OSMANIA UNIVERSITY

Faculty of Pharmacy

SCHEME OF INSTRUCTION, EXAMINATION AND EVALUATION

(Effective for Batches Admitted from 2016 – 17 Academic Year Onwards)

Program Code: 881 B. Pharmacy (Fourth year)

SEMESTER - VIII

Course Code	Description	Course Title	Hours/Week			Credits	Marks		Duration of Exam
			L	T	P		Internal	End Exam	
PY.08.881.8.1.T	PS, CORE	Pharmaceutical Biotechnology	4	0	-	4	30	70	3
PY.08.881.8.2.T	PS, CORE	Pharmacoinformatics	4	0	-	4	30	70	3
PY.08.881.8.3.T	PS, CORE	Cosmetic Technology	4	0	-	4	30	70	3
PY.08.881.8.4.T	PS, FC	Hospital and Clinical Pharmacy	3	0	0	3	30	70	3
PY.08.881.8.5.T	Open elective	cGMP / Pharmaco vigilance	3	0	0	3	30	70	3
PY.08.881.8.6.P	PS, CORE	Pharmaceutical Biotechnology Practical	0	0	4	2	30	70	4
PY.08.881.8.7.P	PS, CORE	Pharmacoinformatics Practical	0	0	4	2	30	70	4
PY.08.881.8.8.P	PS, CORE	Cosmetic Technology Practical	0	0	4	2	30	70	4
			18	0	12	24	240	560	
PY.08.881.8.8.X	Project/ Seminar	Curricular/ Co-curricular	-			2	Grade-A/B/C/D/F		Non-CGPA

At the end of the program CGPA will be Awarded on a 10 Point Scale with the Final Grade on Transcript

PHARMACEUTICAL BIO TECHNOLOGY

Subject Code : PY.08.881.8.1.T **Sessional : 30**
Periods / Week: 4 credits:4 **Examination : 70**
Nature of Exam: Theory **Exam Duration: 3 Hrs**

Unit – I

Genetic Engineering
Introduction, History, Development, Application and Scope Genetics, DNA/RNA replication, Restriction Endonucleases, DNA Ligases, Vectors, Hosts, Cloning strategies, Gene Expression in Recombinant DNA. Application of recombinant DNA in manufacture of biological products such as Insulin, Human growth hormones, Interferons and Interleukins.

Unit – II

Biochemical Engineering – Fermentation Technology

Introduction, development and maintenances of industrial micro-organisms, batch and continuous fermentations, process controls, oxygen supply and demand, single and multiple bubble aeration, sparger aeration, foam control equipment, scale-up of Fermentors.

Microbiological Assay of antibiotics and Vitamin B_{12}.

Study of culture, media, production conditions, extraction and purification of the following:

Antibiotics – Semi synthetic penicillin's, streptomycin and erythromycin as per IP.
Hormones - Insulin Production
Enzymes – Amylase and Diastase; Immobilization and their applications in drug manufacture.

***Biomass* – Lactobacillus sporogenes**

Unit – III

Immunization Products
Manufacture, Standardization, Storage, Labeling and Specific Applications of the following vaccines: Bacterial vaccines, toxoids, viral vaccines, Rickettsial vaccines, Rabies, MMR, BCG, DPT, Cholera, Hepatitis B and Polio
Standardization and Storage of the following Passive immunization products – Anti toxins, Anti venom, Immune sera and other products related to immunity and Immuno Diagnostics;

Unit – IV

Blood and Glandular Products

Collection, processing and storage of whole human blood, Concentrated human R.B.C. dried human plasma, Human plasma protein fraction, dried human serum, Human fibrinogen, Human thrombin, human normal immunoglobulin, Human fibrin foam, Plasma substitutes – Ideal requirements, PVP, Dextran 40, Control of blood products, Transfusion products.

Preparation of extracts and isolation of pure substances and their dosage forms from Pituitary, Adrenal, Pancreas and Thyroid glands;.

Unit – V

Biotransformations and Animal Cell Biotechnology

Microbial transformation of steroids: Introduction, Types and methods of transformations mediated by microorganisms, design of biotransformation processes and selection of organisms.

Animal cell culture: Techniques, Media used and Applications.

Hybridoma culture: Production of monoclonal antibodies and their applications.

Examination: One question from each unit with internal choice.

Text Books

1. **Pharmaceutical Biotechnology by S.S. Kori.**
2. **Principles of Fermentation Technology by P.F. Standury & A. Whitaker, Pergamon Press,**
3. **Industrial Microbiology by Cassida.**

Reference books

1. **Monoclinical Antibody Technology by A.M. Campbeli.**
2. **Handbook of enzyme Biotechnology by A. Wiseman.**
3. **Recombinant DNA Technology by J.D. Watson.**
4. **Molecular Biology and Biotechnology by Smith and Hood.**
5. **General Pharmacy by Copper and Gunn.**
6. **A text book of Pharmaceutics, A.O. Bentley, 8th Edition, 1982 Bailler Tindall & Co.,**
7. **Microbial Biotechnology Alexander N. Glazer & Hiroshi Nikaido, W.H. Freeman Co., 1995.**
8. **Principles of Fermentation Technology by P.F. Stanbury Whitaker.**
9. **Bioitechnology by Wulf Crueger and Anneliese Crueger, 2nd edition, Publisher – Panima Publication Corporation, New Delhi.**

PHARMACOINFORMATICS

Subject Code : PY.08.881.8.2.T **Sessional : 30**
Periods/ Week : 04 credits:4 **Examination : 70**
Nature of Exam: Theory **Exam Duration: 3 Hrs**

Unit – I

Database Design

Databases: Structure of databases, Sequence databases, Relational databases; Sequence analysis, Software resources; Sequence alignment and database searches and Phylogenetic analysis; Principles of database organization, Data mining and knowledge discovery in databases, Bibliographic databases and library catalogs and Drug information databases Database Concept, Database Architecture, Codd Rules, Normalization, Access 2000 Database and Accord 2000 Cheminformatics Database; Importance of Biological Databases

Unit – II

Information Management

Search algorithms: Search logic and complex queries and Search in non-text databases (images and chemical structures); Algorithms for alignment of sequences and structures of nucleic acids, proteins and protein families; Substitution of similarity matrices; Dynamic Programming methods; Structural superposition algorithms; Hidden Markov Models (Construction and Use in Alignment and Prediction); Domain detection and Identification of Genes;

Storage and retrieval of information: Database Querying, Key work searching, Search Machines, Complex searches, Homology searches, Pattern matching and Bio-PERL;

Unit – III

Drug information services

Drug Information: Introduction, Resources Available; Design of Literature Searches; Critical Evaluation of drug information and literature, Preparation of Written and Verbal reports, Development of Drug information, Database useful for emergency treatment of poisoning;

Pharmacy automation: Automated medication dosage, filling and packaging, Coding of information and bar-codes, Medication distribution, management and Inventory control.

Unit – IV

Introduction to Genomics and Proteomics

Structure and Functional Genomics; Genome Analysis; DNA databaks, GENEBANK;

Libraries: Preparation of ordered cosmid libraries, bacterial artificial chromosome libraries; shotgun libraries; Homology algorithims (BLAST) for Proteins and Nucleic Acids

Sequencing: Conventional (Sanger, Maxam and Gilbert Methods) and Automated Sequencing

Protein Analysis; Protein Sequence Databanks, (SWISSPORT, PIR and INTERPRO) Conserved Protein motifs related to structure/function (PROSITE, PFAM and profile

Scan) and database for Protein Structure (PDB); SCOP/CATH and Introduction to EMBOSS;

Unit – V

Computational Concepts in Drug Design

Introduction to drug design; Molar Reactivity of Compounds for Structure Activity Relationship (SAR) and Quantitative Structure Activity Relationship (QSAR) analysis; Free-Wilson and Hansch Methods of Analysis; Detrmination of Partition Coefficient and Dissociation Constant; using computational methods; Application of Quantum Mechanics;
Factors Affecting Bioactivity of Drugs: Resonance, Inductive Effect, Isosterism, bioisosterism, Special Considerations: Conformational Space, Energy Calculations, Local and Global Minimization; Energy Minimization; Molecular dynamics simulations; Docking;
Theory of Drug Activity: Occupancy Theory; Rate Theory; Induced Fit Theory; Drug-Recptor Interactions; Influence of Isomers on Drug Receptors; Biochemical approaches in drug design;

Examination: One question from each unit with internal choice.

Text and Reference Books

1. **Bioinformatics 2000, Higgins and Taylor. OUP**
2. **Internet and the New Biology: Tools for genomic and Molecular research By Peruski, Jr**
3. **Functional genomics: A Practical Approach, Edited by Stephen P. Hunt and Rick Liveey**
4. **Chemical space navigation in lead discovery by Tudor I. Oprea**
5. **Database Management and Information Systems, by Henry Korth**

COSMETIC TECHNOLOGY

Subject Code : PY.08.881.8.3.T **Sessional : 30**
Periods / Week : 4 credits:4 **Examination : 70**
Nature of Exam: Theory **Exam Duration: 3 Hrs**

Unit – I

Introduction, Definition of cosmetics. Basic knowledge of the skin classification of cosmetics.

General aspects of cosmetic preparations: Colouring agents in cosmetics, Preservatives and antioxidants and other additives used in cosmetics, Regulatory provisions related to cosmetics.

An approach to the formulation, ingredients, use, method of manufacturing, packing, labeling, and quality control of the following cosmetics.

Unit – II

Face Preparations - Vanishing creams, Cleansing creams, Face powders and lipsticks.
Eye Preparations - Mascaras, Eye liners, Eye shadows.
Baby Specialties - Baby powder, Baby oils, Baby lotions and Baby shampoos.

Unit – III

Preparations For Skin - Bleaching preparations, Body Lotions and Body Creams.
Preparations For Nails - Nail laquers and Nail polish removers

Body Cosmetic Preparations - Deodorants, Antiperspirants and Talcum powders.

Shaving Preparations: Pre-Shave and after-shave lotions, Shaving creams and Soaps.

Unit – IV

Preparations For The Hair - Shampoos, Hair Conditioners, Hair Straightners, Hair creams, Hair dyes, Depilatories and Epilatories.
Dental Preparations - Tooth powders and pastes, Mouth washes.

Unit – V

Herbal Cosmetics
Skin care products: Body oils and Moisturising lotions.
Hair care products - Shampoos, Hair Conditioners.
Cosmetics for face: Face packs.

Examination: One question from each unit with internal choice.

Text Books

1. Cosmetics formulation manufacturing & Quality control by P.P. Sharma, Vandana Pub, Delhi.
2. Poucher's Perfumes, Cosmetics and Soaps by H. Butler, Chapman & HALL, London

Reference Books

1. Martindale's Extra Pharmacopia, 29th edn. 1989, Pharmaceutical Press, London.

2. Cosmetic Science & Technology, Volume I, II & III by Sagarin 2nd edn. John wiley & Co.

HOSPITAL & CLINICAL PHARMACY

Subject Code : PY.08.881.8.4.T **Sessional : 30**
Periods / Week: 4credits:3 **Examination : 70**
Nature of Exam: Theory **Exam Duration: 3 Hrs**

UNIT – I

Introduction to Hospital and Hospital Pharmacy
Hospital and its Organisation,
Hospital Pharmacy: Objectives, Functions, Organisation, Planning, Personnel and Administration of Hospital Pharmacy Services; Hospital Drug Policy – General Considerations;
Hospital Committees: Purpose, Organization and Functions of Pharmacy and Therapeutic Committee (PTC), Role of Hospital Pharmacist in Hospital Committees and Practice of Rational Drug Therapy and Drug Exchange Program;

UNIT – II

Hospital Formulary
Organization, Formulary Content, Preparation and Distribution; Pharmacy Procedural Manual Preparation; Drug distribution, Dispensing to Inpatient and Ambulatory Patient care, Dispensing of ancillary and controlled substance; Procurement and Distribution of alcohol; Manufacturing of Bulk and sterile supplies; Storage and Handling of Radio isotopic Pharmaceuticals; Budget Planning, Purchasing and Inventory Control; Use of Surgical Instruments & Hospital Equipment.

UNIT – III

Clinical Pharmacy

Introduction, Scope, History and Development of Clinical Pharmacy; Investigational use of Drugs and Drug Therapy Monitoring with examples, Adverse Drug Reaction Management; Drug and Poison Information, Medication history review and Patient Counseling; Patient Compliance, Patient Data Analysis and its Use in evaluation of Clinical Tests for Common Disease States and Organ Functional Tests (Liver, Pulmonary and Renal) for Drug Therapy; Definition and Differences of Generic and Prescription Drugs;

UNIT – IV

Basic Principles of Drug Therapy
Concepts of Essential Drugs and Rational Drug Use;
Drug Distribution: Out Patient and In Patient Services; Unit dose drug distribution systems, floor ward stock systems, satellite pharmacy services, central sterile services and bed side pharmacy;
Drug- Drug Interactions: Mechanism of Pharmacokinetic and Pharmacodynamic interactions with suitable examples; Food and Drug interactions. Incidence, Classification and Surveillance Methods of Adverse Reactions of Drugs; Therapeutic Aspects of Pharmaco Genetics;
Drug induced Disease – Dermatological, Hepatic, GI, Renal, Gout, Parkinsonism, Cancer, Depression, Psychosis, Ototoxicity, Ocular toxicity and Teratogenicity. Adverse drug reactions.

UNIT – V

Pharmaco Therapy of Diseases
Diseases: – Symptoms, Manifestation, Patho-Physiology and Etiology of - Gastrointestinal diseases: Peptic ulcer, Ulcerative colitis, Hepatitis & Cirrhosis (Liver). Cardio Vascular System diseases – Angina Pectoris, Acute Myocardial Infunction, Atherosclerosis, Essential Hypertension, Cardiac arrhythmia. Respirtory diseases – Asthma and T.B.; STD – HIV, Syphilis and Gonorrhea.; Anemia, Parkinsonism, Diabetes, Gout and Rheumatiod arthritis.
Pharmaco Therapy and Critical Analysis of Rational Use of Drugs in the following Disorders: Cardio Vascular, Respiratory, Renal, Gastro-Intestinal, Nervous, Psychiatric, Rheumatic, Hematological, Endocrine and Infections.

Examination: One question from each unit with internal choice.

Text Books

1. **Hospital Pharmacy by Hassan.**
2. **Clinical Pharmacy and Therapeutics by Herfindal, Herschnan.**
3. **Essential Clinical Medicine R.H. Salter.**

Reference Books

1. **Remington Pharmaceutical Sciences.**
2. **Drug Interaction by hamsten, Kven Stockley.**
3. **Clinical Pharmacology and Drug therapy Grahame Smith and Aronson.**
4. **Drug Interactions – J.K. Mehra, Basic Business Publishers, Bombay.**

CURRENT GOOD MANUFACTURING PRACTICE (cGMP)

Scheme of Instruction

Total Duration	: 45 hrs
Periods / Week	: 3
Credits	: 3
Instruction Mode	: Lecture
Subject Code	: PY.08.881.8.5.T

Scheme of Examination

Maximum Marks	: 100
Internal Exam	: 30
End Semester	: 70
Exam Duration	: 3 Hrs

Course Objectives

To learn the concepts and be able to implement validation processes, standards related to manufacturing, trade and communication as well as environment ; able to impart training in good manufacturing practices; to implement documentation procedures; and to implement validation in APIs and products.

Course Outcomes

The student will be able to know, Concepts of quality, quality management and its implementation. The concept of validation and validation of process, equipments and products. Regulatory guidance's and guidelines like ICH, WHO and other relevant documents. Documentation of BMR, MFR, DMF and relevant process related documents. Environment protection and occupational health safety requirements and requirements.

UNIT - I

cGMP of Pharmaceutical manufacturing: History, evolution and principles of cGMP, schedule-M, USFDA guidelines on pharmaceutical manufacturing. WHO recommendation for pharmaceutical products. Import and Export of pharmaceuticals.

UNIT – II

- **Pharmaceutical Equipments:** Selection, purchase, maintenance and clean in place, maintenance of stores for raw materials.
- **Packaging of Dosage Forms:** cGMP complied packaging and documentation, labelling requirements of various regulated and non-regulated markets for tablets, capsules, liquid orals, parenterals/ injectables, and semisolids.

UNIT – III

Introduction to ISO 9000 and 14000 Series: ISO 9000 & 14000 series, guidence to pharmaceutical manufacturing facilities, cGMP considerations with emphasis on documentation practices. Integration of modern management practices and principles of total quality management (TQM).

UNIT - IV

Calibration and validation: Introduction, definition and general principles of calibration, qualification and validation, Importance and scope of validation , types of validation, validation master plan. Calibration of pHmeter, qualification of UV-visible spectrophotometer, general principles of analytical method validation.

Warehousing: Good warehousing practice, material management.

UNIT - V

Validation: General concepts, types and approaches to validation, scope of validation and validation protocol. Relationship between calibration, validation and qualification. Validation master plan, qualifications of utilities - HVAC systems, validation of water

systems. Validation of manufacturing process for sterile and non-sterile products (briefly protocols and reports), Equipment qualification and cleaning validation.

Complaints: complaints and evaluation of complaints, handling of return goods recalling and waste disposal.

Documentation in Pharmaceutical Industry: Batch formula record, master formula record, distribution records. Common technical document and drug master files, medical devices, electronic common technical documentation.

RECOMMENDED BOOKS:

1. Good Manufacturing Practice Rationale and compliance by John Sharp
2. Pharmaceutical master validation plan: The ultimate guide to FDA, GMP and GLP Compliance by Syed Imitiaz Haider
3. Pharmaceutical dosage forms: Parenterals Vol-2, II Edition, by Kennetn EA and Leon Lachman
4. Packaging and Pharmaceuticals and health care products by H. Lockhart, Frank A. Paine
5. The process of new drug discovery and development. I and II Edition by Charles G. Smith, James T and O. Donnell.
6. Establishing a CGMP laboratory audit system- A Practical guide by David M. Bliesner.
7. J.F.Hanlon: Hand book of package engineering :Mac-Grawhill company
8. Good manufacturing practices: A plan total quality control: S.H.Wilhing, M.M. Tuckerman, S.Hitchings, Marcel Deckker, Inc. Yew york.
9. Cell therapy, CGMP, Facilities and Manufacturing, Springer

PHARMACOVIGILANCE

Scheme of Instruction		Scheme of Examination	
Total Duration	: 45 hrs	Maximum Marks	: 100
Periods / Week	: 3	Internal Exam	: 30
Credits	: 3	End Semester	: 70
Instruction Mode	: Lecture	Exam Duration	: 3 Hrs
Subject Code	: PY.08.881.8.5.T		

Scope: This paper will provide an opportunity for the student to learn about development ofpharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.

Objectives: *At completion of this paper it is expected that students will be able to (know, do, and appreciate):*

1. Why drug safety monitoring is important?
2. History and development of pharmacovigilance
3. National and international scenario of pharmacovigilance
4. Dictionaries, coding and terminologies used in pharmacovigilance
5. Detection of new adverse drug reactions and their assessment
6. International standards for classification of diseases and drugs
7. Adverse drug reaction reporting systems and communication in pharmacovigilance
8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle
9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation
10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India
11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
12. CIOMS requirements for ADR reporting
13. Writing case narratives of adverse events and their quality.

Unit I

Introduction to Pharmacovigilance

- History and development of Pharmacovigilance
- Importance of safety monitoring of Medicine
- WHO international drug monitoring programme
- Pharmacovigilance Program of India(PvPI)

Introduction to adverse drug reactions

- Definitions and classification of ADRs
- Detection and reporting
- Methods in Causality assessment
- Severity and seriousness assessment
- Predictability and preventability assessment
- Management of adverse drug reactions

Basic terminologies used in pharmacovigilance

- Terminologies of adverse medication related events
- Regulatory terminologies

- Management of adverse drug reactions

Basic terminologies used in pharmacovigilance

- Terminologies of adverse medication related events
- Regulatory terminologies

Unit II

Drug and disease classification

- Therapeutic and chemical classification of drugs
- International classification of diseases
- Daily defined doses
- International Non proprietary Names for drugs

Drug dictionaries and coding in pharmacovigilance

- WHO adverse reaction terminologies
- MedDRA and Standardised MedDRA queries
- WHO drug dictionary

Information resources in pharmacovigilance

- Basic drug information resources
- Specialised resources for ADRs

Establishing pharmacovigilance programme

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Contract Research Organisations (CROs)
- Establishing a national programme

Unit III

Vaccine safety surveillance

- Vaccine Pharmacovigilance
- Vaccination failure
- Adverse events following immunization

Pharmacovigilance methods

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

Unit IV

Safety data generation

- Pre clinical phase
- Clinical phase
- Post approval phase (PMS)

ICH Guidelines for Pharmacovigilance

- Expedited reporting
- Individual case safety reports

- Periodic safety update reports
- Post approval expedited reporting
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

Unit V

Pharmacogenomics of adverse drug reactions

- Genetics related ADR with example focusing PK parameters.

Drug safety evaluation in special population

- Paediatrics
- Pregnancy and lactation
- Geriatrics

CIOMS

- CIOMS Working Groups
- CIOMS Form

CDSCO (India) and Pharmacovigilance

- Schedule Y of D&C Act
- Differences in Indian and global pharmacovigilance requirements

Recommended Books (Latest edition):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance:Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Waller, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller,Wiley Publishers
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert,Jones& Bartlett Publishers.
7. Textbook of Pharmacoepidemiolog edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy,Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills:G. Parthasarathi, Karin NyfortHansen,Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal
11. http://www.whoumc.org/DynPage.aspx?id=105825&mn1=7347&mn2=7259&mn3=7297
12. http://www.ich.org/
13. http://www.cioms.ch/
14. http://cdsco.nic.in/
15. http://www.who.int/vaccine_safety/en/
16. http://www.ipc.gov.in/PvPI/pv_home.html
17. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna

PHARMACEUTICAL BIO TECHNOLOGY

Subject Code : PY.08.881.8.6.P **Sessional : 25**
Periods / Week: 4credits:2 **Examination : 50**
Nature of Exam: Practical **Exam Duration: 4 Hrs**

List of Experiments

1. **Standardization of cultures**
2. **Microbiological assay of Antibiotics / Vitamins**
3. **Production of alcohol by fermentation techniques**
4. **Immobilization of cells / enzymes by different techniques**
5. **Comparison of efficacy of immobilized cells.**
6. **Sterility testing of Pharmaceutical products.**
7. **Isolation of mutants by gradient plate technique.**
8. **Preparation of bacterial vaccine.**
9. **Preparation of blood products / human normal immunoglobulin injection**
10. **Extraction of DNA.**

Reference Books

1. **F.C. Garg, Experimental Microbiology, CBS Publishers, New Delhi, 2003.**
2. **R.S Gaud and G.D Gupta, Practical Microbiology, 6th Edition, Nirali Prakashan, Pune, 2006.**
3. **R.S Gaud, G.D Gupta and S.B. Gokhale, Practical Biotechnology, 2nd Edition, Nirali Prakashan, Pune, 2004.**
4. **Vinita Kale and Kishore Bhusar, Practical Microbiology Principles and Techniques, Himalaya Publishing House, Hyderabad, 2005.**

PHARMACOINFORMATICS PRACTICALS

Subject Code : PY.08.881.8.7.P **Sessional : 25**
Periods / Week : 4 credits:2 **Examination : 50**
Nature of Exam: Practicals **Exam Duration: 4 Hrs**

List of Experiments

Minimum 8 experiments of Exercise and Problem Solving of the following shall be conducted.

1. **Review of key internet sites for sequence analysis (Hypertext and World Wide Web)**
   - **Information search in WWW**
   - **Pharmaceutical resources in WWW**
   - **Retrieving and installing a program (Tree Tool)**
   - **Similarity Searching BLAST/FASTA**
   - **Multiple Sequence Alignment (CLUSTAL W and Bee)**
   - **Basic Sequence Analysis and Multiple Sequence Analysis**
   - **GCG sequence Analysis**
2. **Virtual Library**
   - **Searching MEDLINE on the PubMed System from the NCBI site**
   - **Searchingthe Science Citation Index and Current Contents Connect from the ISI**
   - **Accessing full text journals on the internet through INFLIBNET and other sources**
3. **Database and Search Tools**
   - **Types of indexing tools and search strategies**
   - **Literature evaluation Methods**
4. **Basic Programming in BioPERL**
5. **Problems related Gene Sequencing and Protein Sequencing**
6. **Basic Programming in SQL**

Reference Books

1. S Misener and SA Krawets, Bioinformatics: Methods & Protocols, Vol. 132, Human Press Inc, New Jersey, 2003.

2. SC Rastogi, N Mediratta and P Rastogi, Bioinformatics: Concepts, Skills & Applications, CBS Publishers & Distributors, New Delhi, 2004.

3. D Higgins and W Taylors, (ed) Bioinformatics – Sequence, Structure and Data-Banks – Practical Approaches, Oxford University Press, New Delhi, 2006.

4. WD Mount, Bioinformatics – Sequence and Genome Analysis, 2nd Edition, CBS. Publishers & Distributors, New Delhi, 2005.

5. I Bayrogs, SQL / PL/ SQL/ - The Programming Language of Oracle, 3rd Edition, BPB Publication, New Delhi, 2006.

6. DC Jamison, Perl Programming for Bioinformatics & Biologists, John Wiley & Sons Inc, New Delhi, 2004.

7. http: // blast. Ncbi nlm. Nih. Gov / blast. Csi. http: // www. ebi.ac.uk/.

COSMETIC TECHNOLOGY

Subject Code : PY.08.881.8.8.P **Sessional : 25**
Periods/week : 4 credits:2 **Examination : 50**
Nature of Exam : Practicals **Exam Duration: 4 Hrs**

List of Experiments

Preparation of the following products

1. **Cleansing creams**
2. **Vanishing creams**
3. **Shaving creams**
4. **Tooth paste**
5. **After shave lotion**
6. **Hand lotion**
7. **Baby lotion**
8. **Face powder / talcum powder / tooth powder / baby powder**
9. **Nail paint / Lip stick**
10. **Nail paint remover**
11. **Deodorant formulation.**

Reference Books

1. **B.M. Mithal and R.N Saha, Hand Book of Cosmetics, Vallabh Prakashan, New Delhi. 2006.**
2. **P.P. Sharma, Cosmetics: Formulation Manufacturing & Quality Control, Vandana Publications, Delhi, 2005.**
3. **W.A Poucher, Modern Cosmetics, Vol – I, II & III, B I Publications, New Delhi.**
4. **Anne Moung, Practical Cosmetic Science, Milh & Boon Ltd, London,**