Detailed Course Scheme

Bachelor of Science

(Physics, Mathematics, Chemistry, Botany, Zoology, Biotechnology and Computer Sciences)

Semester-III

(2016-2019)

DOC201717040006

RNB GLOBAL UNIVERSITY

RNB Global City, Ganganagar Road,

Bikaner, Rajasthan 334601

OVERVIEW

RNB Global University follows Semester System along with Choice Based Credit System as per latest guidelines of University Grants Commission (UGC). Accordingly, each academic year is divided into two semesters, **Odd (July-December) and Even (January-June).** Also, the university follows a system of continuous evaluation along with regular updating in course curricula and teaching pedagogy.

The curriculum for B.Sc. Program for (July-Dec.) Semester, 2017 along with examination pattern is as follows:

Semester – III

S. No	Course Code	Course Name	Credits
1.	-	Discipline Specific Core Course-I Paper-III	4
2.	-	Discipline Specific Core Course-I Paper-III Lab	2
3.	-	Discipline Specific Core Course-II Paper-III	4
4.	-	Discipline Specific Core Course-II Paper-III Lab	2
5.	-	Discipline Specific Core Course-III Paper-III	4
6.	-	Discipline Specific Core Course-III Paper-III Lab	2
7.	13002900	Ability & Skill Enhancement Module - III	3
8.	99002300	E-Commerce	4
9.	99002000	NCC/NSS/Other Similar activities	-
10.	99002100	Club activities	-
Total Credits			**25**

Discipline Specific Core Course Papers

Subject	Course Code	Course Name
Physics	13001500	Thermal Physics & Statistical Mechanics
	13001600	Thermal Physics & Statistical Mechanics Lab
Chemistry	13001300	Chemistry-III
	13001400	Chemistry-III Lab
Mathematics	13001700	Real Analysis

Botany	13007300	Plant Anatomy and Embryology
	13007400	Plant Anatomy and Embryology Lab
Zoology	13007500	Physiology and Bio Chemistry
	13007600	Physiology and Bio Chemistry Lab
Biotech	13007700	Genetics
	13007800	Genetics Lab
Computer Science	13007900	Operating Systems
	13008000	Operating Systems Lab

EVALUATION SCHEME - THEORY

The evaluation of the theory paper of B.Sc. program would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessments as follows:

Internal Assessment

Area of Assessment	Marking	Maximum Marks
Sessional-I	As per marks obtained	10
Sessional-II	As per marks obtained	10
Assignment + Presentation	15	15
Overall Conduct and Discipline	To be decided by concerned Faculty Member	5
Attendance	Student with 80% attendance will get 5 marks and 0.25 marks for every 1%	10
Total	**50**	

External Assessment

Type	Marks

Theory	50

EVALUATION SCHEME - PRACTICAL

The evaluation of the practical paper of B.Sc. program would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessment is as follows:

Internal Assessment

Type	Details	Marks
Marks obtained in various manuals, practical file, participation, any model prepared, output of practical	Average of marks obtained	35
Discipline	To be decided by concerned faculty	5
Attendance	80% - 5 marks and 0.25 percent for every one percent above 80 %	10
TOTAL	**50**	

External Assessment

Type	Marks
Practical	50

EVALUATION SCHEME- NSS/NCC AND CLUB ACTIVITIES

1. NSS/NCC will be evaluated internally.
2. The students have to join club/clubs with the active participation in different activities of club. The students would be continuously assessed.

CURRICULUM

Course Name: Thermal Physics & Statistical Mechanics

Course Code: 13001500

Course Outline

Unit I: Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermo dynamical Processes, Applications of First Law: General Relation between CP & CV, Work Done during Isothermal and Adiabatic Processes, Compressibility & Expansion Coefficient, Reversible & irreversible processes, Second law & Entropy, Carnot's cycle & theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Unattainability of absolute zero.

Unit II: Thermodynamic Potentials**:** Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations & applications - Joule-Thompson Effect, Clausius- Clapeyron Equation, Expression for (CP – CV), CP/CV, TdS equations.

Unit III: Kinetic Theory of Gases**:** Derivation of Maxwell's law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases.

Unit IV Theory of Radiation**:** Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.

Unit V: Statistical Mechanics: Phase space, Macrostate and Microstate, Entropy and Thermodynamic probability, Maxwell-Boltzmann law - distribution of velocity - Quantum statistics - Fermi-Dirac distribution law - electron gas - Bose-Einstein distribution law - photon gas - comparison of three statistics.

Suggested Readings:

1. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.
2. A Treatise on Heat, Meghnad Saha, and B.N. Srivastava, 1969, Indian Press.
3. Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.
4. Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill
5. Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears &
6. G.L.Salinger. 1988, Narosa
7. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
8. Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. chand Publications.

Course Name: Thermal Physics & Statistical Mechanics Lab

Course Code: 13001600

List of Experiments

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. Measurement of Planck's constant using black body radiation.
3. To determine Stefan's Constant.
4. To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.
5. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
6. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
7. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.
8. To study the variation of thermo emf across two junctions of a thermocouple with temperature.
9. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system
10. To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge

Suggested Readings

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th
3. Edition, reprinted 1985, Heinemann Educational Publishers A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
4. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.

Course Name: Chemistry III

Course Code: 13001300

Course Outline

Unit I: Solutions: Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions. Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions. Distillation of solutions., Lever rule. Azeotropes Partial miscibility of liquids: Critical solution temperature; effect of

impurity on partial miscibility of liquids. Immiscibility of liquids- Principle of steam distillation, Nernst distribution law and its applications, solvent extraction

Unit II: Phase Equilibrium: Phases, components and degrees of freedom of a system, criteria of phase equilibrium. Gibbs Phase Rule and its thermodynamic derivation,. Derivation of Clausius – Clapeyron equation and its importance in phase equilibria. Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics (lead-silve), congruent and incongruent melting points (Na-K only).

Unit III Conductance**:** Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility. Applications of conductance measurements: Conductometric titrations (only acid-base).

Unit IV Electrochemistry: Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance. Types of electrodes. Standard electrode potential. Electrochemical series. Thermodynamics of a reversible cell, calculation of thermodynamic properties: ΔG, ΔH and ΔS from EMF data. Calculation of equilibrium constant from EMF data.. pH determination using hydrogen electrode and quinhydrone electrode. Potentiometric titrations -qualitative treatment (acid-base and oxidation-reduction only)

Unit V: Organic Chemistry: Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.
Carboxylic acids and their derivatives: Carboxylic acids (aliphatic and aromatic) *Preparation:* Acidic and Alkaline hydrolysis of esters. *Reactions:* Hell – Vohlard - Zelinsky Reaction.

Carboxylic acid derivatives (aliphatic):
Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their interconversion. *Reactions:* Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation.
Amines and Diazonium Salts
Amines (Aliphatic and Aromatic):
Preparation: from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann Bromamide reaction.
Reactions: Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, with HNO2, Schotten – Baumann Reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation.
Diazonium salts: *Preparation:* from aromatic amines. *Reactions:* conversion to benzene, phenol, dyes.

Unit VI: Amino Acids, Peptides and Proteins:_Preparation of Amino Acids:_ Strecker synthesis using Gabriel's phthalimide synthesis. Zwitterion, Isoelectric point and Electrophoresis._Reactions of Amino acids_: ester of –COOH group, acetylation of –NH2 group, complexation with Cu2+ ions, ninhydrin test. Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. Determination of Primary structure of Peptides by degradation Edmann degradation (N-terminal) and C–terminal (thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis.

Carbohydrates: Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending in monosaccharides. Structure of disacharrides (sucrose, cellobiose, maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation.

Suggested Readings:

1. Barrow, G.M. _Physical Chemistry_ Tata McGraw-Hill (2007).
2. Castellan, G.W. _Physical Chemistry_ 4th Ed. Narosa (2004).
3. Kotz, J.C., Treichel, P.M. & Townsend, J.R. _General Chemistry_, Cengage Learning India Pvt. Ltd.: New Delhi (2009).
4. Mahan, B.H. _University Chemistry_, 3rd Ed. Narosa (1998).
5. Petrucci, R.H. _General Chemistry_, 5th Ed., Macmillan Publishing Co.: New York (1985).
6. Morrison, R. T. & Boyd, R. N. _Organic Chemistry_, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
7. Finar, I. L. _Organic Chemistry_ (_Volume 1 & 2_), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
8. Nelson, D. L. & Cox, M. M. _Lehninger's Principles of Bioch_emistry _7th Ed.,_ W. H. Freeman.
9. Berg, J.M., Tymoczko, J.L. & Stryer, L. _Biochemistry_, W.H. Freeman, 2002

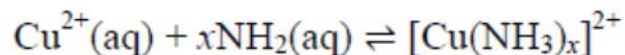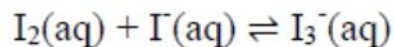# Course Name: Chemistry III Lab

Course Code 13001400

List of Experiments

Section A: Physical Chemistry

Distribution
Study of the equilibrium of one of the following reactions by the distribution method:

$$I_2(aq) + I^-(aq) \rightleftharpoons I_3^-(aq)$$

$$Cu^{2+}(aq) + xNH_2(aq) \rightleftharpoons [Cu(NH_3)_x]^{2+}$$

Phase equilibria

a) Construction of the phase diagram of a binary system (simple eutectic) using cooling curves.
b) Determination of the critical solution temperature and composition of the phenol water system and study of the effect of impurities on it.
c) Study of the variation of mutual solubility temperature with concentration for the phenol water system and determination of the critical solubility temperature.

Conductance

I. Determination of cell constant
II. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
III. Perform the following conductometric titrations:
i. Strong acid vs. strong base
ii. Weak acid vs. strong base

Potentiometry

Perform the following potentiometric titrations:
i. Strong acid vs. strong base
ii. Weak acid vs. strong base
iii. Potassium dichromate vs. Mohr's salt

Section B: Organic Chemistry

Systematic Qualitative Organic Analysis of Organic Compounds possessing mono functional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.

1. Separation of amino acids by paper chromatography

2. Determination of the concentration of glycine solution by formylation method.

3. Titration curve of glycine

4. Action of salivary amylase on starch

5. Effect of temperature on the action of salivary amylase on starch.

6. Differentiation between a reducing and a non-reducing sugar.

Suggested Readings:

1. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G.,
2. *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
3. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
4. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry,* R. Chand & Co.: New Delhi (2011).
5. Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry,* Universities Press.

Course Name: Real Analysis

Course Code: 13001700

Course Outline:

Unit I: Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano- Weierstrass theorem.

Unit II: Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof).

Unit III: Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof). Definition and examples of absolute and conditional convergence.

Unit IV: Sequences and series of functions, Pointwise and uniform convergence. Mn-test, Mtest, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.

Suggested Readings:

1. T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2. R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, J Wiley & Sons. (Asia) P. Ltd., 2000.
3. E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4. K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate
5. Texts in Mathematics, Springer Verlag, 2003.

Course Name: Plant Anatomy and Embryology

Course Code: 13007300

Course Outline:

Unit I: Meristematic and permanent tissues: Root and shoot apical meristems; Simple and complex tissues.

Unit II: **Organs:** Structure of dicot and monocot root,stem and leaf.

Unit III Secondary Growth: Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood)

Unit IV: Adaptive and protective systems: Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.

Unit V: Structural organization of flower: Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.

Unit VI: Pollination and fertilization: Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.

Unit VII: Embryo and endosperm: Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship.

Unit VIII: Apomixis and poly embryony: Definition, types and practical applications.

Suggested Readings

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.

Name: Plant Anatomy and Embryology Lab

Course Code:13007400

List of Experiments

1. Study of meristems through permanent slides and photographs.

2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).
4. Root: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (*Nerium* leaf); Hydrophyte (Hydrilla stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
9. Female gametophyte: Polygonum (monosporic) type of Embryo sac Development (Permanent slides/photographs).
10. Ultrastructure of mature egg apparatus cells through electron micrographs.
11. Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).
12. Dissection of embryo/endosperm from developing seeds.
13. Calculation of percentage of germinated pollen in a given medium.

Course Name: Physiology and Biochemistry

Course Code: 13007500

Course Outline:

Unit I Nerve and muscle: Structure of a neuron, Resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres, Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction.

Unit II Digestion: Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids.

Unit III: Respiration: Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood.

Unit IV: Excretion: Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism.

Unit V: Cardiovascular system: Composition of blood, Hemostasis, Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle.

Unit VI: Reproduction and Endocrine Glands: Physiology of male reproduction: hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle Structure and function of pituitary, thyroid, Parathyroid, pancreas and adrenal.

Unit VII: Carbohydrate Metabolism: Glycolysis, Krebs Cycle, Pentose phosphate pathway, Gluconeogenesis, Glycogen metabolism, Review of electron transport chain.

Unit VIII: Lipid Metabolism: Biosynthesis and β oxidation of palmitic acid.

Unit IX: Protein metabolism: Transamination, Deamination and Urea Cycle.

Unit X Enzymes: Introduction, Mechanism of action, Enzyme Kinetics, Inhibition and Regulation.

Suggested Readings

1. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
2. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology, XI Edition., McGraw Hill
3. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company
4. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
5. Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co
6. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). Harper's Illustrated Biochemistry. XXVIII Edition. Lange Medical Books/Mc Graw3Hill

Course Name: Physiology and Biochemistry Lab

Course Code: 13007600

List of Experiments

1. Preparation of hemin and hemochromogen crystals
2. Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland
3. Study of permanent slides of spinal cord, duodenum, liver, lung, kidney, bone, cartilage

4. Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose) 2. Estimation of total protein in given solutions by Lowry's method.
5. Study of activity of salivary amylase under optimum conditions

Suggested Readings

1. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
2. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology, XI Edition., McGraw Hill
3. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company

Course Name: Genetics

Course Code: 13007700

Course Outline:

Unit I: 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. Role of meiosis in life cycles of organisms. Mendelian genetics: Mendel's 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, semi-dominance, pleiotropy, multiple allele, pseudo-allele, essential and lethal genes, penetrance and expressivity.

Unit II: Non allelic interactions: Interaction producing new phenotype complementary genes, epistasis (dominant & recessive), duplicate genes 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: 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: 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: Rules of extra nuclear inheritance, maternal effects, maternal inheritance, cytoplasmic inheritance, organelle heredity, genomic imprinting.

Unit V : Evolution and population genetics: In breeding and out breeding, Hardy Weinberg law (prediction, derivation), Selective advantage and Hardy Weinberg equation, allelic and genotype frequencies, changes in allelic frequencies, systems of mating, evolutionary genetics, natural selection. Genetics; Pedigrees- gathering family history, pedigree symbols, construction of pedigrees; Monogenic traits - autosomal inheritance-dominant and recessive; Sex-linked inheritance- dominant and recessive; Sex-limited and sex-influenced traits; Y-linked

Suggested Readings

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.

Course Name: Genetics Lab

Course Code: 13007800

List of Experiments

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 Readings

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).
2. Principles of Genetics. V Edition. John Wiley and Sons Inc. 3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009).
3. Concepts of Genetics. IX Edition. Benjamin Cummings. 4. Russell, P. J. (2009).
4. 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

Course Name: Operating Systems

Course Code:13007900

Course Outline

Unit-I Introduction: Definition and types of operating systems, Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines. Process Management:

Unit-II Process concept, Process scheduling, Cooperating processes, Threads, Inter-process communication, CPU scheduling criteria, Scheduling algorithms, multiple processor scheduling, Real-time scheduling and Algorithm evaluation. Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Unit-III Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure

Unit-IV File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Swap-Space management, Disk reliability.

Unit-V Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption.

Suggested Readings

1. W. Stalling, Data & Computer Communication, 8th edition, Prentice Hall of India, 2006.
2. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
3. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
4. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.

Course Name: Operating Systems Lab

Course Code: 13008000

List of Experiments

1. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date.
3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users

10. Write a shell script to display the multiplication table any number,
11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file. 12. Write a shell script to find the sum of digits of a given number.
12. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
13. Write a shell script to find the LCD(least common divisor) of two numbers.
14. Write a shell script to perform the tasks of basic calculator.
15. Write a shell script to find the power of a given number.

16. Write a shell script to find the factorial of a given number.

17. Write a shell script to check whether the number is Armstrong or not.
18. Write a shell script to check whether the file have all the permissions or not.

Course Name: E-Commerce

Course Code: 99002300

Course Outline:

Unit I: **Introduction** Meaning, nature, concepts, advantages, disadvantages and reasons for transacting online, types of E-Commerce, e-commerce business models (introduction , key elements of a business model and categorizing major E-commerce business models), forces behind e-commerce. Technology used in E-commerce: The dynamics of world wide web and internet(meaning, evolution and features) ; Designing, building and launching e-commerce website (A systematic approach involving decisions regarding selection of hardware, software, outsourcing vs. in-house development of a website)

Unit II: Security and Encryption: Need and concepts, the e-commerce security environment: (dimension, definition and scope of e-security), security threats in the E-commerce environment (security intrusions and breaches, attacking methods like hacking, sniffing, cyber-vandalism etc.), technology solutions (Encryption, security channels of communication, protecting networks and protecting servers and clients),

Unit III: IT Act 2000 and Cyber Crimes :IT Act 2000: Definitions, Digital signature, Electronic governance, Attribution, acknowledgement and dispatch of electronic records, Regulation of certifying authorities, Digital signatures certificates, Duties of subscribers, Penalties and adjudication, Appellate Tribunal, Offences and Cyber-crimes

Unit IV: E-payment System: Models and methods of e–payments (Debit Card, Credit Card, Smart Cards, e-money), digital signatures (procedure, working and legal position), payment gateways, online banking (meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting), risks involved in e-payments.

Unit V: On-line Business Transactions: Meaning, purpose, advantages and disadvantages of transacting online, E-commerce applications in various industries like {banking, insurance, payment of utility bills, online marketing, e-tailing (popularity, benefits, problems and features), online services (financial, travel and career), auctions, online portal, online learning, publishing and entertainment} Online shopping (amazon, snap deal, alibaba, flipkart, etc.)

Unit VI: Website Designing: Introduction to HTML; tags and attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets.

Suggested Readings

1. Kenneth C. Laudon and Carlo Guercio Traver *E-Commerce*, Pearson Education.
2. David Whiteley, *E-commerce: Strategy, Technology and Applications*, McGraw Hill Education
3. Bharat Bhaskar, *Electronic Commerce: Framework, Technology and Application, 4th Ed.,*McGraw Hill Education
4. PT Joseph, *E-Commerce: An Indian Perspective*, PHI Learning
5. KK Bajaj and Debjani Nag, *E-commerce,* McGraw Hill Education
6. TN Chhabra, *E-Commerce,* Dhanpat Rai & Co.
7. Sushila Madan, *E-Commerce,* Taxmann
8. TN Chhabra, Hem Chand Jain, and Aruna Jain, *An Introduction to HTML*, Dhanpat Rai & Co.

Note: The review of Syllabus happens on periodic basis for the benefit of the students. In case there are changes in curriculum due to review, students would be intimated in writing.

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