Fate Maps in early embryos.

UNIT III: Embryonic Differentiation **(20 Periods)**
Differentiation: Cell commitment and determination- the epigenetic landscape: a model of determination and differentiation, control of differentiation at the level of genome, transcription and post-translation level Concept of embryonic induction: Primary, secondary & tertiary embryonic induction, Neural induction and induction of vertebrate lens.

UNIT IV: Organogenesis **(10 Periods)**
Neurulation, notogenesis, development of vertebrate eye. Fate of different primary germlayers Development of behaviour: constancy & plasticity, Extra embryonic membranes, placenta in Mammals**.**

TUTORIALS:

SUGGESTED READING
1. Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
2. Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.
3. Kalthoff, (2000). Analysis of Biological Development, II Edition, McGraw-Hill Professional.

Contact person: Dr. Sujoy Bose, Department of Biotechnology, GU

SEMESTER III

GENETICS

UNIT I **(12 Periods)**

Introduction: Historical developments in the field of genetics. Organisms suitable for genetic experimentation and their genetic significance. Cell Cycle: Mitosis and Meiosis: Control points in cell-cycle progression in yeast and Drosophila. Role of meiosis in life cycles of organisms.

Mendelian genetics : Experimental design, monohybrid, di-hybrid and tri hybrid crosses, Law of segregation, Principle of independent assortment. Verification of segregates by test and back crosses, Chromosomal theory of inheritance, Allelic interactions: Concept of dominance, recessiveness, incomplete dominance, co-dominance, pleiotropy, multiple allele, pseudo-allele, essential and lethal genes,

UNIT II **(18 Periods)**

Non allelic interactions: Complementary genes, epistasis (dominant & recessive), duplicate and inhibitory genes. Chromosome and genomic organization: Eukaryotic nuclear genome nucleotide sequence composition –unique & repetitive DNA, satellite DNA. Centromere and telomere DNA sequences, middle repetitive sequences- VNTRs & dinucleotide repeats, repetitive transposed sequences- SINEs & LINEs, middle repetitive multiple copy genes, noncoding DNA. Genetic organization of prokaryotic and viral genome. Structure and characteristics of bacterial and eukaryotic chromosome, chromosome morphology, concept of euchromatin and heterochromatin. Packaging of DNA molecule into chromosomes, chromosome banding pattern, karyotype, giant chromosomes, one gene one polypeptide hypothesis, concept of cistron, exons, introns, genetic code, gene function.

UNIT III **(15 Periods)**

Chromosome and gene mutations: Definition and types of mutations, causes of mutations, Ames test for mutagenic agents, screening procedures for isolation of mutants and uses of mutants, variations in chromosomes structure - deletion, duplication, inversion and translocation (reciprocal and Robertsonian), position effects of gene expression, chromosomal aberrations in human beings, abonormalities– Aneuploidy and Euploidy. Sex determination and sex linkage: Mechanisms of sex determination, Environmental factors and sex determination, sex differentiation, Barr bodies, dosage compensation, genetic balance theory, Fragile-X-syndrome and chromosome, sex influenced dominance, sex limited gene expression, sex linked inheritance.

UNIT IV **(15 Periods)**

Genetic linkage, crossing over and chromosome mapping: Linkage and Recombination of genes in a chromosome crossing over, Cytological basis of crossing over, Molecular mechanism of crossing over, Crossing over at four strand stage, Multiple crossing overs Genetic mapping. Extra chromosomal inheritance: Extra nuclear inheritance, maternal effects, maternal inheritance, cytoplasmic inheritance, organelle heredity, genomic imprinting. Evolution and population genetics: In breeding and out breeding, Hardy Weinberg law (prediction, derivation), allelic and genotype frequencies, changes in allelic frequencies, systems of mating, evolutionary genetics, natural selection.

PRACTICALS

1. Permanent and temporary mount of mitosis.
2. Permanent and temporary mount of meiosis.
3. Mendelian deviations in dihybrid crosses
4. Demonstration of - Barr Body -*Rhoeo* translocation.
5. Karyotyping with the help of photographs
6. Pedigree charts of some common characters like blood group, color blindness and PTC tasting.
7. Study of polyploidy in onion root tip by colchicine treatment.

SUGGESTED READING

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2006). Principles of Genetics. VIII Edition John Wiley & Sons.

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. IX Edition. Benjamin Cummings.
4. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
5. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition. Introduction to Genetic Analysis, W. H. Freeman & Co.

Contact person: H.K. Sarma, Department of Biotechnology, GU

GENERAL MICROBIOLOGY

UNIT I **(15 Periods)**

An introduction to microbiology and its underlying principles

Functional morphology of the microbial cell - Bacteria, Algae, Fungi, Protozoa, and viruses. Classification of microorganisms, Microbial taxonomy –principles and techniques including molecular approaches, Classification of bacteria - An introduction to Bergey's Manual of Systematic Bacteriology. Extremophiles.

UNIT II **(5 Periods)**

Microbial nutrition, nutritional categories, methods of isolation and preservation

UNIT III **(20 Periods)**

Microbial growth: Growth curve, Generation time, synchronous batch and continuous culture, measurement of growth and factors affecting the growth of bacteria.

Microbial Metabolism: Autotrophic, heterotrophic, mixotrophic, lithotrophic, organotrophic, chemotrophic and phototrophic. Bacterial Reproduction: Transformation, transduction, and conjugation. Endospores and sporulation in bacteria.

UNIT IV **(20 Periods)**

Physical and chemical control of microorganisms.
Water Microbiology: Bacterial pollutants of water, coliforms, and non-coliforms.
Food Microbiology: Important microorganism in food Microbiology: Moulds, Yeasts, bacteria. Major foodborne infections and intoxications, an introduction to microbial food fermentation, food preservation.

PRACTICALS

1. Preparation of media & sterilization methods.
2. Isolation of bacteria & fungi and their biochemical characterization.
2. Staining methods: simple staining, Gram staining, fungal staining, spore staining, negative staining.

4. Determination of bacterial cell size by micrometry and bacterial cell count by haemocytometer.
5. Enumeration of microorganism - total & viable count.
6. Isolation of bacteriophages from sewage.

SUGGESTED READING

1. Alexopoulos CJ, Mims CW, and Blackwell M. (1996). Introductory Mycology. 4 th edition. John and Sons, Inc.
2. Jay JM, Loessner MJ and Golden DA. (2005). *Modern Food Microbiology*. 7thedition, CBS Publishers and Distributors, Delhi, India.
3. Kumar HD. (1990). Introductory Phycology. 2nd edition. Affiliated East Western Press.
4. Madigan MT, Martinko JM and Parker J. (2009). Brock Biology of Microorganisms. 12th edition. Pearson/Benjamin Cummings.
5. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company.
6. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). General Microbiology. 5th edition. McMillan.
7. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9 th edition. Pearson Education.
8. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. 7th edition. McGraw Hill Higher Education.

Contact person: Dr. Debasish Borbora, Department of Biotechnology, GU

ENZYMOLOGY

UNIT – I **(15 Periods)**

Enzymes: Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric & oligomeric enzymes, activation energy and transition state, complementarity, enzyme activity, Michaelis-Menten hypothesis, and Lineweaver Burke plot, specific activity, and common features of active sites.

Enzyme specificity: types & theories, Biocatalysts from extreme thermophilic and hyperthermophilic archaea and bacteria. Role of: NAD+, NADP+, FMN/FAD, coenzymes A, Thiamine pyrophosphate, Pyridoxal phosphate,lipoic-acid, Biotin vitamin B12, Tetrahydrofolate and metallic ions

UNIT - II **(15 Periods)**

Isolation, crystallization and purification of enzymes, test of homogeneity of enzyme preparation, methods of enzyme analysis.

Enzyme classification (rationale, overview and specific examples) Zymogens and their activation (Proteases and Prothrombin).

Enzyme substrate complex: concept of E-S complex, binding sites, active site, specificity, Kinetics of enzyme activity, Michaelis-Menten equation and its derivation,

Different plots for the determination of Km and Vmax and their physiological significance, factors affecting initial rate, E, S, temp. & pH. Collision and transition state theories,
Significance of activation energy and free energy.

UNIT – III **(15 Periods)**

Two substrate reactions (Random, ordered and ping-pong mechanism). Enzyme inhibition and types of inhibition, determination of Ki, suicide inhibitor.
Mechanism of enzyme action: General mechanistic principle, factors associated with catalytic efficiency: proximity, orientation, distortion of strain, acid-base, nucleophilic and covalent catalysis. Techniques for studying mechanisms of action, chemical modification of active site groups, specific examples-: chymotrypsin, Iysozyme, GPDH, aldolase, RNase, Carboxypeptidase and alcohol dehydrogenase.
Enzyme regulation: Product inhibition, feed backcontrol, covalent modification.

UNIT – IV **(12 Periods)**

Allosteric enzymes with special reference to aspartate transcarbomylase and phosphofructokinase. Models of Allosteric enzymes. Negative cooperativity and half site reactivity. Macromolecular interaction: Enzyme interaction, Protein ligand binding, cooperativity, Hill and scatchard plots, kinetics of allosteric enzymes. Isoenzymes– types and significance with special reference to lactate dehydrogenase. Multienzyme complexes. Ribozymes. Abzymes. Multifunctional enzyme-eg Pyruvate dehydrogenase complex.

UNIT – IV **(8 Periods)**

Enzyme Technology: Methods for large scale production of enzymes.
Immobilized enzyme and their comparison with soluble enzymes, Methods for immobilization ofenzymes. Basic kinetics of immobilized enzymes.

PRACTICALS

1. Purification of an enzyme from any natural resource.
2. Quantitative estimation of proteins by Bradford/Lowry's method.
3. Perform assay for the purified enzyme.
4. Determination of - pH optima, temperature optima, Km value, Vmax value, Effect of inhibitor (Inorganic phosphate) on the enzyme activity.

SUGGESTED READING

1. Biochemistry, Lubert Stryer, 6th Edition, WH Freeman, 2006.
2. Harper's illustrated Biochemistry by Robert K. Murray, David A Bender, Kathleen M.Botham, Peter J. Kennelly, Victor W. Rodwell, P. Anthony Weil. 28th Edition, McGrawHill, 2009.
3. Biochemistry, Donald Voet and Judith Voet, 2nd Edition, Publisher: John Wiley andSons, 1995.
4. Biochemistry by Mary K.Campbell & Shawn O.Farrell, 5th Edition, Cenage Learning,2005.
5. Fundamentals of Enzymology Nicholas Price and Lewis Stevens Oxford University Press 1999

6. Fundamentals of Enzyme Kinetics Athel Cornish-Bowden Portland Press 2004
7. Practical Enzymology Hans Bisswanger Wiley–VCH 2004
8. The Organic Chemistry of Enzyme-catalyzed Reactions Richard B. Silverman Academic Press 2002

Contact person: Dr Mohammad Imtiyaj Khan, Department of Biotechnology, Gauhati University. 9844162330, imtiyaj@gauhati.ac.in.

BIOETHICS AND BIOSAFETYUNIT

UNIT- I: **(20 Periods)**

Introduction to Indian Patent Law. World Trade Organization and its related intellectual property provisions. Intellectual/Industrial property and its legal protection in research, design and development. Patenting in Biotechnology, economic, ethical and depository considerations.

UNIT II **(15 Periods)**

Bioethics – Necessity of Bioethics, different paradigms of Bioethics – National & International. Ethical issues against the molecular technologies.

UNIT IV **(15 Periods)**

Biosafety– Introduction to biosafety and health hazards concerning biotechnology. Introduction to the concept of containment level, Concept of BSL and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP).to the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP).

PRACTICALS

1. Proxy filing of Indian Product patent
2. Proxy filing of Indian Process patent
3. Planning of establishing a hypothetical biotechnology industry in India
4. A case study on clinical trials of drugs in India with emphasis on ethical issues.
5. Case study on women health ethics.
6. Case study on medical errors and negligence.
7. Case study on handling and disposal of radioactive waste

SUGGESTED READING

1. Entrepreneurship: New Venture Creation : David H. Holt
2. Patterns of Entrepreneurship : Jack M. Kaplan
3. Entrepreneurship and Small Business Management: C.B. Gupta, S.S. Khanka, Sultan Chand & Sons.
4. Sateesh MK (2010) Bioethics and Biosafety, I. K. International Pvt Ltd.
5. Sree Krishna V (2007) Bioethics and Biosafety in Biotechnology, New age international publishers

Contact Person: Dr. H.K. Sarma, Department of Biotechnology. GU

SEMETSTER IV
MOLECULAR BIOLOGY

UNIT I: DNA structure and replication **(15 Periods)**

DNA as genetic material, Structure of DNA, Types of DNA, Replication of DNA in prokaryotes and eukaryotes: Semiconservative nature of DNA replication, Bi-directional replication, DNA polymerases, The replication complex: Pre-primming proteins, primosome, replisome, Rolling circle replication, Unique aspects of eukaryotic chromosome replication, Fidelity of replication.

UNIT II: DNA damage, repair and homologous recombination **(10 Periods)**

DNA damage and repair: causes and types of DNA damage, mechanism of DNA repair, base excision repair, nucleotide excision repair, mismatch repair, translation synthesis, Homologous recombination.

UNIT III: Transcription and RNA processing **(17 Periods)**

RNA structure and types of RNA, Transcription in prokaryotes: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains

Transcription in eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation RNA splicing and processing: processing of pre-mRNA: 5' cap formation, polyadenylation, splicing, rRNA and tRNA splicing.

UNIT IV: Regulation of gene expression and translation **(18 Periods)**

Regulation of gene expression in prokaryotes: Operon concept (inducible and repressible system), Genetic code and its characteristics, Prokaryotic and eukaryotic translation: ribosome structure and assembly, Charging of tRNA, aminoacyl tRNA synthetases, Mechanism of initiation, elongation and termination of polypeptides, Posttranslational modifications of proteins.

PRACTICALS

1. Preparation of solutions for Molecular Biology experiments.
2. Isolation of chromosomal DNA from bacterial cells.
3. Isolation of Plasmid DNA by alkaline lysis method
4. Agarose gel electrophoresis of genomic DNA & plasmid DNA
5. Preparation of restriction enzyme digests of DNA samples.

SUGGESTED READING

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., (2008) Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press, Pearson Pub.

Contact person: Dr. Pranjan Barman, Department of Biotechnology, GU pranjan.barman@gauhati.ac.in (Call +91 9859947743).

IMMUNOLOGY

UNIT I **(20 Periods)**

Immune Response - An overview, components of mammalian immune system, molecular structure of Immuno-globulins or Antibodies, Humoral & Cellular immune responses, Tlymphocytes & immune response (cytotoxic T-cell, helper T-cell, suppressor T-cells), B-lymphocyte differentiation, Antigens.

UNIT II **(15 Periods)**

Regulation of immunoglobulin gene expression – clonal selection theory, allotypes & idiotypes, allelic exclusion, immunologic memory, heavy chain gene transcription, genetic basis of antibody diversity,

UNIT III **(13 Periods)**

Major Histocompatibility complexes – class I & class II MHC antigens, antigen processing. Immunity to infection, pathogen defense strategies, autoimmune diseases, Immunodeficiency-AIDS. Introduction to HLA system.

UNIT IV **(12 Periods)**

Types of Vaccines & adjuvants, cytokines, passive and active immunization. Introduction to immunodiagnostics –RIA, ELISA. Introduction to basics of plant immune system.

PRACTICALS

1. Differential leucocytes count
2. Total leucocytes count
3. Total RBC count
4. Haemagglutination assay
5. Haemagglutination inhibition assay
6. Separation of serum from blood.
7. ELISA
9. Preparation and quantification of microbial antigen.

SUGGESTED READING

1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6 th edition Saunders Publication, Philadelphia.
2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford.
3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
4. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
5. Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.
7. Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.

Contact person: Dr. Sujoy Bose, Department of Biotechnology, GU

INDUSTRIAL FERMENTATIONS

UNIT I **(12 Periods)**

Biotechnology and bioprocess engineering – principles and steps involved. Media ingredients for industrial fermentation, media formulation, optimization, and sterilization. Inoculum production for bacterial and fungal processes. Strain development. Fermentation material and energy balance, microbial growth kinetics, growth cycle, batch, fed-batch and continuous fermentation. Aeration (O_2, N_2, CO_2) antifoam and buffers.

UNIT II **(15 Periods)**

Microbial products of pharmacological interest, chemotherapeutic products, antibiotics, amino acids, vitamins, steroids and enzymes. Secondary metabolism – its significance and products. Cell immobilization techniques in industrial processing, enzymes in organic synthesis, enzymes in food sciences, textile industries and tanning and leather industries. Production of industrial chemicals viz., acetic acid, propionic acid, butyric acid. Ethanol fermentation and bio-hydrogen. Production of microbial polysaccharides, microbial insecticides, microbial biosurfactants.

UNIT III **(13 Periods)**

Downstream processing - Separation characteristics of proteins and enzymes, purification methodologies. Cell disruption methods for intracellular products, homogenization, sonication, enzyme digestion. Distribution of microbial cells, centrifugation, filtration of fermentation broth, ultra-centrifugation, Supercritical fluid extraction, liquid extraction, ion-exchange recovery, precipitation, distillation, drying of biological products. Product recovery and yield.

UNIT IV **(20 Periods)**

Rate equations for enzyme kinetics, simple and complex reactions. Mathematical derivation of growth kinetics, batch and continuous culture operations. Basic design of a fermenter, aseptic operation and containment, agitator and sparger design, and baffles. Process parameters, measurement of temperature, pressure, pH, dissolved oxygen, foaming, and flow rate of liquids and gases. Types of fermenters, Single stage Continuously Stirred Tank Reactor, bubble column, airlift, packed bed, fluidized bed, membrane type, solid state and photobiorectors.

PRACTICALS

1. Isolation of industrially important microorganisms
2. Production of Industrially important Enzyme by submerged fermentation (Lab scale)
3. Production of Industrially important Enzyme by solid state fermentation
4. Study of Microbial Growth Kinetics
5. Production of alcohol by viable yeast cells
6. Cell disruption by ultrasonication.
7. Soxhlet extraction of plant metabolites and usage of flash evaporator.

SUGGESTED READING

1. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
2. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology.2nd edition. Panima Publishing Co. New Delhi.

3. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.
4. Salisbury, Whitaker and Hall. Principles of fermentation Technology,
5. Bioprocess Engineering, Basic Concepts, II Ed. Michael L Shuler, Fikret Kargi, Prentice Hall of India pvt. Ltd. 2002.

Contact person – Mr. Debasish Borbora (Debasish.borbora@gauhati.ac.in.) and Dr. Dr H.K. Sarma (hridip@gauhati.ac.in)

ENTERPRENEURSHIP DEVELOPMENT

UNIT I **(10 Periods)**

Introduction - Meaning, Needs and Importance of Entrepreneurship, Promotion of entrepreneurship, Factors influencing entrepreneurship, Features of a successful Entrepreneurship.

UNIT II **(12 Periods)**

Establishing an enterprise**,** Forms of Business Organization, Project Identification, Selection of the product, Project formulation, Assessment of project feasibility. Finance in projects.

UNIT III **(15 Periods)**

Financing the enterprise, Importance of finance / loans and repayments, Characteristics of finance, Fixed capital management: Sources of fixed capital, working capital its sources and how to move for loans, Inventory direct and indirect raw materials and its management.

UNIT IV **(13 Periods)**

Marketing management**,** Meaning and Importance, Marketing-mix, product management – Product line, Product mix, stages of product like cycle, marketing Research and Importance of survey, Physical Distribution and Stock Management.

UNIT V **(10 Periods)**

Entrepreneurship and international business, Meaning of International business, Selection of a product, Selection of a market for international business, Export financing, Institutional support for exports.
Project Report on a selected product should be prepared and submitted.

SUGGESTED READING

1. Holt DH. Entrepreneurship: New Venture Creation.
2. Kaplan JM Patterns of Entrepreneurship.
3. Gupta CB, Khanka SS. Entrepreneurship and Small Business Management, Sultan Chand & Sons.

Contact person – Mr. Debasish Borbora (Debasish.borbora@gauhati.ac.in.)

SEMESTER -V

BIOPROCESS TECHNOLOGY

UNIT I **(10 Periods)**

Introduction to bioprocess technology. Techniques and .basic principle components of fermentation technology. Types of microbial fermentation and their uses.

UNIT II **(20 Periods)**

Design of bioprocess vessels- Significance of Impeller, Baffles, Sparger; Types of culture/production vessels- Airlift; Cyclone Column; Packed Tower and their application in production processes. Principles of upstream processing – Media preparation, Inocula development and sterilization.

UNIT III **(15 Periods)**

Introduction to oxygen requirement in bioprocess; mass transfer coefficient; factors affecting KLa. Bioprocess measurement and control system with special reference to computer aided process control.

UNIT IV **(15 Periods)**

Introduction to downstream processing, product recovery and purification. Effluent treatment. Microbial production of ethanol, amylase, lactic acid and Single Cell Proteins.

PRACTICALS

1. Bacterial growth curve.
2. Calculation of thermal death point (TDP) of a microbial sample.
3. Production and analysis of ethanol.
4. Production and analysis of amylase.
5. Production and analysis of lactic acid.
6. Isolation of industrially important microorganism from natural resource.

SUGGESTED READING

1. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
2. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.
3. Patel AH. (1996). Industrial Microbiology. 1st edition, Macmillan India Limited.
4. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.

Contact person: Dr H.K. Sarma

RECOMBINANT DNA TECHNOLOGY

UNIT I **(15 Periods)**

Molecular tools and applications- restriction enzymes, ligases, polymerases, alkaline phosphatase. Gene Recombination and Gene transfer: Transformation, Episomes, Plasmids and other cloning vectors (Bacteriophage-derived vectors, artificial chromosomes), Microinjection, Electroporation, Ultrasonication, Principle and applications of Polymerase chain reaction (PCR), primer-design, and RT- (Reverse transcription) PCR.

UNIT II **(20 Periods)**

Restriction and modification system, restriction mapping. Southern and Northern hybridization. Preparation and comparison of Genomic and cDNA library, screening of recombinants, reverse transcription,. DNA fingerprinting, Applications of Genetic Engineering in animals. Therapeutic products produced by genetic engineering-blood proteins, human hormones, immune modulators and vaccines (one example each).

UNIT III **(10 Periods)**

Random and site-directed mutagenesis: Primer extension and PCR based methods of site directed mutagenesis, Random mutagenesis, Protein engineering concepts and examples (any two).

UNIT IV **(15 Periods)**

Genetic engineering in plants: Strategies for gene transfer to plant cells, Direct DNA transfer to plants, Gene targeting in plants,

PRACTICALS

1. Isolation of chromosomal DNA from plant cells
2. Isolation of chromosomal DNA from *E.coli*
3. Qualitative and quantitative analysis of DNA using spectrophotometer
4. Plasmid DNA isolation
5. Restriction digestion of DNA
6. Making competent cells
7. Demonstration of PCR

SUGGESTED READING

1. Brown TA. (2006). Gene Cloning and DNA Analysis. 5th edition. Blackwell Publishing, Oxford, U.K.
2. Clark DP and Pazdernik NJ. (2009). Biotechnology-Applying the Genetic Revolution. Elsevier Academic Press, USA.
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington
4. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
5. Sambrook J, Fritsch EF and Maniatis T. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press.

Contact person: Dr. Pranjan Barman, pranjan.barman@gauhati.ac.in (call: +91 9859947743)

BIOINFORMATICS

UNIT I **(10 Periods)**

Basic computer applications in biology, History of Bioinformatics. Sequence Information Sources, EMBL, GENBANK, Entrez, Unigene, Understanding the structure of each source and using it on the web.

UNIT II **(20 Periods)**

Protein Information Sources, PDB, SWISSPROT, TREMBL, Understanding the structure of each source and using it on the web. Introduction of Data Generating Techniques and Bioinformatics problem posed by them- Restriction Digestion, Chromatograms, Blots, PCR,

UNIT III **(20 Periods)**

Sequence and Phylogeny analysis, Detecting Open Reading Frames, Outline of sequence Assembly, Mutation/Substitution Matrices, Concept of Homology search, Pairwise Alignments, Introduction to BLAST, using it on the web, Interpreting results, Multiple Sequence Alignment, Phylogenetic Analysis.

UNIT IV **(10 Periods)**

Searching Databases: SRS, Entrez, Sequence Similarity Searches-BLAST, FASTA, Data Submission. Genome Annotation: Pattern and repeat finding, Gene identification tools.

PRACTICALS

1. Sequence information resource
2. Understanding and use of various web resources: EMBL, Genbank, Entrez, Unigene, Protein information resource (PIR)
3. Understanding and using: PDB, Swissprot, TREMBL
4. Using various BLAST and interpretation of results.
5. Retrieval of information from nucleotide databases.
6. Sequence alignment using BLAST.
7. Multiple sequence alignment using Clustal W.

SUGGESTED READING

1. Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.
2. Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell.
3. Campbell A. M., Heyer L. J. (2006) Discovering Genomics, Proteomics and Bioinformatics. II Edition. Benjamin Cummings.

Contact Person: **Dr. S.S. Swargiary. Department of Biotechnology, GU**
Dr. Pranjan Barman, pranjan.barman@gauhati.ac.in (call +91 9859947743 M)

ECOLOGY AND ENVIRONMENT MANAGEMENT

UNIT-I **(12 Periods)**

Scope of Ecology. Development & Evolution of Ecosystem. Principles & Concepts of Ecosystem. Structure and strata of ecosystem. Types of ecosystem including habitats, niche and biomes. Evolution of early life and changes in earth's atmosphere. Whittaker's classification of kingdoms, monera, protists, fungi, plant, and animal kingdoms. Darwin's and Wallace theories of evolution and inheritance.

UNIT II **(20 Periods)**

Energy transfer in an Ecosystem. Food chain, food web, Energy budget, Production and decomposition in a system. Ecological efficiencies, trophic structure and energy pyramids,
Ecological energetics, principles pertaining to limiting factors, Bio-geochemical cycles (N,C,P cycles). Population ecology – populations and communities, attributes of populations, introduction to Mendelian

and population genetics, Hardy Weinberg's law, genetic drift, gene flow.. Intraspecific interactions, commensalism, mutualism, competition and predation. Species diversity, richness, stability and disturbance.

UNIT-III **(18 Periods)**

Aquatic and terrestrial communities; rare communities. Primary and secondary productivity - basic concepts. Primary and secondary ecological succession – water, forests, and lands. Invasive species and control. Adaptation and behaviour under various ecological conditions.

Pollution and environmental health related to soil, water, air, food, pesticides, metals, solvents, radiations, carcinogen, and poisons. Basics of detecting environmental pollutants, indicators of pollution.

UNIT-IV **(10 Periods)**

Environmental biotechnology, approaches for the protection and preservation of environment. Bioremediation, waste water management. Analysis of air pollutants and mitigation of greenhouse gases. Estimation of physico-chemical parameters of water and soil quality, BOD, COD, DO, heavy metals and suspended solids. Principle, instrumentation and application of UV spectroscopy, flame spectrometry and atomic absorption spectroscopy.

PRACTICALS

1. Study of all the biotic and abiotic components of any simple ecosystem- natural pond or terrestrial ecosystem.
2. Determination of population density in a terrestrial or plant community and calculation of the Simpson's and Shannon- Weiner diversity index munity.
3. Study of fecundity table of three types of survivorship curves from zooplanktons collected from natural source.
4. Study of the types of soil, their texture by sieve method and rapid tests for –pH, phosphorous, chlorides, nitrates, carbonates and organic carbon
5. Study any five endangered/ threatened species- one from each class of Whittaker's classification.

SUGGESTED READING

1. Chapman, J.L., Reiss, M.J. 1999. Ecology: Principles and applications (2nd edition) Cambridge, University Press.
2. Divan Rosencraz, Environmental laws and policies in India, Oxford Publication.
3. Joseph, B., Environmental studies, Tata Mc Graw Hill.
4. Miller, G.T. 2002. Sustaining the earth, an integrated approach. (5thedition) Books/Cole,Thompson Learning, Inc.
5. Thakur, I S, Environmental Biotechnology, I K Publication.

Contact person –Dr. Dr H.K. Sarma (hridip@gauhati.ac.in)

SEMESTER VI
BIO-ANALYTICAL TOOLS

UNIT I **(10 Periods)**

Microscopy: Principles and applications of light, Camera lucida, Simple microscopy, phase contrast microscopy, florescence and electron microscopy (TEM and SEM), photomicrography, absorption and emission spectroscopy

UNIT II **(20 Periods)**

Spectroscopy: General principles and law of absorption, Types of spectra and their biochemical usefulness, fluorimetry, colorimetry, spectrophotometry (visible, UV, infrared), IR spectroscopy, CD spectroscopy, Mass spectrometry, NMR, X-ray diffraction: Principles and Application.
Centrifugation: Basic principles of sedimentation – Types of centrifuges and their uses –Preparative and Analytical centrifuge, cell fractionation techniques, isolation of sub-cellular organelles and particles.

UNIT III **(10 Periods)**

Chromatography: principle of chromatography – Adsorption and Partition Chromatography, Paper chromatography, thin layer chromatography, column chromatography: silica and gel filtration, affinity and ion exchange chromatography, gas chromatography, HPLC.

UNIT IV **(10 Periods)**

Electrophoresis: General principles – apparatus, methods and applications. Starch-gel, polyacrylamide gel (native and SDS-PAGE), agarose-gel electrophoresis, pulse field gel electrophoresis, immuno-electrophoresis, isoelectric focusing, Western blotting.

UNIT V **(10 Periods)**

Molecular Techniques: PCR, RT-PCR, Gradient PCR, Real Time PCR, DNA Sequencer, DNA Synthesizer. Introduction to Biosensors and Nanotechnology and their applications**.**

PRACTICAL

1. Native gel electrophoresis of proteins
2. SDS-polyacrylamide slab gel electrophoresis of proteins under reducing conditions.
3. Preparation of the sub-cellular fractions of rat liver cells.
4. Preparation of protoplasts from leaves.
5. Separation of amino acids by paper chromatography.
6. To identify lipids in a given sample by TLC.
7. To verify the validity of Beer's law and determine the molar extinction coefficient of NADH.
8. Gradient PCR

SUGGESTED READING

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley& Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell.7th edition. Pearson Benjamin Cummings Publishing, San Francisc

Contact person: Dr Mohammad Imtiyaj Khan, Department of Biotechnology, Gauhati University. 9844162330, imtiyaj@gauhati.ac.in.

GENOMICS & PROTEOMICS

UNIT I **(15 Periods)**

Introduction to Genomics, DNA sequencing methods – manual & automated: Maxam & Gilbert and Sangers method. Pyrosequencing, Genome Sequencing: Shotgun & Hierarchical (clone contig) methods, Computer tools for sequencing projects: Genome sequence assembly software.

UNIT II **(10 Periods)**

Managing and Distributing Genome Data: Web based servers and softwares for genome analysis: ENSEMBL, VISTA, UCSC Genome Browser, NCBI genome. Selected Model Organisms' Genomes and Databases.

UNIT III **(20 Periods)**

Introduction to protein structure, Chemical properties of proteins. Physical interactions that determine the property of proteins. Short-range interactions, electrostatic forces, van der waal interactions, hydrogen bonds, Hydrophobic interactions. Determination of sizes (Sedimentation analysis, gel filteration, SDS-PAGE), Determination of covalent structures – Edman degradation.

UNIT IV **(15 Periods)**

Introduction to Proteomics, Analysis of proteomes. 2D-PAGE. Sample preparation, Solubilisation, reduction, resolution. 2D-PAGE, Mass spectrometry based method.

PRACTICALS

1. Use of SNP databases at NCBI and other sites
2. Use of OMIM database
3. Detection of Open Reading Frames using ORF Finder
4. Proteomics 2D PAGE database
5. Softwares for Protein localization.
6. Hydropathy plots
7. SDS-PAGE

SUGGESTED READING

1. Genes IX by Benjamin Lewin, Johns and Bartlett Publisher, 2006.
2. Modern Biotechnology, 2nd Edition, S.B. Primrose, Blackwell Publishing, 1987.
3. Molecular Biotechnology: Principles and Applications of Recombinant DNA, 4th Edition, B.R. Glick, J.J. Pasternak and C.L. Patten, 2010.
5. Molecular Cloning: A Laboratory Manual (3rd Edition) Sambrook and Russell Vol. I to III, 1989.
6. Principles of Gene Manipulation 6th Edition, S.B.Primrose, R.M.Twyman and R.W. Old. Blackwell Science, 2001.
7. 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. IX Edition. Benjamin Cummings.
4. Russell, P. J. (2009). *i*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.
6. Pevsner, J. (2009). Bioinformatics and Functional Genomics. II Edition. John Wiley & Sons.

Contact person:

Dr. Pranjan Barman (pranjan.barman@gauhati.ac.in), Call +91 9859947743

BIOSTATISTICS

UNIT I **(12 Periods)**

Types of Data, Collection of data; Primary & Secondary data, Classification and Graphical representation of Statistical data. Measures of central tendency and Dispersion. Measures of Skewness and Kurtosis.

UNIT II **(18 Periods)**

Probability classical & axiomatic definition of probability, Theorems on total and compound probability), Elementary ideas of Binomial, Poisson and Normal distributions.

UNIT III **(18 Periods)**

Methods of sampling, confidence level, critical region, testing of hypothesis and standard error, large sample test and small sample test. Problems on test of significance, t-test, chi-square test for goodness of fit and analysis of variance (ANOVA)

UNIT IV **(12 Periods)**

Correlation and Regression. Emphasis on examples from Biological Sciences.

PRACTICALS

1. Based on graphical Representation
2. Based on measures of Central Tendency & Dispersion
3. Based on Distributions Binomial Poisson Normal
4. Based on t, f, z and Chi-square

SUGGESTED READING

1. Le CT (2003) Introductory biostatistics. 1st edition, John Wiley, USA
2. Glaser AN (2001) High Yield™ Biostatistics. Lippincott Williams and Wilkins, USA
3. Edmondson A and Druce D (1996) Advanced Biology Statistics, Oxford University Press.
4. Danial W (2004) Biostatistics : A foundation for Analysis in Health Sciences, John Wiley and Sons Inc.

Contact person –Dr. Dr H.K. Sarma (hridip@gauhati.ac.in), Dr S.S. Swargiary (swargiary.ss77@gauhati.ac.in)
DR S.S. SWARGIARY

Important Notes:

1. **Faculty Numbers and Specialization requirements**: For Teaching in B.Sc. (Major/ Regular) in Biotechnology (**5 compulsory permanent posts** + 1 additional Guest Faculty post as per requirement of the semester)

Post no.	Specialization		Post no.	Specialization
1	Biochemistry & Physiology		4	Bioinformatics & Bioinstrumentation or Biostatistics
2	Molecular Biology & Genetic Engineering		5	Industrial Biotechnology or Plant Biotechnology
3	Microbiology and Immunology			

2. For each core paper, the distribution of marks will be as follow-
   Theory : 60 marks (50 final exams + 10 internal assessment)
   Practical : 40 mark

   Internal assessment marks should be assessed as follows:

   1 (one) Mid Term Examination, Theory papers : 5 marks
   1 (one) Seminar presentation per theory papers : 3 marks
   1 (one) Assignment (in group/ individually) : 2 marks

3. Practicals will be assessed in the presence of external evaluator (Faculty) from the parent Department of the Affiliating University)
4. Dissertation projects can be done either individually or in groups but has to be done in house.

Syllabus for BVoc in Small Tea Garden Management (STGM)

Programme Template : B Voc Course (CBCS) in STGM
Gauhati University

Semester	CORE COURSE (12 papers, 72 credits)	Ability Enhancement Compulsory Course (AECC) (2 papers , 8 credits)	Skill Enhancement Course (SEC) (4 papers, 16 credits)	Discipline Specific Elective (DSE) (6 papers, 36 credits)
I	STG-VC-1016 STG-VC-1026 STG-VC-1036	ENG-AE-1014		
II	STG-VC-2016 STG-VC-2026 STG-VC-2036	ENV-AE-2014		
III	STG-VC-3016 STG-VC-3026 STG-VC-3036		XXX-SE-3XX4	
IV	STG-VC-4016 STG-VC-4026 STG-VC-4036		XXX-SE-4XX4	
V			XXX-SE-5XX4	STG-VE-5016 STG-VE-5026 STG-VE-5036
VI			XXX-SE-6XX4	STG-VE-6016 STG-VE-6026 STG-VE-6036

1ST SEMESTER

Paper: STG-VC-1016: Introduction to Tea with reference to STG (6 Credits)

Overview & key learning as per NOS:

This paper unit component of first semester will help the student to know in details about the introduction of Tea in India and also worldwide emergence of tea, especially invention history of tea in Assam, other North East & Eastern States & also the emergence of the Small Tea Grower (STG) in Assam & other parts of India. It will also help the student's to know the "Role of tea in Indian Economy".

Total Marks: 100

UNIT- I

History of Tea Cultivation — 1 Credit (15 marks)

Origin of Tea, History of Tea cultivation in India & Assam, History & introduction of STG in Assam, Total area of STG posses as on date in respect to total area of Assam in terms of land, production quantity from beginning to present.

UNIT-II

Importance & Science in Tea — 1 Credit (15 marks)

Tea as a beverage of all people, Tea & employment generation, Tea in Indian Economy, Taxonomy of Tea, Tea in human health, Chemical constituent of Tea plant.

UNIT- III

Government policies on Tea Plantation — 1 Credit (15 marks)

Different Government policies and support on Tea estate and also for Small Tea Grower (STG).

UNIT-IV

Formalities for opening a Tea plantation for new comer — 1 Credit (15 marks)

Practical — **20 marks (1 credit)**

Field Works to understand about different practices follows in the College Demo plot itself

Internal Assessment — **20 marks (1credit)**

Submission of assignment on given subjects

1ST SEMESTER

Paper: STG-VC-1026: Agro practices of Tea plantation (6 Credits)

Overview & key learning as per NOS:

After going through the units of this skill paper, the students will be able to learn different types of planting materials like different clones & biclonal seed varieties, able to choose the planting materials by narrating criteria, establishment of clonal nucleus plot, procedure of seed collection & packaging. Further, these unit helps in establishment of tea plant nursery, young tea management practices & also get the information on different developmental schemes under TBI (Five Year Plan) for STG's & commercial garden.

Total Marks: 100

UNIT- I

Planting Materials of Tea — 1 Credit (15 marks)

Planting Materials approved by Tea Board of India under Five year plan

UNIT-II

Propagation of Tea & Nursery Technique — 1 Credit (15 marks)

Propagation by seeds, Vegetative Propagation, Grafting, Mother bush management.

UNIT- III

Establishment of Tea Plantation — 1 Credit (15 marks)

Selection of Planting Site, Land Preparation, Nursery Management (Package & practices followed in nursery), Plant Spacing and Staking, Planting operation both pre & post- planting operation.

UNIT-IV

Young Tea Management in a commercial garden & Small Tea Garden — 1 Credit (15 marks)

Methods of young tea plant management practices followed in the field of tea plantation in details from planting, manuring, plant protection to harvesting.

Practical — **20 marks(1 credit)**

Field Visit to nearby Tea estate to know the various operations followed in Tea Plantation.

Internal Assessment — **20 marks(1 credit)**

Assignment on the selected subject

1ST SEMESTER

Paper: STG-VC-1036: Soil Nutrient Management (6 Credits)

Overview & key learning as per NOS:

After studying this paper unit of 1st semester the student will be able to perform different range of soil quality & adoptability in regards to plantation of tea, nutrients contains in wide range of soils like sandy, sandy loam, silt & clay soil. Soil and climate requirement for growing tea in different parts of India & other countries, how application of nutrients in soil absorb by tea plant, etc…

Total Marks: 100

UNIT- I

Soil & Importance of soil nutrients for Tea Plantation — 1 Credit (15 marks)

Soil structure, texture & soil health for tea plantation, Soil P^H for tea plantation, Soil rehabilitation, Soil topography, etc...

UNIT-II

Climate requirement for Tea Plantation — 1 Credit (15 marks)

Climatic condition includes temperature, rainfall, relative humidity required for suitable tea plantation.

UNIT-III

Soil Nutrients Management in Tea Plantation — 1 Credit (15marks)

Soil Conservation, Role of soil nutrient in the growth & development of tea, study on nutrients deficiency symptoms & its improvement practices for growth & development for tea plantation in terms of maximum production.

UNIT- IV

Water Management in Tea Plantation — 1 Credit (15 marks)

Importance of water in growth & development of Tea Plant**,** Importance & Management of Irrigation & Drainage systems practices in Tea.

Practical — **20 marks(1 credit)**

Field Visit as well as Laboratory works

1. How Soil PH, Soil conductivity on the basis of soil texture, Available NPK & other micro nutrient are measured.

1 Preparation of different types of Drainage system, how the irrigation practices followed in a tea estate, what is catchment area, different source of water management made in a tea estate etc?

Internal Assessment — **20 marks (1 credit)**

Preparation of report on the basis of field visit on a given topic

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2ND SEMESTER

Paper: STG-VC-2016: Plantation Management (6 Credits)

Overview & key learning as per NOS:

The component units under this paper help the students to know how to pluck leaves from young tea as well as matured tea bushes, able to learn how plucking to be done under various situation, able to determine the plucking standard, caring in green leaves handling, help in understanding the tipping as well as determine the height of tipping for different types of prune & skiff tea bushes, further, the students develop the skill of supervising plucking. Again in regards to pruning & skiffing this paper help in skill up the students how pruning operation is carry out, before pruning what are the criteria to be follow, what are the safety measures one should take before pruning /skiffing of a tea bushes, also it helps in identify recommended height of different types of prune/skiff.

Total Marks: 100

UNIT- I

Plucking & Tipping — 1 Credit (15 marks)

Methods of Plucking & Tipping in Young Tea Plants & Matured tea, Methods of plucking for maintenance of plant canopy, maintenance of Plucking Table of the Tea plants for getting maximum yield as well as Quality, Plucking round management.

UNIT-II

Pruning & Training — 1 Credit (15 marks)

What is pruning? Why pruning is necessary & when the operations followed. Training on different types of Pruning to develop pruning skills, What is the Pruning cycle follows in Garden & what height consider in different types of pruning what is the percentage maintain for pruning & un-pruning & Why?

UNIT- III

Drought Management in Tea — 1 Credit (15 marks)

How the drought management over come, Rain Water Harvest methods & procedure, Climate change & Climate Resilient in Tea , Use of Mulching with a proper thickness, proper use of Growth regulator, use of lime/ Pyrite if the soil is too acidic or alkaline.

UNIT-IV

Shade Tree & Maintenance of Shade tree — 1 Credit (15 marks)

Advantage of Shade tree, what are the plants used as Shade tree, Spacing of shade tree, treatment of shade tree to become a free from disease & Pest.

Practical — **20 marks (1 credit)**

1. Pruning & Plucking operation carried out in the field?
2. Shade tree management practices in the garden & Types of Shade trees used in a garden?

Internal Assessment

Assignment on the basis of theory. — 20 marks(1 credit)

2ND SEMESTER

Paper: STG-VC-2026: Integrated Disease, Pest & Weed Management (6 Credits)

Overview & key learning as per NOS:

After going through this paper component the students will acquire the meaning of IPM (minimum ETL), which ultimately reduced the affect in the ecology, it also help in develop the skill in identification of major pests, diseases and different species of weeds attack on tea bushes along with their control measures by means of using inorganic chemical, organic and biological methods of controls, the students will also able to know about PPA; as well as the TBI recommended chemicals, which have a very low residual effect on made tea & ultimately does not affect in the health of tea consumed peoples of the world.

Total Marks: 100

UNIT- I

Pest Management in Tea — 1 Credit (15 marks)

Identification, symptoms and control measures by various synthetic chemical, organic chemicals, biological trap, Integrated Pest control measures

UNIT-II

Disease Management — 1 Credit (15 marks)

Identification, symptoms and control measures by various synthetic chemical, organic chemicals, Integrated disease control measures.

UNIT- III

Weed management — 1 Credit (15 marks)

Identification, symptoms and control measures by various synthetic chemical, organic chemicals. Methods of collar weeding.

UNIT-IV

Mineral Nutrition of Tea — 1 Credit (15 marks)

Function of Major & & Micro nutrient in Tea, Soil Fertility & crop productivity, Used of Lime and Iron Pyrite why & when needed, Fertilizer & their nutrient contain, like in urea % of N, in SSP % of P& in Potassium % of K, like in others also.

Practical — **20 marks (1 credit)**

1. Identification of different pest & diseases & their symptoms.
2. Pest, disease & weed management control in tea plantation.

Internal Assessment

Assignment on the basis of theory. — **20 marks(1 credit)**

2ND SEMESTER

Paper: STG-VC-2036: Application Technique used for IPM (6 Credits)

Overview & key learning as per NOS:

Basically this paper emphasize on various spraying tools along with different size of the nozzles used for pests, diseases and weed controls in tea plants as well as in shade trees, the student will develop the skill how to operate various types of spraying machines and which nozzle use for pests/diseases/weeds control practices. Above this it will also helps in develop the skills of different characteristics of better performance factors of the nozzle like temperature, rate of discharge, surface tension and also the effective time of spraying for better result of IPM practices.

Total Marks: 100

UNIT- I

Sprayer & it's Application Technique — 1 Credit (15 marks)

What is Sprayer, various types of sprayer used for various purposes, like control of Pest, Diseases & Weed in tea plantation.

UNIT-II

Calibration & operation, Spraying Technique — 1 Credit (15 marks)

How the calibration & operation practices followed in tea plantation, different Techniques of application of spraying machine for effective control of Pest, Diseases & Weed in tea plantation.

UNIT-III

Nozzle & Types of Nozzle — 1 Credit (15 marks)

What is nozzle, its importance in spraying different pesticides, weedicides application? Types of nozzle used in different types of spraying foe effective results.

UNIT- IV

Nozzle performance Factors — 1 Credit (15 marks)

Factors to be considered for nozzle performances, like temperature, viscosity, surface tension, nozzle wear, etc.

Practical: **20 marks(1 credit)**

UNIT- I: Identification of Major Pest & Diseases in tea by field visit

Unit- II: Identification of different kind of weeds & their control measures

Unit-III: Identification of different nutrients deficiency symptoms in the tea plant & how it is Corrected.

Internal Assessment: **20marks(1 credit)**

Assignment on making an album on different pest, diseases & Weed of tea with their symptoms & Control measures.

3RD SEMESTER

Paper: STG-VC-3016: Organic Tea Plantation Management (6 Credits)

Overview & key learning as per NOS:

In this paper the importance is given on tea plantation & processing practices using the organic methods, as the revolution of organic cultivation able to bring high demand in the market. Only natural inputs were apply in organic cultivation instead of inorganic or synthetic chemical. In organic cultivation vermi-compost plays a significant role, hence in this paper the student will learn about vermi-compost as well as acquire the skill how the vermi-compost units are made by seeing the unit set up in the college land itself. Again this paper help the students to know the HRM practices followed in a tea estate, role of different employees top to bottom involved in the tea plantation, able to develop organizational chart of a tea estate, also acquire skill of health & safety measures involve in tea plantation.

Total Marks: 100

UNIT- I

Organic Tea Plantation — 1 Credit (15 marks)

Package & practices of organic tea plantation from cultivation to processing.

UNIT-II

Vemicompost & its importance — 1 Credit (15marks)

What is Vermicompost, preparation methods of vermicompost unit, Cost of vermicompost unit preparation of different size, Importance of vermicompost from own use to commercial use, Effect of vermicompost use in the tea estate, Advantage of vermicompost practice in the field.

UNIT- III

Human Resource Management in Tea — 1Credit (15marks)

Organizational behaviours**,** Organizational Chart, Role of Estate Manager, Role of Grade / Factory Assistant Manager, Role of Different Clerk (activity) wise.

UNIT-IV

Health & Safety measure's followed in a Tea Gardens — 1 Credit (15 marks)

Various steps of health & safety measure are followed in a tea estate. Study on the health & safety related issues in details in order to maintain peaceful work environment in the tea estate..

Practical — **20 marks(1 credit)**

1. Demonstration of vermin-compost unit preparation in the field

Internal Assessment — **20 marks(1 credit)**

Assignment on the subject studied in the semester

3RD SEMESTER

Paper: STG-VC-3026: Small Tea Garden Management (6 Credits)

Overview & key learning as per NOS:

The objective of this paper is to give more focus on STGs, prospect & problems of STG's use to face. Here the student's able to develop the skill on how SHG/cooperative/company/ federation can be form among the STG's group in an organized and systematic way, which will help in minimizing input cost of STG's and maximize the earnings through common marketing, minimize the leaf wastage, etc.. In this chapter the student's develop skill on how an individual can be a entrepreneur or self employment through STG, also focus will be remain on the policies for STG's develop by TBI as well as State Governments.

Total Marks: 100

UNIT- I

IMPACT ON SOCIAL DEVELOPMENT — 1 Credit (15 marks)

Motivation of the unemployed youth towards the adoption of STG, How a successful STG recognized in the society & how his influential helps in development in the society & also the Existing lethargic STG become proactive in the development of STG by generating employment to uneducated/ primary school dropout youths in development of livelihood.

UNIT-II

Management of Bought leaves — 1 Credit (15 marks)

Techniques of purchased or selling tea leaves management, how the plucked leaves are stores up to the transportation period without damages in leaves or maintain the quality of the leaves to get the best market value, what practices followed in transportation during monsoon & dry weather condition, How the cost control can be done to maximize profit.

UNIT- III

Role of SHG's or Cooperation in development of STG in Assam — 1 Credit (15 marks)

Operation practices SHG. SWOT Analysis, Institutional Framework of SHG or Cooperative society for development of STG, Price sharing formula, quality up gradation programme, setting up of SHG or FPC.

UNIT-IV

Details study on the Tea Board Development & Plantation Scheme under the Five year plan for Small Tea Grower's of Assam & non conventional area of N.E. India — 1 Credit (15 marks)

Practical — **20 marks(1 credit)**

Field visit to Small Tea Grower's federation or SHG's & study details about their experiences in the tea industry

Internal Assessment — **20 marks(1 credit)**

Assignment on the subject studied in the semester

3RD SEMESTER

Paper: STG-VC-3036: Major thrust area of STG (6 Credits)

Overview & key learning as per NOS:

This units study will help the students in unfolding the major constrain & issues of the STG's were facing or experiencing, so it will be useful for the students to develop the skill of planning & execution the same for the smooth running of the gardens, irrespective of doing job in commercial garden or become self employment as an entrepreneur, the students also able to identify the soil condition, whether it's suitable for tea plantation or need to rejuvenate the soil condition by planting Guatemala grass for 24 to 36 months.

Total Marks: 100

UNIT- I

Problems of STG grower of Assam & non conventional area of North east India — 1 Credit (15 marks)

Identification of problems faced by STG & how the non conventional area can be transformed to large STG grower's by common plan of action.

UNIT-II

Role of Tea Board of India & other governmental institution in developing STG of Assam & other parts of N.E India — 1 Credit (15 marks)

What are the role played by TBI & other Governmental institution in promotion & development of STG of Assam & other parts of N.E India? What is the role of respective state's Governments also in development of STG.

UNIT-III

Inter- Cropping practices in STG — 1 Credit (15 marks)

What is inter-cropping & its importance, what are the crops can be inter-cropped along with young tea, why selected crops are considered for inter-cropping, Advantage of inter- cropping system for STG grower's.

UNIT- IV

Marketing & Management of leaves of STG grower's of Assam & other parts of N.E. India — 1 Credit (15 marks)

Marketing of tea leaves & it's importance in terms of economic condition of STG grower's, how the leaves are managed & handle by the STG grower's to minimize the damages and maximize the earning, importance of leaves management.

Practical — **20 marks(1 credit)**

UNIT- I: Identification the role of Governing body in developing Small tea grower's.
Unit- II: Identification of how entrepreneurship as a profession developed by STG Grower's
Unit-III: Documents & formalities required to form an SHG or Cooperative society of STG grower's

Internal Assessment: — **20marks(1 credit)**

Assignment on what are the role & responsibility of Governing body as well as members of the SHG or society of STG.

4TH SEMESTER

Paper: STG-VC-4016: Tea processing in details (6 Credits)

Overview & key learning as per NOS:

This paper is one of the most important for the students to develop skill in manufacturing process of three different types of made tea- Black Tea (CTC & Orthodox); Green Tea & Olong Tea, this chapter will help in determining the students which types of leaves used for best quality tea making of above mentioned made tea, the students also able to know in details the processes involved in making a made tea from the harvested green leaves, role of each & every machineries used in processing like , withering trough, rolling table, CTC machine with the shape of roller, fermenting, dryer, shivers of different size used for different grade, sorting, packaging and how the tea is tested to know the quality of made tea.

Total Marks: 100

UNIT- I

Manufacturing of Tea — 1 Credit (15 marks)

Details technique of processing made tea from the harvest of tea leaves. Role of withering trough, rolling machines, fermenting, CTC & orthodox machineries, different Dryer, Roaster etc..

UNIT-II

Drying, Sorting, Grading, Packaging & Weighing — 1 Credit (15 marks)

What is Dryer, Types of Dryer, how different grade of CTC & orthodox tea are made under recommended temperature, what is Sorting, what are the percentage of sieve used in the sorting Machine to get different size of CTC & Orthodox tea, How the Grading is done, what are the names of different grade of CTC & Orthodox Tea, like BP, BOP etc.

UNIT- III

GREEN TEA MANUFACTURING — 1 Credit (15 marks)

How green tea is made? what types of tea leaves are suitable for making green tea, how the boiling temperature maintain in Roaster for making Green Tea, steps followed in making green tea till packaging, Why green tea are preferred in terms of beverage for drinking & and as a medicinal value.

UNIT-IV

Tea Quality & Tea Testing — 1 Credit (15 marks)

Why Tea Testing is important? How the different types of tea testing done in a factory? What are the criteria of a good Tea Tester?

Practical — **20marks (1 credit)**

Visit to a Tea factory where all kinds of made tea are manufactured.

Internal Assessment — **20 marks(1 credit)**

Assignment on the subject studied in the semester

4TH SEMESTER

Paper: STG-VC-4026: Management of Made Tea (6 Credits)

Overview & key learning as per NOS:

In this paper component emphasis given on how the quality made tea is made up & from which type of leaves, what plucking cycles need to follow to attain different quality of made tea, handling of made tea in order to retain quality, what are the risk involved & how to mitigate the risk in made up of green tea, also how the STG's played an important role in generating income to the educated /uneducated unemployed and unemployable person by deploying in this profession**.**

Total Marks: 100

UNIT- I

Management of different quality of made tea — 1 Credit (15 marks)

Importance of making quality made tea, what are the factors plays an important role in making different quality made tea like leaves, withering, fermenting, drying, grading, sorting, packaging etc**..**

UNIT-II

Comparative study of Green tea with other made tea — 1 Credit (15 marks)

What are the differences of green tea with other's made tea, study of value, demand, production, export comparison between green tea & other's made tea.

UNIT-III

Risk involved in making a green tea in Assam condition — 1 Credit (15 marks)

What are the risks involved in making green tea from production to processing in Assam Condition, how these problems can be solved in an effective manner.

UNIT- IV

Role of STG in bringing the unemployable youth to main stream — 1 Credit (15 marks)

Planning & execution in bringing the youth into commercial business like STG growers, effects of law & insurgency problems of the State after taking this plan of action.

Practical/Field visit — **20 marks(1 credit)**

UNIT- I: Steps followed in making a made tea of CTC & Orthodox Tea with details of machinery used and criteria maintain.

Unit- II: Steps followed in making a Green tea with details of machinery used and criteria maintain.

Unit-III: Different Grade of Made Tea (CTC, Orthodox, Green Tea), sorting, blending & Packaging etc...

Internal Assessment: — **20 marks(1 credit)**

Assignment on made up a Poster with a proper diagram of different machinery used for making a CTC, orthodox & Green Tea.

4TH SEMESTER

Paper: STG-VC-4036 Statutory Compliance in Tea Management (6 Credits)

Overview & key learning as per NOS:

This paper unit's component basically helps in understanding as well as skill up the students in development of plantation acts & the rules applicable in plantation industry. In commercial garden all the statutory compliance under plantation act have to adhere as per the the norms TBI, otherwise TBI may cancel the registration.

Total Marks: 100

UNIT- I

The Plantation Labour Act, 1951 — 1 Credit (15 marks)

Definition & Objective, Scope & provisions in regards working hours, Leave with wages, Procedure for Penalties, employer obligation.

UNIT-II

The Factory Act, 1948 — 1Credit (15 marks)

Definition & Objective, Registration Procedure & criteria for obtaining Factory License, Renewal of License, and Safety measure to be taken for Factory workers.

UNIT- III

The Payment of wages Act, 1936 — 1 Credit (15 marks)

Definition & Objective, Fixation of wages

The Payment of Bonus Act, 1936

Definition & Objective, who are eligible for bonus payment, on what basis bonus is paid, whom & why the bonus is given as a minimum bonus & deduction of bonus payment. How the bonus paid either one phase or two phase

UNIT-IV

The Employee PF Act, 1952 — 1 Credit (15 marks)

Definition & Objective, who are eligible for PF payment

The Industrial Employment Act, 1946

Definition, Objective & Major component of the act.

The Minimum wages Act, 1948

Definition & Objective, Wages of Permanent & Temporary workers, Wages for Skilled, Semi skilled & Unskilled workers as per Governments norms.

The workmen Compensation Act, 1923

Definition & Objective, who & why eligible for compensation

Practical — **20 marks(1credit)**

Field Visit to a Tea estate where all the statutory maintain & how?

Internal Assessment: — **20 marks(1 credit)**

Reports to be made on the activities carried out in the practical.

5TH SEMESTER

Paper: STG-VE-5016: Estate Management (6 credits)

Overview & key learning as per NOS:

After going through this paper unit's the students will be able to develop the knowledge & skill on Garden management, which includes how /when extension planting, replanting planting, similarly factory management works & any others administrative functions of the estate is to be done/ maintain to run the estate smoothly and organize manner.

Total Marks:100

UNIT- I

Garden Management 1 Credit (15 marks)

Study on Extension, Replanting, Rejuvenation planting & new planting followed in a garden.

UNIT-II

Factory Management 1 Credit (15 marks)

Repairing & maintenance of the factory equipments, extension of factory buildings & exchanged of old parts with new parts & up gradation of machineries

UNIT-III

Store Management 1 Credit (15 marks)

What are the function of store in tea plantation & its management for the smooth running of tea estate?

UNIT- IV

Tea work force management 1 Credit (15 marks)

Facilities provided to the tea workers, benefits availed by the permanent worker of the estate, what are the other welfare related establishments seen in a garden.

Practical: **20 marks(1 credit)**

Cultivation practices of Tea to be done on the campus plantation area by formation of group among the students & result on performance basis.

Internal Assessment: **20 marks(1credit)**

Reports to be made on the activities carried out in the practical.

5TH SEMESTER

Paper: STG-VE-5026: Tea Board Development & Plantation Scheme on Tea (6 Credits)
(Five year plan)

Overview & key learning as per NOS:

In this units all the development & plantation schemes (under five year plan) will be elaborately discuss, so that the students after passing out with a various skill's & join in a job or become an entrepreneur, they will be able to materialized the schemes and able to make the required information to get qualify & avail the benefits from the schemes. The same condition is though applicable for STGs but there are various grants in aid schemes for the STG's, which are also discuss in details in this paper, so that the STG's also able to get the grant from TBI.

Total Marks: 100

UNIT- I

Details on Plantation Development Scheme — 1 Credit (15 marks)

Study on the sub component of plantation development scheme in details, what are the eligibility criteria & what is rate of subsidy on different component & how the disbursement is done?

UNIT-II

Details on Quality Up gradation & Product diversification including orthodox production — 1Credit (15 marks)

Study on the sub component on the above scheme in details, what are the eligibility criteria & what is rate of subsidy on different component & how the disbursement is done?

UNIT- III

Details on Human Resource Management Scheme — 1 Credit (15 marks)

Details Study on the sub component on the HRM schemes, what are the eligibility criteria & what is rate of subsidy on different component & how the disbursement is done?

UNIT-IV

Details study on Market Promotion & Research and Development Schemes — 1 Credit (15 marks)

Details Study on the sub component on the above schemes, what are the eligibility criteria & what is rate of subsidy on different component & how the disbursement is done?

Practical: **20 marks(1 credit)**

Exercise on the fill up of application for different developmental scheme to Fulfill the eligibility for getting subsidy/incentives/grant in aid

Internal Assessment: **20 marks(1 credit)**

Assignment on the subject studied in the semester

5TH SEMESTER

Paper STG-VE-5036 (Practical)

Overview & key learning as per NOS:

In this paper , students will get different sections to maintain the garden from planting to harvesting. Each student will know practically overall package and practices followed in the tea garden.

Total marks: 100

Practical Work

1. Field work in the college demo plot

a. Nursery Management.

b. Garden Management.

c. Pest disease and weed management.

d. Soil fertility Management.

d. Processing of tea.

e. Marketing of tea .

6TH SEMESTER

Paper- STG-VE-6016: Exercise on operations followed in Tea Estate (6 Credits)

Overview & key learning as per NOS:

The main objective of this paper is that after going through the unit's exercise, the students will skill up with the nursery estimation of a given area, cost incurred in setting up of vermi- compost unit, cost of irrigation of a given land and also able to well acquaint with different field management implements.

Total Marks: 100

UNIT- I

The cost calculation for Nursery Preparation 1 Credit (15 marks)

What is the Component of Nursery Preparation, How many man days required for a Nursery of Seed/ Clone. The Size of the Nursery will consider approx 3 Bigha of land

UNIT-II

Exercise in cost evaluation for a 1 Ha land Irrigation 1 Credit (15 marks)

What is the machinery required, what is the size of the nozzle for disbursement of water up to 4-5 meter, by using Sprinkler irrigation.

UNIT- III

Various Implements use in Tea Management 1 Credit (15marks)

Name of the implements and their function use in Garden, Factory & packaging activity

UNIT-IV

Exercise on Vermi-compost unit cost of different size 1 Credit (15 marks)

What are the components required for Vermi-compost unit Preparation, How many man days required & how many days required for starting commercial operation by selling the Vermi-compost.

Practical: **20 marks(1 credit)**

Field Visit to Auction Centre, Tea Broker House & Ware House for Market Study

How the auction of tea done, what is broker house use role, How the tea is store in the Ware House?

Internal Assessment: **20 marks(1 credit)**

Submission of report on the basis of theory & practical field visit.

6TH SEMESTER

Paper: STG-VE-6026: Skill up with cultivation practices (6 credits)

Overview & key learning as per NOS:

This units is made up to learn the various practices followed in a tea estate fields through internship itself by staying in a commercial garden, where they can explore their expertise knowledge & skill developed from the subjects they studied in the earlier course component of tea garden field management operation, from the land preparation to pruning including, nursery practices, vegetative propagation, different types of planting materials as per TBI recommended, planting, INM, IPM practices, irrigation & drainage, plucking & tipping, the students will do the practices in the college own land, after that move for internship, here also students able to know the report writing & also the contents need in a report writing or practical note submitting.

Total Marks: 100

UNIT- I

Management of Nursery 1 Credit (15 marks)

Details package & practices of nursery to be study theoretically & practically

UNIT-II

Management of Young tea 1 Credit (15 marks)

Details package & practices of nursery to be study theoretically & practically along with all practices.

UNIT- III

Management of Matured tea 1 Credit (15 marks)

Details package & practices of nursery to be study theoretically & practically along with all practices.

UNIT-IV

Management of Drainage & Irrigation operation 1 Credit (15 marks)

How drainage & Irrigation management practices followed in a tea estate & its importance.

Practical: **20 marks (1 credit)**

Field work of the entire cultivation methods will be done in the college own land.
How the nursery practices followed also the young tea & matured tea maintenance Practices, how drainage is made & where catchment areas need to put for proper irrigation on the land.

Internal Assessment: **20 marks(1 credit)**

Submission of report on the basis of the practical & theory.

6TH SEMESTER

Paper: STG-VE-6036: Internship

Overview & key learning as per NOS:

This paper is design to learn the various practices followed in a tea estate factory through internship itself by staying in a commercial garden, where they can explore their expertise knowledge & skill developed from the subjects they studied in the earlier course component of tea manufacturing process, from the tea leaves to made tea, sorting, grading and packaging & marketing operation. Here the students able to understand about a good report writing & also the contents need in a report writing or practical note submitting.

Total marks: 100

(a) 4 months internship programme will be carry out by the student staying in different garden.

(b) Presentation of internship programme.

(c) Final Submission of the report.

Syllabus for BVoc in Tourism & Service Industry (TSI)

Programme Template : B Voc Course (CBCS) in TSI
Gauhati University

Semester	CORE COURSE (12 papers, 72 credits)	Ability Enhancement Compulsory Course (AECC) (2 papers , 8 credits)	Skill Enhancement Course (SEC) (4 papers, 16 credits)	Discipline Specific Elective (DSE) (6 papers, 36 credits)
I	TSI-VC-1016	ENG-AE-1014		
	TSI-VC-1026			
	TSI-VC-1036			
II	TSI-VC-2016	ENV-AE-2014		
	TSI-VC-2026			
	TSI-VC-2036			
III	TSI-VC-3016		XXX-SE-3XX4	
	TSI-VC-3026			
	TSI-VC-3036			
IV	TSI-VC-4016		XXX-SE-4XX4	
	TSI-VC-4026			
	TSI-VC-4036			
V			XXX-SE-5XX4	TSI-VE-5016
				TSI-VE-5026
				TSI-VE-5036
VI			XXX-SE-6XX4	TSI-VE-6016
				TSI-VE-6026
				TSI-VE-6036

Syllabus of

B.VOC in TOURISM AND SERVICE INDUSTRY (TSI)

Semester 1

Paper TSI-VC-1016- Travel Consultant

Total Credit: 6

Total Marks=100

Unit 1: Introduction to different sectors of tourism industry — Marks 25

- Classification of tourism
- Knowledge of types of travel
- Learning about types of travellers
- Understanding various travel related services
- Identifying the different sectors of tourism industry

Unit 2: Travel Agency — Marks 15

- Understanding the concept of Travel Agency
- Developing knowledge of different types of travel agency
- Functions of Travel agency

Unit 3: Purpose of travel — Marks 10

- Establishing the purpose and objectives of travel
- Identifying the needs of the customers in planning tours
- Understanding the geographic preferences for the customers

Unit 4: Customer Feedback — Marks 10

- Meaning and importance of customer feedback
- Different methods of Collecting customer feedback

Practical: Home assignment — Marks 20

Internal Assessment — Marks 20

- Reader list: Karma & Chand, Basics of Tourism, Theory, Operation and Practices
- Bhatia,A.K, International Tourism Management

Paper- TSI-VC-1026 Travel Formalities

Total Credit: 6

Total Marks=100

Unit 1: TRAVEL DOCUMENTATION Marks 30

- Passport and its type
- Visa and its type
- Health Regulation
- RAP
- ILP
- FOREX
- Travel Insurance

Unit 2: Planning the itinerary for inbound and out bound tours as per customer requirements Marks 30

- Understanding the importance of planning an itinerary
- Developing an itinerary with different destinations from the start to the end of the journey
- Mapping the destinations
- To identify the tourist places of interest to the customer to be included in the itinerary
- Understand the distance between the different destinations
- To communicate with customers the time taken for the each activity
- Developing a list of accommodation places according to the preferences of the customer
- Developing a list of food and beverage service outlets according to the preferences of customers
- Costing and budgeting for the tour

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- Chand,Mohinder, Travel Agency management: An Introductory Text
- K.S., Negi, Travel Agency Management
- Bhatia,A.K, Tour Operator

PAPER TSI-VC-1036 OJT

Total Credit: 6

Total Marks=100

- Field Visit +Project Report + PPT Presentation +Viva Marks 100

Semester 2nd

PAPER TSI-VC-2016 MEETING, CONFERENCE AND EVENT PLANNER

Total Credit: 6

Total Marks=100

Unit 1: Introduction to Meeting, conference and event planning Marks 20

- An overview of the event industry
- Skills required for an event planner
- Difference between meeting and conference
- Different types of events- religious, musical, sporting, personal and private, political and government, commercial and business, corporate, special events and leisure events
- Technology Trends in Meeting industry
- Planning for event marketing

Unit 2: Meeting Management Marks 15

- Seminar, Workshop, symposium
- Purpose of meeting
- Rules of Meeting Management
- Managing yourself
- Identifying various requirements (i.e. accommodation, audio- visual, health service, waste disposal etc)

Unit 3: Conference and Convention Management Marks 15

- Conference Management services
- Benefits of Conference Planning
- Steps involve in organizing a conference
- Budgeting

Unit 4: Risk Management Plan and Emergency Plan Marks 10

- Meaning
- Risk Management Process
- Emergency Response Plan

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- Singh, Ratandeep, Meeting, Conference and Event Planner
- Event Planning and Procedure Handbook

PAPER TSI-VC-2026 Etiquette required in tourism industry

Total Credit: 6

Total Marks=100

Unit 1: Business etiquettes Marks 15

- Greet, welcome and address the customer appropriately
- Maintain pitch and tone of voice while speaking to customers
- Dress professionally
- Maintain personal integrity and ethical behaviour
- Maintain personal grooming and positive body language

Unit 2: Communicating with customers, superiors and colleagues Marks 10

- Use appropriate language and tone and listen actively
- Show sensitivity to gender/ cultural and social differences
- Handle customer grievances professionally

Unit 3: Customer centric and Service quality requirements Marks 10

- Customer Expectation ,Customer Satisfaction, Customer Loyalty,
- Understand target customers, their profiles and needs
- Build good rapport with the customer
- Enhance company's brand value

Unit 4: Health and Hygiene Marks 5

- Keep the workplace clean
- Identify waste and ensure its disposal
- Ensure waste bins are cleared everyday
- Point out requirements for pest control
- Ensure work place has fresh air supply and sufficient lighting
- Ensure maintenance check of air conditioners and other mechanical equipment in the department Hand wash procedure
- personal hygiene

Unit 5: Women safety policies Marks 10

- Understand women rights and company's polices regarding them
- Know special facilities available for women colleagues and customers
- Inform about methods to ensure safety and security of women
- Provide comfortable and safe environment for female customers
- Maintain compliant behavior etiquette while dealing with women
- Treat women equally and avoid discrimination
- Ensure safety and security of female colleagues and customers at all levels

Unit 6: Ethics, policies and confidentiality of customer Marks 10

- Understand company policies
- Understand company products and services
- Understand the human resource policies of the company
- Understand the competition
- Know about the grievance procedures of the company
- Ensuring maintenance of company customers records
- UnderstandinEnsuring safe business practices to be followed by all staff and management g the ethics and code of conduct of the company

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- Business Ethics
- Chawla Romila, Tourism Marketing and Communication

PAPER TSI-VC-2036 OJT

Total Credit: 6

Total Marks=100

- Field Visit +Project Report + PPT Presentation +Viva Marks 100

Semester 3rd

Paper TSI-VC-3016 Tour Manager

Total Credit: 6

Total Marks=100

Unit 1: Meaning and definition Marks 15

- Tour Manager, tour operator
- Skill required to be a Tour Manager
- Types of Tour Operators
- Procedure for arranging a Tour Operation

Unit 2: Designing the tour packaging Marks 15

- visit various tourist destinations
- understand the various tourist attractions and places of interest in the destination
- suggest interesting travel routes to and within the destination
- design and develop various interesting and economical domestic and international tour packages
- ensure the packages will meet the needs of various types of customers

Unit 3: Managing the staffing process and setting standards Marks 15

- overview the appraisal forms and decide on the promotions, hikes and performance appreciations
- organize weekly or monthly meetings with all the staff of the company to understand their issues, brief them on the company future plans and updating, motivate them for work, train them on any new developments, assure them of more benefits if targets achieved, etc.
- handle interviews and hiring of staff
- monitor the retention and firing of staff based on their behavior, misconduct, low performance in spite of warnings given earlier
- bring in incentive and bonus schemes
- Ensure the staff is informed of the standards to be followed in cash handling, tour organizing, client management, etc.
- Set the standards for grooming, greeting, work, etc.
- ensure the department is not overstaffed or understaffed
- oversee staff behavior and the level of communication

Unit 4: Maintain IPR of organization and customer Marks 15

- IPR and its Segments
- how IPR protection is important for competitiveness of a company
- significance of damages resulting from IPR infringement
- industrial and political espionages

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- Negi,Jagmohan S,Tourist Guide and Tour Operation, Planning and Management
- Negi, J, Travel Agency & Tour Operation, Concept& Principles

Paper TSI-VC-3026 Tourism Marketing

Total Credit: 6

Total Marks=100

Unit 1: Basics of Tourism Marketing — Marks 20

- Meaning and Definition of Tourism Marketing
- Characteristics of Tourism Marketing
- Marketing Mix and Tourist Marketing Mix
- Marketing Segmentation

Unit 2: Consumer Behaviour and CRM — Marks 15

- Meaning
- Factors influencing Consumer Behaviour
- Building Customer Relationship
- CRM Process in Tourism Marketing

Unit 3: Marketing of Tourism Services — Marks 15

- Airlines
- Hotel, Resort
- Travel Agencies and other services
- Challenges and strategies

Unit 4: Marketing Skill for Tourism — Marks 10

- Creativity- Communication-Self motivation- Team Building- Personality Development

Practical: Home assignment — Marks 20

Internal Assessment — Marks 20

Reader list:

- Singh, Ratandeep, Tourism Marketing
- Jha S.M, Tourism Marketing
- Jha S.M, Service Marketing

PAPER TSI-VC-3036 OJT

Total Credit: 6

Total Marks=100

- Field Visit +Project Report + PPT Presentation +Viva — Marks 100

Semester 4th

TSI-VC-4016 Tourism Resources of Assam

Total Credit: 6
Total Marks=100

Unit 1: Meaning and concept of Tourism Resources Marks 10

- Concept of Tourism Resources
- Types of Tourism Resources

Unit 2: Resources of Assam Marks 25

- Natural Resources
- Socio-cultural Resources
- Religious Resources
- Historical Resources
- Satra Institution of Assam

Unit 3: Other Resources of Assam Marks 25

- Man-made Resources
- Adventure Sports of Assam and their Tourism significance
- Popular Tourist Festival organized for the promotion of tourism in Assam

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- Bhattacharaya,P., Tourism in Assam, Trends & Potentialities
- Bhagawati,A.K.,Bora, A.K., &Kar, B.K., Geography of Assam
- Bora,Sheila & Bora, M.C, The Story of Assam: An Enchanting Journey Through India's North-East

Paper- TSI-VC-4026 HOSPITALITY AND ACCOMODATION SERVICE

Total Credit: 6

Total Marks=75(Theory=40+ Practical=20 + Internal Assessment=15)

Unit 1: Hospitality Marks 30

- Concept, Nature and Dimensions
- Different types of Hotel
- Functional Departments of Hotel
- Booking procedure of Hotel
- Hotel Chains in India

Unit 2: Accommodation Marks 30

- Meaning and Definition
- Types of Accommodation
- Accommodations in Assam
- Linkage of Accommodation with Transport Operator and Travel Agency

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- Hospitality Services

PAPER TSI-VC-4036 OJT

Total Credit: 6

Total Marks=100

- Field Visit +Project Report + PPT Presentation +Viva Marks 100

Semester 5th

Paper TSI-VE-5016 TRANSPORT DUTY MANAGER

Total Credit: 6

Total Marks=100

Unit 1: Managing the work planning and allocation for transportation and meet and greet duty

- allocate the work requirements of various staff
- monitor the vehicles and the driver on weekly basis Marks20
- manage the work assignments for the staff
- ensure the work allocated are in a way the customer requirements are satisfied
- determine the priorities and allocate work accordingly
- arrange for weekly review meetings on the work allotment and review of work completed
- monitor and track the flight timings and pick up scheduling
- check on the duties assigned for the customer pick up from airport for the meet and greet service
- ensure no delay in the work performed

Unit 2: Monitoring the operations and scheduled work Marks 20

- ensure the instructions and manuals provided are as per the company policy
- supervise and track the operations of both transport officers and meet and greet officers
- ensure the risk activities are overcome
- monitor the grooming and behavioral aspects of the staff
- Ensure the working condition of the various devices and equipments used for transportation such as GPS, maps, etc.
- make sure to handle the situations of emergency efficiently
- verify the vehicle papers and safety precautions undertaken
- Check the requirements for meet and greet duty such as carrying maps, itinerary, travel options and sightseeing knowledge, etc.
- check on the compliance to standards and procedures of the duty

Unit 3: Checking the work performance and other requirements Marks 20

- monitor the hire quotes provided for various travels
- collect the customer feedbacks collected
- evaluate the performance of every staff
- oversee the vehicle maintenance
- audit the trip sheets, expenses and invoices
- approve the various work requirements as per the staff duties
- Review and revise the schedule of activities
- record and documents the activities performed

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- Bhatia,A.K., Tourism Development, Principles & Practice

PAPER TSI-VE-5026 TRANSPORTATION AND TRAVEL ORGANISATION

Total Credit: 6

Total Marks=100

Unit 1: Transportation Marks 30

- Transportation- Transport System- Types
- Hospitality and Transportation –Linkage and interrelationship
- Types of Air Transportation
- Air Transportation Industry in India
- Types of water transport
- Water transportation in India
- Prospects of water transportation in Assam
- Road Transport- Changing dimension and typologies
- Tourist Transportations
- Rail Transport- Typologies

Unit 2: Travel Organization Marks 30

- TAAI
- ITDC
- IATA
- FHRAI
- IATO
- UNWTO
- PATA

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- Bhatia,A.K., Tourism Development, Principles & Practice
- J.Negi, International Tourism & Travel Mangement,Concept and Principles

PAPER TSI-VE-5036 OJT

Total Credit: 6

Total Marks=100

- Field Visit +Project Report + PPT Presentation +Viva Marks 100

SEMESTER 6th

PAPER TSI-VE-6016 TOURISM POLICY, PLANNING & DEVELOPMENT

Total Credit: 6

Total Marks=100

Unit 1: Fundamentals of Tourism Policy and Planning — Marks 20

- Meaning and definition of Tourism Policy
- Formulating Tourism Policy
- Tourism Policy in India
- National Act Plan for Tourism 1992(NAPT)
- Tourism Policies of North Eastern States

Unit 2: Approaches of Planning in Tourism — Marks 20

- Types of Tourism Planning
- Tourism planning Process
- Planning approaches for different forms of Tourism
- Planning for the development of a Tourist destination

Unit 3: Tourism Development — Marks 20

- Economic development and Tourism
- Concept of Planned Tourism Development
- Impact of Unplanned Tourism development in a Tourist destination

Practical: Home assignment — Marks 20

Internal Assessment — Marks 20

Reader list:

- Sharma,J.K.,Tourism Development: Design for Ecological Sustainability
- Sharma.K.K.,Planning for Tourism

PAPER TSI-VE-6026 BUSINESS LAWS IN TRAVEL AND TOURISM

Total Credit: 6

Total Marks=100

Unit 1: Laws and Regulations Marks 20

- Travel Agency
- Tour Operation
- Transport Operation
- Adventure Tourism as Sports

Unit 2: Passport and Foreign Exchange Marks 20

- Definition
- The Passport Act, 1967
- Foreign Exchange Management, 1999

Unit 3: Wildlife Act and Forest Act Marks 20

- Wildlife (protection) Act 1972
- Forest(Conservation) Act 1980

Practical: Home assignment Marks 20

Internal Assessment Marks 20

Reader list:

- M,Annamalai., Hospitaliy And Tourism Laws with Conventions
- Godwin,J.R.&Gaston,J.R.,Hotel, Hospitality and Tourism Law

PAPER TSI-VE-6036 OJT

Total Credit: 6

Total Marks=100

- Field Visit +Project Report + PPT Presentation +Viva Marks 100