Detailed Course Scheme

Bachelor of Science (B.Sc.)

(Physics, Mathematics, Chemistry, Botany, Zoology,

Biotechnology and Computer Sciences)

Semester- V

(2016-2019)

DOC201806110016

GLOBAL UNIVERSITY

Educating stars for tomorrow

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-December) Odd Semester, 2018 along with examination pattern is as follows:

Course Scheme

Semester – V

S. No	Course Code	Course Name	L	T	P	Credits
1.	13012200	Summer Internship or Summer Project	0	0	8	4
2.	-	Discipline Specific Core Course-I Elective I	4	0	0	4
3.	-	Discipline Specific Core Course-I Elective I Lab	0	0	4	2
4.	-	Discipline Specific Core Course-II Elective I	4	0	0	4
5.	-	Discipline Specific Core Course-II Elective I Lab	0	0	4	2
6.	-	Discipline Specific Core Course-III Elective I	4	0	0	4
7.	-	Discipline Specific Core Course-III Elective I Lab	0	0	4	2
8.	13012100	Biological Databases & their Management (Only for Biotechnology Students)	2	0	0	2
9.	13010000	Applications of IT Skills in Sciences	3	0	0	3
10.	13010100	Applications of IT Skills in Sciences Lab	0	0	2	1
11.	13003100	Ability & Skill Enhancement Module - V	2	0	0	2
12.	99002700	Human Values & Social Service/NCC/NSS	-	-	-	1
13.	99002800	Workshops & Seminars	-	-	-	1
Total			**19**	**0**	**22**	**30***

*** 32 Credits for Bio-Technology**

Discipline Specific Core Course Papers

Subject	Course Code	Course Name
Physics	13006800	Elements of Modern Physics
	13006900	Elements of Modern Physics Lab
Chemistry	13007000	Chemistry of Main Group Elements, Theories of Acids and Bases
	13007100	Chemistry of Main Group Elements, Theories of Acids and Bases Lab
Mathematics	13009900	Complex Analysis
Botany	13011300	Cell and Molecular Biology
	13011400	Cell and Molecular Biology Lab
Zoology	13011500	Immunology
	13011600	Immunology Lab
Computer Science	13011700	Database Management Systems
	13011800	Database Management Systems Lab
Biotechnology	13011900	Bioinformatics
	13012000	Bioinformatics Lab
	13012100	Biological Database & their Management

- Lab would be same as per theory elective paper opted by the student.

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

The distribution of Internal Assessment Marks is as follows:

Type	Details	Marks
Mid Term	Two Mid-term Sessional of 15 marks each (15+15)	30
Marks obtained in various Tests, Assignments, Presentations, Quiz, Tutorials, etc.	Average of marks obtained	15
Attendance	75%+ : 5 marks	5
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	45
Attendance	75%+ : 5 marks	5
TOTAL	**50**	

External Assessment

Type	Marks
Practical	50

CURRICULUM

Course Name: Elements of Modern Physics

Course Code: 13006800

Course Outline:

Unit I
Planck's quantum, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson Germer experiment.

Unit II
Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra.

Unit III
Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory;

estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle.

Unit IV

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical 20 interpretation of wavefunction, probabilities and normalization; Probability and probability current densities in one dimension.

Unit V

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as an example; Quantum mechanical scattering and tunnelling in one dimension - across a step potential and across a rectangular potential barrier

Unit VI

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy.

Unit VII

Radioactivity: stability of nucleus; Law of radioactive decay; Mean life & half-life; α decay; β decay - energy released, spectrum and Pauli's prediction of neutrino; γ-ray emission

Unit VIII

Fission and fusion - mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions

Suggested Readings

1. Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill.
2. Modern Physics, John R. Taylor, Chris D. Zafiratos, Michael A.Dubson, 2009, PHI Learning.
3. Six Ideas that Shaped Physics: Particle Behave like Waves, Thomas A. Moore, 2003, McGraw Hill.
4. Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw-Hill Co.
5. Modern Physics, R.A. Serway, C.J. Moses, and C.A.Moyer, 2005, Cengage Learning.
6. Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill.

Course Name: Elements of Modern Physics Lab

Course Code: 13006900

Course Outline

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine work function of material of filament of directly heated vacuum diode.
3. To determine value of Planck's constant using LEDs of at least 4 different colours.
4. To determine the ionization potential of mercury.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the absorption lines in the rotational spectrum of Iodine vapour.
7. To study the diffraction patterns of single and double slits using laser source and measure its intensity variation using Photo sensor and compare with incoherent source – Na light.
8. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
9. To determine the value of e/m by magnetic focusing.
10. To setup the Millikan oil drop apparatus and determine the charge of an electron.

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 Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

Course Name: Chemistry of Main Group Elements, Theories of Acids and Bases

Course Code: 13007000

Course Outline

Unit I

Acids and Bases Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and leveling solvents. Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept. Hard and soft acids and bases (HSAB concept), applications of HSAB process.

Unit II

General Principles of Metallurgy Chief modes of occurrence of metals based on standard electrode potentials, Ellingham diagrams for reduction of metal oxides using carbon and

carbon monoxide as reducing agents. Hydrometallurgy with reference to cyanide process for gold and silver. Methods of purification of metals (Al, Pb, Ti, Fe, Cu, Ni, Zn, Au): electrolytic refining, zone refining, van Arkel-de Boer process, Parting Process, Mond's process and Kroll Process.

Unit III

s- and p-Block Elements Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electron gain enthalpy, electro negativity (Pauling scale). General characteristics of s-block metals like density, melting and boiling points, flame colour and reducing nature. Oxidation states of s- and p-block elements, inert-pair effect, diagonal relationships and anomalous behaviour of first member of each group. Allotropy in C, P and S. Complex forming tendency of s block elements and a preliminary idea of crown ethers and cryptates, structures of basic beryllium acetate, salicylaldehyde/ acetylacetonato complexes of Group 1 metals. Solutions of alkali metals in liquid ammonia and their properties. Common features, such as ease of formation, solubility and stability of oxides, peroxides, superoxides, sulphates and carbonates of s-block metals.

Unit IV

Structure, bonding and properties (acidic/ basic nature, oxidizing/ reducing nature and hydrolysis of the following compounds and their applications in industrial and environmental chemistry wherever applicable: Diborane and concept of multicentre bonding, hydrides of Groups 13 (BH_3), 14, 15, 16 and 17. Oxides of N and P, Oxoacids of P, S and Cl. Halides and oxohalides of P and S (PCl_3, PCl_5, $SOCl_2$ and SO_2Cl_2) Interhalogen compounds. A brief idea of pseudohalides.

Unit V

Noble gases: Rationalization of inertness of noble gases, clathrates, preparation and properties of XeF_2, XeF_4 and XeF_6; bonding in these compounds using VBT and shapes of noble gas compounds using VSEPR Theory.

Unit VI

Inorganic Polymers Types of inorganic polymers and comparison with organic polymers, structural features, classification and important applications of silicates. Synthesis, structural features and applications of silicones. Borazines and cyclophosphazenes – preparation, properties and reactions. Bonding in $(NPCl_2)_3$

Suggested Readings

1. Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
2. Cotton, F.A., Wilkinson, G. & Gaus, P.L. Basic Inorganic Chemistry, 3rd ed., Wiley.
3. Douglas, B.E., McDaniel, D.H. & Alexander, J.J. Concepts and Models in Inorganic Chemistry, John Wiley & Sons.

4. Greenwood, N.N. & Earnshaw. Chemistry of the Elements, Butterworth Heinemann. 1997.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India Edition, 2002.
6. Miessler, G. L. & Donald, A. Tarr. Inorganic Chemistry 4th Ed., Pearson, 2010. •Atkin, P. Shriver & Atkins' Inorganic Chemistry 5th Ed. Oxford University Press (2010).

Course Name: Chemistry of Main Group Elements, Theories of Acids and Bases Lab

Course Code: 13007100

Course Outline

1. Iodometric estimation of potassium dichromate and copper sulphate.
2. Iodimetric estimation of antimony in tartaremetic.
3. Estimation of amount of available chlorine in bleaching powder and household bleaches.
4. Estimation of iodine in iodized salts.
5. Iodimetric estimation of ascorbic acid in fruit juices.
6. Estimation of dissolved oxygen in water samples.
7. Gravimetric estimation of sulphate as barium sulphate.
8. Gravimetric estimation of aluminium as oximato complex.
9. Preparation of the following: potash alum, chrome alum, tetraammine copper(II) sulphate monohydrate, potassium trioxalato ferrate(III) (any two, including one double salt and one complex).

Suggested Readings

1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012
2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2000

Course Name: Complex Analysis

Course Code: 13009900

Course Outline

Unit I
Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability.

Unit II
Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions, definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy integral formula

Unit III
Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples Laurent series and its examples, absolute and uniform convergence of power series.

Suggested Readings

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications, 8th Ed., McGraw – Hill International Edition, 2009.

Course Name: Cell and Molecular Biology

Course Code: 13011300

Course Outline

Unit I: Techniques in Biology
Principles of microscopy; Light Microscopy; Phase contrast microscopy; Fluorescence microscopy; Confocal microscopy; Sample Preparation for light microscopy; Electron microscopy (EM)- Scanning EM and Scanning Transmission EM (STEM); Sample Preparation for electron microscopy; X-ray diffraction analysis.

Unit II: **Cell as a unit of Life**
The Cell Theory; Prokaryotic and eukaryotic cells; Cell size and shape; Eukaryotic Cell components.

Unit III: Cell Organelles
Mitochondria: Structure, marker enzymes, composition; Semiautonomous nature; Symbion thypothesis; Proteins synthesized within mitochondria; mitochondrial DNA. Chloroplast Structure, marker enzymes, composition; semiautonomous nature, chloroplastDNA.ER, Golgi body & Lysosomes: Structures and roles . Peroxisomes and Glyoxisomes: Structures, composition, functions in animals and plants and biogenesis.

Nucleus: Nuclear Envelope- structure of nuclear pore complex; chromatin; molecular organization, DNA packaging in eukaryotes, euchromatin and heterochromatin, nucleolus and ribosome structure (brief).

Unit IV: Cell Membrane and Cell Wall
The functions of membranes; Models of membrane structure; The fluidity of membranes; Membrane proteins and their functions; Carbohydrates in the membrane; Faces of the membranes; Selective permeability of the membranes; Cell wall.

Unit V: Cell Cycle
Overview of Cell cycle, Mitosis and Meiosis; Molecular controls.

Unit VI Genetic material
DNA: Miescher to Watson and Crick- historic perspective, Griffith's and Avery's transformation experiments, Hershey-Chase bacteriophage experiment, DNA structure, types of DNA, types of genetic material.
DNA replication (Prokaryotes and eukaryotes): bidirectional replication, semi–conservative, semi discontinuous RNA priming, Ø (theta) mode of replication, replication of linear, ds-DNA, replicating the 5′end of linear chromosome including replication enzymes.

Unit VII: Transcription (Prokaryotes and Eukaryotes): Types of structures of RNA (mRNA, tRNA, rRNA), RNA polymerase- various types; Translation (Prokaryotes and eukaryotes), genetic code.

Unit VIII: Regulation of gene expression: Prokaryotes:Lac operon and Tryptophan operon ; and in Eukaryotes.

Suggested Readings:

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 Francisco

Course Name: Cell and Molecular Biology Lab

Course Code: 13011400

Course Outline

1. To study prokaryotic cells (bacteria), viruses, eukaryotic cells with the help of light and electron micrographs.
2. Study of the photomicrographs of cell organelles
3. To study the structure of plant cell through temporary mounts.
4. To study the structure of animal cells by temporary mounts-squamous epithelial cell and nerve cell.
5. Preparation of temporary mounts of striated muscle fiber
6. To prepare temporary stained preparation of mitochondria from striated muscle cells /cheek epithelial cells using vital stain Janus green.
7. Study of mitosis and meiosis (temporary mounts and permanent slides).
8. Study the effect of temperature, organic solvent on semi permeable membrane.
9. Demonstration of dialysis of starch and simple sugar.
10. Study of plasmolysis and deplasmolysis on Rhoeo leaf.
11. Measure the cell size (either length or breadth/diameter) by micrometry.
12. Study the structure of nuclear pore complex by photograph (from Gerald Karp)Study of special chromosomes (polytene & lampbrush) either by slides or photographs.
13. Study DNA packaging by micrographs.
14. Preparation of the karyotype and ideogram from given photograph of somatic metaphase chromosome.

Suggested Readings

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 Francisco.

Course Name: Immunology

Course Code: 13011500

Course Outline:

Unit I: Overview of the Immune System

Introduction to basic concepts in immunology, components of immune system, principles of innate and adaptive immune system.

Unit II: Cells and Organs of the Immune System

Haematopoeisis, Cells of immune system and organs (primary and secondary lymphoidorgans) of the immune system.

Unit III: **Antigens**
Basic properties of antigens, B and T cell epitopes, haptens and adjuvants.

Unit IV: Antibodies
Structure, classes and function of antibodies, monoclonal antibodies, antigen antibody interactions as tools for research and diagnosis.

Unit V:Working of the immune system
Structure and functions of MHC, exogenous and endogenous pathways of antigen presentation and processing, Basic properties and functions of cytokines, Complement system: Components and pathways.

Unit VI: Immune system in health and disease
Gell and Coombs' classification and brief description of various types of hypersensitivities, Introduction to concepts of autoimmunity and immunodeficiency .Immunological techniques – ELISA Immuno diffusion Immuno electrophoresis.

Unit VII: Vaccines
General introduction to vaccines, Various types of vaccines.

Suggested Readings

1. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). Immunology, VI Edition. W.H. Freeman and Company.
2. David, M., Jonathan, B., David, R. B. and Ivan R. (2006). Immunology, VII Edition, Mosby, Elsevier Publication.
3. Abbas, K. Abul and Lechtman H. Andrew (2003.) Cellular and Molecular Immunology.V Edition. Saunders Publication.

Course Name: Immunology Lab

Course Code: 13011600

Course Outline

1. Demonstration of lymphoid organs
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of blood cells.
4. Ouchterlony's double immuno-diffusion method.
5. ABO blood group determination.

6. Cell counting and viability test from splenocytes of farm bred animals/cell lines.
7. Demonstration of a) ELISA b) Immuno electrophoresis

Course Name: Database Management Systems

Course Code: 13011700

Course Outline

Unit I

Introduction to Database Management Systems: Characteristics of database approach, data models, DBMS architecture and data independence.

Entity Relationship and Enhanced ER Modeling: Entity types, relationships, SQL-99: Schema Definition, constraints, and object modeling.

Unit II

Relational Data Model: Basic concepts, relational constraints, relational algebra, SQL queries.

Database design: ER and EER to relational mapping, functional dependencies, normal forms upto third normal form..Transaction Processing ACID properties, concurrency control.

Unit III

Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals. **Types of SQL commands**: DDL, DML, DCL. Basic SQL Queries. Logical operators :BETWEEN, IN, AND, OR and NOT Null Values: Disallowing Null Values, Comparisons Using Null Values Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses,

Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins, Equijoins Overview of views and indexes.

Unit IV

Transaction Processing ACID properties, concurrency control ,.File Structure and Indexing Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files(Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

Suggested Readings

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.

2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.
5. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
6. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
7. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.

Course Name: Database Management Systems Lab

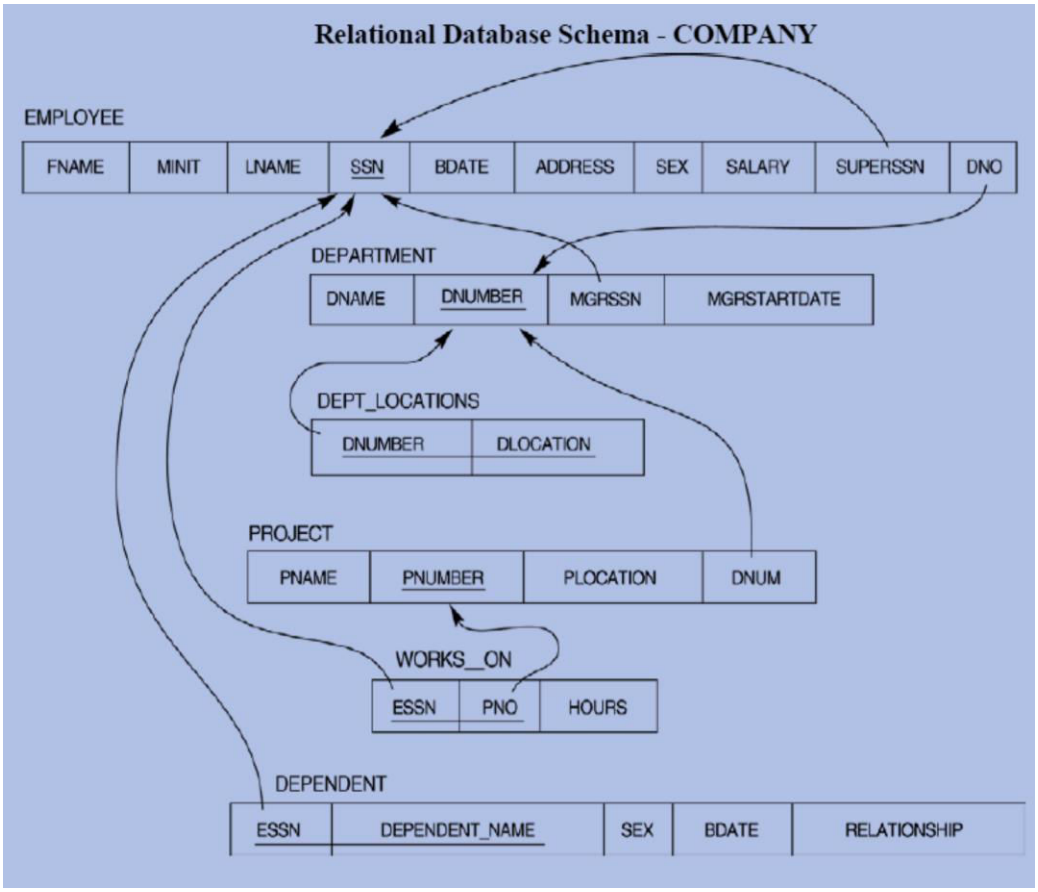
Course Code: 13011800

Course Outline

Note: MyAccess/MySQL may be used.

DDL Commands

- Create table, alter table, drop table DML Commands
- Select , update, delete, insert statements
- Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,=,<=)
- Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)
- Multiple table queries (join on different and same tables) • Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by……..having
- Arranging using order by Relational Database Schema – COMPANY



Questions to be performed on above schema

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :
   - Display all the details of all employees working in the company.
   - Display ssn, lname, fname, address of employees who work in department no 7.
   - Retrieve the birth date and address of the employee whose name is 'Franklin T. Wong'.
   - Retrieve the name and salary of every employee.
   - Retrieve all distinct salary values.
   - Retrieve all employee names whose address is in ‘Bellaire’
   - Retrieve all employees who were born during the 1950s.
   - Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive).
   - Retrieve the names of all employees who do not have supervisors.
   - Retrieve SSN and department name for all employees.
   - Retrieve the name and address of all employees who work for the 'Research' department.

- For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
- For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
- Retrieve all combinations of Employee Name and Department Name.
- Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
- Increase the salary of all employees working on the 'Product X' project by 15%. Retrieve employee name and increased salary of these employees.
- Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
- Select the names of employees whose salary does not match with salary of any employee in department 10.
- Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
- Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
- Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
- Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
- Select the names of employees whose salary is greater than the average salary of all employees in department 10.
- For each department, retrieve the department number, the number of employees in the department, and their average salary.
- For each project, retrieve the project number, the project name, and the number of employees who work on that project.
- Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.
- For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
- Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table. 29. Delete all dependents of employee whose ssn is '123456789'.
- Delete an employee from Employee table with ssn = '12345' (make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL

- Perform a query using alter command to drop/add field and a constraint in Employee table.

Course Name: Bioinformatics

Course Code: 13011900

Course Outline:

Unit I

History of Bioinformatics.The notion of Homology. Sequence Information Sources, EMBL,GENBANK, Entrez, Unigene, Understanding the structure of each source and using it on theweb.

Unit II

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,Microarrays, Mass Spectrometry.

Unit III

Sequence and Phylogeny analysis, Detecting Open Reading Frames, Outline of sequence Assembly, Mutation/Substitution Matrices, Pair wise Alignments, Introduction to BLAST, using it on the web, Interpreting results, Multiple Sequence Alignment, Phylogenetic Analysis.

Unit IV

Searching Databases: SRS, Entrez, Sequence Similarity Searches-BLAST,FASTA, Data Submission. Genome Annotation: Pattern and repeat finding, Gene identification tools.

Suggested Readings

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.

Course Name: Bioinformatics Lab

Course Code: 13012000

Course Outline

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 Readings

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

Course Name: Biological Databases and their Management

Course Code: 13012100

Course Outline

Unit I Introduction

An overview of database management system, database system Vs file system, Characteristics of database approach, DBMS architecture, data models, schema and instances, data independence **Data Modelling using Entity Relationship Model:** Entity, Entity types, entity set, notation for ER diagram, attributes and keys,

Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals.**Types of SQL commands**: DDL, DML, DCL. Basic SQL Queries. Logical operators :BETWEEN, IN, AND, OR and NOT Null Values: **Joins**: Inner joins, Outer Joins, Left outer, Right outer, full outer joins, Equijoins Relational Data Model: Relational model terminology domains, Attributes, Tuples, Relations.

Unit-II

Biological data types, Major biological databases and its classification, sequence and structure file formats, The NCBI /GENBANK data model, SEQUIN submitting DNA sequences to the data base, structure data base, genomic mapping and mapping data bases, information retrieval from biological data bases FASTA sequence data base Nucleic acid sequence databases EMBL/DDBJ, Protein sequence databases UniProtKB, Structural Biological Databases PDB

Course Name: Applications of IT Skills

Course Code: 13010000

Course Outline

Unit I

C basics, C character set, Identifiers and keywords, Data types, constants, variables and arrays,declarations, expressions statements, symbolic constants, compound statements, arithmetic, operators, unary operators, relational and logical operators, assignment operators, conditional, operators, bit operators.C constructs: If statement, if….else statement, if…..else if….else statement, while statement, do….while statement, for statement, switch statement, nested control statement, break operator, continue operator, comma operator, got statement.

Unit II

C Functions: Functions: declaration, definition & scope, recursion, call by value, call byreference.Storage Classes: automatic, external (global), static & registers.

Unit III

Arrays: Arrays, pointers, array & pointer relationship, pointer arithmetic, dynamic memory allocation, pointer to arrays, array of pointers, pointers to functions, array of pointers to functions, Pre-processor directives: #include, #define, macro's with arguments, the operators #and ##, conditional compilations.

UnitIV

Structures: Structures, unions, passing structure to functions, bit fields, file handling [text(ASEII), binary].

Unit V

String manipulation functions and other standard library functions from stdio.h, stdlib.h,conio.h, ctype.h, math.h, string.h, process.h.Usage of command line arguments.

Unit VI

Computer programming: Constants, variables, bits, bytes, binary and ASCII formats, arithmetic expressions, hierarchy of operations, inbuilt functions. Elements of the BASIC language.BASIC keywords and commands.Logical and relative operators. Strings and graphics. Compiled versus interpreted languages. Debugging. Simple programs using these concepts. Matrix addition and multiplication. Statistical analysis.

Suggested Reading:

1. Ashok N. Kamthane, "Computer Basics and C Programming", Pearson Education.
2. E. BalaGuruswamy, "Programming in ANSI C", 2008.
3. V Rajaraman, "Computer Basics and C Programming", PHI.
4. Herbert Schildt, "C The Complete Reference" Fourth Edition, 2000.
5. YashwantKanetkar, "Let us C" eighth edition, 2002.
6. Kernighan and d. Ritchie, "The ANSI C Programming Language", 2000.
7. StephennPrata, "C Primer Plus" Fourth Edition, 2001.
8. Schaum'sOutline Series, "Programming with C", 2nd Edition, 1996.

Course Name: Applications of IT Skills Lab

Course Code: 13010100

Course Outline

List of Experiments (Not limiting to)

1. Write a program sum of two numbers
2. Write a program to check either the number is even or odd
3. Write a program calculate simple interest.
4. Write a program to calculate the marks of four subject and percentage.
5. Write a program to check either the year is leap year or not.
6. Write a program to find out the grade using if/else if statement.
7. Write a program to find out the greater number between two number.
8. WAP to read base and height of a triangle, calculate the area using formula :
    i. Area =1/2*base*height
9. WAP to read marks obtained and maximum marks of a student and calculate its percentage and display it.
10. Write a program to print even number up to n.
11. Write a program to print odd number up to n.
12. Write a program to print table.
13. Handling numeric data: Spreadsheet software (Excel), creating a spreadsheet, entering and formatting information basic functions and formulae, creating charts,

tables and graphs. Incorporating tables and graphs into word processing documents.

Course Name: Ability & Skill Enhancement Module- V

Course Code: 13003100

Course Outline – Final Assessment - Interview with an Entrepreneur /Leader

Unit I: Leadership
What is leadership? Traits of Leadership, Identifying leaders and traits of Leadership, Movie/ Story/ Interviews of leaders: Identify leadership qualities, Debate/ Discussion/ Presentations on leaders.

Unit II: Entrepreneurship
What is Entrepreneurship, Traits of Successful Entrepreneurs, Movie/ Story/Interviews of Entrepreneurs: Identify Entrepreneurial qualities, Debate/ Discussion/Presentation on Entrepreneurs.

Unit III: Organisational Skills & Employability Skills
What are organizational skills, how to develop them, the skills needed to become a successful entrepreneur/administrator, good communication, ambition, courage, hardwork, planning, accountability. Organizational skills can be developed by discipline making a system, rules, delegation of power at workplace, etc.
How to enhance employability; skills, why do we need them, different workplaces, having different needs, different skills, how to recognize different work skills.

Unit IV: Decision making
The process of decision making, its steps, what are its basics, what are the basics of organizational decision making process, entrepreneurial decision making, how to make a right decision at right time, dilemma.

Unit V: Interview Skills
Conducting Interviews with Leaders/ Entrepreneurs, Preparing Questions, Interviewing the fellow person, do's & don'ts while taking interview.

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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