

**Scheme & Syllabus of  
Bachelor in Pharmacy  
Batch 2011**



**By  
Department of Academics**

**Punjab Technical University**

**First Semester**

**Contact Hours 32 Hrs.**

Course Code	Course Name	L+T	P	Total Marks	
				Internal Marks	External Marks
<b>BTHU101</b>	Communicative English	2+1	-	20	80
<b>BPHM101</b>	Pharmacognosy-I	2+1	-	20	80
<b>BPHM 102</b>	Pharmaceutical Chemistry-I (Inorganic Pharmaceutical Chemistry)	3+1	-	20	80
<b>BPHM 103</b>	Pharmaceutical Analysis-I	3+1		20	80
<b>BPHM 104</b>	Computer Science & Application	2+1	-	20	80
<b>BPHM 105</b>	Introduction to Dosage Form	2+1	-	20	80
<b>BPHM 106</b>	Lab Pharmacognosy-I	-	3	20	80
<b>BPHM 107</b>	Lab Pharmaceutical Chemistry-I (Inorganic Pharmaceutical Chemistry)	-	3	20	80
<b>BPHM 108</b>	Lab Pharmaceutical Analysis-I	-	3	20	80
<b>BPHM109</b>	Lab Computer Science & Application		3	20	80
	Total	20	12	200	800
	<b>Grand Total</b>	<b>32H/Week</b>		<b>1000</b>	

**Second Semester**

**Contact Hours 32 Hrs.**

Course Code	Course Name	L+T	P	Total Marks	
				Internal Marks	External Marks
<b>HVPE101</b>	Human Values and Professional Ethics	2+1	-	20	80
<b>BPHM 201</b>	Pharmaceutics-I (Dispensing & Community Pharmacy)	2+1	-	20	80
<b>BPHM 202</b>	Pharmaceutical Chemistry-II (Physical Chemistry)	3+1	-	20	80
<b>BPHM 203</b>	Pharmaceutical Chemistry-III (Organic Chemistry)	3+1	-	20	80
<b>BPHM 204</b>	Anatomy, Physiology & Health Education-I	2+1	-	20	80
<b>BPHM205</b>	Pharmaceutics-II (Hospital Pharmacy)	2+1		20	80
<b>BPHM206</b>	Lab Pharmaceutics-I (Dispensing & Community Pharmacy)	-	3	20	80
<b>BPHM 207</b>	Lab Pharmaceutical Chemistry-II (Physical Chemistry)	-	3	20	80
<b>BPHM 208</b>	Lab Pharmaceutical Chemistry-III (Organic Chemistry)	-	3	20	80
<b>BPHM 209</b>	Lab Pharmaceutics-II (Hospital Pharmacy)	-	3	20	80
	Total	20	12	200	800
	<b>Grand Total</b>	<b>32H/W</b>		<b>1000</b>	

**Third Semester**

**Contact Hours 32 Hrs.**

Course Code	Course Name	L+T	P	Total Marks	
				Internal Marks	External Marks
<b>BPHM301</b>	Pharmaceutical Mathematics	3+1	-	20	80
<b>BPHM 302</b>	Pharmacognosy-II	2+1	-	20	80
<b>BPHM 303</b>	Pharmaceutics-III (Unit Operation-I)	2+1	-	20	80
<b>BPHM 304</b>	Anatomy, Physiology & Health Education-II	2+1	-	20	80
<b>BPHM 305</b>	Pharmaceutical Industrial Management	2+1	-	20	80
<b>BPHM 306</b>	Pharmaceutical Chemistry-IV (Organic Chemistry-II)	3+1		20	80
<b>BPHM 307</b>	Lab Pharmacognosy-II	-	3	20	80
<b>BPHM 308</b>	Lab Pharmaceutics-III (Unit Operation-I)	-	3	20	80
<b>BPHM 309</b>	Lab Anatomy, Physiology & Health Education-II	- -	3	20	80
<b>BPHM310</b>	Lab Pharmaceutical Chemistry-IV (Organic Chemistry-II)	- -	3	20	80
	Total	20	12	200	800
	<b>Grand Total</b>	<b>32H/W</b>		<b>1000</b>	

**Fourth Semester**

**Contact Hours 32 Hrs.**

Course Code	Course Name	L+T	P	Total Marks	
				Internal Marks	External Marks
<b>BPHM 401</b>	Pharmaceutics-IV (Unit Operation-II)	2+1	-	20	80
<b>BPHM 402</b>	Pharmaceutical Analysis-II	3+1	-	20	80
<b>BPHM 403</b>	Pharmacognosy-III	2+1	-	20	80
<b>BPHM 404</b>	Pathophysiology of Common Diseases	2+1	-	20	80
<b>BPHM 405</b>	Pharmaceutics-V (Physical Pharmacy)	3+1	-	20	80
<b>BPHM406</b>	Intellectual Property Rights	2+1	-	20	80
<b>BPHM 407</b>	Lab Pharmaceutics-IV (Unit Operation-II)	-	3	20	80
<b>BPHM 408</b>	Lab Pharmaceutical Analysis-II	-	3	20	80
<b>BPHM 409</b>	Lab Pharmacognosy-III	-	3	20	80
<b>BPHM 410</b>	Lab Pharmaceutics-V (Physical Pharmacy)	-	3	20	80
	Total	20	12	200	800
	<b>Grand Total</b>	<b>32H/W</b>		<b>1000</b>	

**Fifth Semester**

**Contact Hours 32 Hrs.**

Course Code	Course Name	L + T	P	Total Marks	
				Internal Marks	External Marks
<b>BPHM 501</b>	Pharmaceutical Chemistry-V (Biochemistry)	2+1	-	20	80
<b>BPHM 502</b>	Pharmaceutics-VI (Pharmaceutical Technology-I)	2+1	-	20	80
<b>BPHM 503</b>	Pharmacology-I	3+1	-	20	80
<b>BPHM 504</b>	Pharmacognosy-IV	2+1	-	20	80
<b>BPHM 505</b>	Pharmaceutics- VII (Biopharmaceutics & Pharmacokinetics)	3+1	-	20	80
<b>BPHM 506</b>	Lab Pharmaceutical Chemistry-V (Biochemistry)		3	20	80
<b>BPHM 507</b>	Lab Pharmaceutics-VI (Pharmaceutical Technology-I)		3	20	80
<b>BPHM 508</b>	Lab Pharmacology-I		3	20	80
<b>BPHM 509</b>	Lab Pharmacognosy-IV		3	20	80
<b>BPHM 510</b>	Lab Pharmaceutics- VII (Biopharmaceutics & Pharmacokinetics)		3	20	80
	Total	17	15	200	800
	<b>Grand Total</b>	<b>32H/W</b>		<b>1000</b>	

**Sixth Semester**

**Contact Hours 32 Hrs.**

Course Code	Course Name	L+T	P	Total Marks	
				Internal Marks	External Marks
<b>PBHU 601</b>	Communication Skills-II	2+1		20	80
<b>BPHM 602</b>	Pharmaceutical Chemistry-VI (Medicinal Chemistry-I)	3+1	-	20	80
<b>PHM 603</b>	Pharmaceutical Jurisprudence & ethics	2+1	-	20	80
<b>PHM 604</b>	Pharmacology-II	3+1	-	20	80
<b>PHM 605</b>	Pharmacognosy-V	2+1	-	20	80
<b>PHM 606</b>	Pharmaceutical Microbiology	2+1	-	20	80
<b>PHM 607</b>	Lab Pharmaceutical Chemistry-VI (Medicinal Chemistry-I)	-	3	20	80
<b>PHM 608</b>	Lab Pharmacology-II	-	3	20	80
<b>PHM 609</b>	Lab Pharmacognosy-V	-	3	20	80
<b>PHM 610</b>	Lab Pharmaceutical Microbiology	-	3	20	80
	Total	20	12	200	800
	<b>Grand Total</b>	<b>32H/W</b>		<b>1000</b>	

**Seventh Semester**

**Contact Hours 31 Hrs.**

Course Code	Course Name	L+T	P	Total Marks	
				Internal Marks	External Marks
<b>BPHM701</b>	Pharmaceutical Biotechnology	2+1	-	20	80
<b>BPHM702</b>	Pharmaceutics-VII (Pharmaceutical Technology-II)	2+1	-	20	80
<b>BPHM703</b>	Pharmacology-III	2+1	-	20	80
<b>BPHM704</b>	Pharmaceutical Chemistry-VII (Medicinal Chemistry-II)	3+1	-	20	80
<b>BPHM705</b>	Lab Pharmaceutical Biotechnology	-	3	20	80
<b>BPHM706</b>	Lab Pharmaceutics-VII (Pharmaceutical Technology-II)	-	3	20	80
<b>BPHM707</b>	Lab Pharmacology-III	-	3	20	80
<b>BPHM708</b>	Lab Pharmaceutical Chemistry-VII (Medicinal Chemistry-II)	-	3	20	80
<b>BPHM709</b>	Project Work	-	6	20	80
<b>BPHM710**</b>	Industrial Training	-	-	20	80
	Total	13	18	200	800
	<b>Grand Total</b>	<b>31H/W</b>		<b>1000</b>	

**Eighth Semester**

**Contact Hours 36Hrs.**

Course Code	Course Name	L+T	P	Total Marks	
				Internal Marks	External Marks
<b>BPHM801</b>	Pharmaceutics-IX (Dosage Form Design)	3+1	-	20	80
<b>BPHM802</b>	Pharmaceutical Analysis-III	2+1	-	20	80
<b>BPHM803</b>	Pharmacognosy-VI	2+1	-	20	80
<b>BPHM804</b>	Pharmacology-IV (Clinical Pharmacy & Drug Interaction)	3+1	-	20	80
<b>BPHM805</b>	Pharmaceutical Chemistry-VIII (Medicinal Chemistry-III)	3+1	-	20	80
<b>BPHM806</b>	Lab Pharmaceutics-IX (Dosage Form Design)	-	3	20	80
<b>BPHM807</b>	Lab Pharmaceutical Analysis-III	-	3	20	80
<b>BPHM808</b>	Lab Pharmacognosy-VI	-	3	20	80
<b>BPHM809</b>	Lab Pharmaceutical Chemistry-VIII (Medicinal Chemistry-III)	-	3	20	80
<b>BPHM810</b>	Dissertation on Project Work	-	6	20	80
	Total	18	18	200	800
	<b>Grand Total</b>	<b>36/H/W</b>		<b>1000</b>	

*Note: At least two sessional exams to be conducted, the best of two will be considered in final exam*

\* Indicates an exercise of interaction of the students with the respective teacher in the classes. The students would express their difficulties, understanding the subject.

\*\*Industrial Training of four weeks in summer vacations after 6<sup>th</sup> Semester & evaluation in 7<sup>th</sup> Semester

# *First Semester*

## BTHU 101 Communicative English

### Objective/s and Expected outcome:

The objective is to help the students to become independent users of English language. Students should be able to understand spoken and written English language of varied complexity on most including some abstract topics; particularly the language of their chosen technical field. They must show awareness of appropriate format and a capacity for explaining their views in a rational manner. The students should be able to converse fluently, without strain with international speakers of English in an accent and lexis that is widely understood across the globe. They will be able to produce on their own texts which are clear and coherent.

- 1. Reading:** Reading texts of varied complexity; speed reading for global and detailed meaning; processing factual and implied meanings
- 2. Vocabulary:** Building up and expansion of vocabulary; active use of the prescribed expressions in the appropriate context
- 3. Grammar:** Revising and practicing a prescribed set of grammar items; using grammar actively while processing or producing language
- 4. Writing:** The qualities of good writing; Learning the prescribed written expressions of conventional use; writing business letters, emails; reports, summaries and various forms of descriptive and argumentative essays

### Learning and Teaching Activities:

#### PART A (Reading)

The prescribed reading textbook for students will be S. P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD), Orient Blackswan. They will go through the reading texts themselves with the help of a dictionary or word power as given at the end. As they progress from one reading to another they should learn to read fast with greater degree of understanding of both concrete and abstract topics. While taking up the textbook lessons in the classroom, the teacher shall ensure that students can do the following:

- i. Identify the significant points and conclusions as given in the text.
- ii. Handle large texts (even outside the prescribed book) with overall comprehension of the links between arguments and the finer distinction between stated and implied meanings.
- iii. Generally read the stance or the point of view of the writer and present it in the form of a summary

- iv. Use the vocabulary learnt in the lessons (especially given in 'word power') productively in various writing tasks as suggested at the end of each lesson.
- v. Profitably use the grammatical items as discussed at the end of each lesson while producing language for communication.

Besides the textbook, the teacher must insist that students extend their reading by taking up additional texts of their own choice.

### **PART B (Writing)**

In addition to the various exercises given at the end of each lesson of Dhanavel's book, the teacher shall use Anne Laws Writing Skills, Orient Blackswan to teach the language and conventions of writing. The students must learn the language that expresses various cognitive functions that are frequently used in writing. With the help of the teacher who will give them adequate practice, the students should be able to:

- i. Convey information on concrete or abstract topics with clarity and precision.
- ii. Write about objects or events with appropriate detail in both descriptive and narrative form.
- iii. Explain ideas and build up arguments with adequate support in a convincing manner.
- iv. Use language with some degree of flexibility in consideration to the reader.
- v. Produce effectively such forms of professional writing as business letter, emails, notes, memos, reports summaries etc.

While teaching, the teacher must inculcate in students the habit of revising their writing. The teacher can also use and recommend the relevant sections of the following books for developing writing skills in students.

### **Suggested Readings/ Books**

1. Vandana R Singh, The Written Word, Oxford University Press, New Delhi
2. KK Ramchandran, et al Business Communication, Macmillan, New Delhi
3. Swati Samantaray, Business Communication and Communicative English, Sultan Chand, New Delhi.
4. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD)

## BPHM 101 Pharmacognosy-I

### PART-A

1. Definition, history, scope and development of Pharmacognosy. (02)
2. **Sources of drugs:** Biological, marine, mineral and plant tissue culture as sources of drugs. (03)
3. **Plant Cell, Histology and Morphology:** Structure of plant cell and its non-living inclusions; different types of plant tissues and their functions. Morphology and histology of root, stem, bark, wood, leaf, flower, fruit and seed. Modifications of root and stem. (04)
4. **Classification of drugs:** Alphabetical, morphological, taxonomical, chemical and pharmacological. (02)
5. **Plant taxonomy:** Study of the following families with special reference to medicinally important plants-Apocynaceae, Solanaceae, Rutaceae, Umbelliferae, Leguminosae, Rubiaceae, Liliaceae, Graminae, Libiatae, Cruciferae, Papaveraceae. (10)

### PART-B

6. **Cultivation, collection, processing and storage of crude drugs:** Factors influencing cultivation of medicinal plants. Polyploidy, mutation and hybridization with reference to medicinal plants (04)
7. **Quality control of crude drugs:** Adulteration of crude drugs. Brief introduction to evaluation of crude drugs by organoleptic, microscopic, physical, chemical and biological methods. Introduction to crude drug monograph and its importance in registration of herbal products. (08)
8. **Introduction to Phytoconstituents of drugs:** Definition, classification and properties and identification tests of alkaloids, glycosides, terpenoids, steroids and flavonoids. (05)
9. **Introduction to Chromatographic Techniques:** Column, Paper, Thin Layer (TLC). (02)

### Suggested Readings/ Books:

1. Trease, G. E. and Evans, W.C. Pharmacognosy, Published by Elsevier, a Division of Reed Elsevier India Pvt. Ltd., New Delhi.
2. Kokate, C.K., Purohit, A.P. and Gokhale, S.B Pharmacognosy, Nirali Prakashan, Pune.
3. Handa, S.S and Kapoor, V.K. Textbook of Pharmacognosy, Vallabh Prashan, New Delhi.

4. Wallis, T.E. Textbook of Pharmacognosy, Fifth Edition, CBS Publishers and Distributors, New Delhi.
5. Tyler, V.C., Brady, L.R. and Robers, J.E. Pharmacognosy. Lea & Febiger, Philadelphia.
6. Tyler, V.E. Jr. and Schwarting, A.E. Experimental Pharmacognosy. Burgess Pub. Co, Hinneapois, Minnesota
7. Brain, K.R. and Turner, T.D. The Practical Evaluation of Phytopharmaceuticals. Wright-Scientifica, Bristol.

## BPHM 102 Pharmaceutical Chemistry-I

### PART-A

1. Impurities in Pharmaceutical Substances & their control sources and types of impurities, their limits, limit test for chlorides, sulphates, iron, lead, arsenic & heavy metals (04)
2. **Pharmaceutical Aids & Necessities**
  - a. **Antioxidants:** Theory, the selection of Antioxidants, Official antioxidants (Hypophosphorous Acid, Sodium bisulphite, Sodium thiosulphate, Sodium nitrite) (03)
  - b. **Water:** Official water (Water, Purified water, Water for injection, Bacteriostatic water for injection, Sterile water for injection) (03)
3. **Major Intra & Extracellular Electrolytes:**

Major Physiological ions (Chloride, Phosphate, Bicarbonate, Sodium, Potassium, Calcium, Magnesium); Electrolytes used in replacement therapy (Sodium chloride), Potassium replacement (potassium chloride), Calcium replacement (Calcium chloride, Calcium gluconate) Parenteral magnesium administration (Magnesium sulphate), Physiological acid base balance, Electrolytes used in acid base therapy (Sodium acetate, Potassium acetate, Sodium bicarbonate, Sodium citrate, Potassium citrate, Sodium lactate, Ammonium chloride), Electrolyte combination therapy. (07)
4. **Essential and Trace Elements:**

Iron, Copper, Zinc, Chromium, Manganese, Molybdenum, Selenium, Sulphur and Iodine. Official Iodine Products (Iodine, Potassium iodide, Sodium iodide). (03)
5. **Gastrointestinal Agents**
  - a. **Acidifying agents, Antacids:** (Sodium bicarbonate, Aluminium hydroxide, Aluminium phosphate, Dihydroxy Aluminium, Sodium carbonate, Calcium carbonate, Tribasic Calcium phosphate, Magnesium carbonate, Magnesium hydroxide, Magnesium oxide, Magnesium phosphate, Magnesium trisilicate) Combination antacid preparations. (05)  
**Protectives and Adsorbents:** Introduction. Bismuth containing products, Bismuth subnitrate, Bismuth subcarbonate, Kaolin, Activated charcoal. (02)
  - b. **Saline Cathartics:** Introduction, Sodium phosphate, Potassium sodium tartrate, Magnesium hydroxide, Magnesium citrate, Magnesium sulphate, Potassium phosphate, Potassium bitartrate, Calomel. (04)

## PART-B

### 6. Topical Agents

- a. **Protective:** Definition, Protective products, Talc, Insoluble Zinc compounds (Zinc oxide, Calamine, Zinc stearate), Titanium dioxide, Aluminium as a protective agent, Silicone polymer. **(04)**
  - b. **Antimicrobials and Astringents:** Antimicrobial terminology, mechanism of action, control of antimicrobial/ astringent action. **(03)**
  - c. **Oxidative Antimicrobial Agents:** Hydrogen peroxide, Zinc peroxide, Sodium carbonate, Potassium permanganate, Iodine preparation and compounds. **(03)**
  - d. **Protein Precipitant Antimicrobial Agents:** Silver nitrate, Mild Silver Protein Mercury compounds (Yellow Mercuric oxide, Mercuric chloride), Sulphur and Sulphur compounds (Sublimed sulphur and Precipitated sulphur) Boric acid and Sodium borate, Antimony potassium tartrate, Official compounds of Aluminium and Zinc. **(05)**
7. **Dental Products:** Anticaries agents: Fluorides, official products (Sodium fluoride, Stannous fluoride), Phosphates, Dentifrices: Dentifrices containing Fluorides, Official products (Pumice). Dentifrices containing desensitizing agents, Official products (Zinc chloride and Zinc-Eugenol cement). **(04)**
8. **Co-ordination Compounds and Complexation:** Theoretical considerations and official products (Calcium disodium edetate, Disodium edetate, Dimercaprol & Penicillamine) **(03)**
9. **Miscellaneous Inorganic Pharmaceutical Agents:** Inhalants, respiratory stimulants, expectorants and emetics, antidotes, tableting aids and suspending agents. **(02)**

### Suggested Readings/ Books:

1. J.H. Block, E. Roche, T.O. Soine and C.O. Wilson, "Inorganic Medicinal and Pharmaceutical Chemistry", Lea & Febiger, Philadelphia, P.A.
2. L.M. Artherden, Bentley and Drivers, "Textbook of Pharmaceutical Chemistry", S& Ed., Oxford University Press, Delhi.
3. Pharmacopoeia of India, Govt. of India, Ministry of Health.
4. Block, Roche, Soine & Wilson. Inorganic Medicinal & Pharmaceutical Chemistry. 1<sup>st</sup> edition, 1986. Varghese publishing house, Mumbai.
5. Chatwal. Pharmaceutical Chemistry Inorganic. 3<sup>rd</sup> edition, 2007. Himalaya publishing house, Mumbai.
6. Singh & Kapoor. Practical Pharmaceutical chemistry. 4<sup>th</sup> edition, 1998. Vallabh prakashan, Delhi.

## BPHM103 Pharmaceutical Analysis-I

### PART-A

- 1. Quantitative Analysis and Data Handling:** Introduction to concept of Quality Control and Assurance in Pharmaceutical Industry and role of Statistics in pharmaceutical analysis. Significance of quantitative analysis in quality control, different techniques of analysis, preliminaries and definitions, significant figures. Rules for retaining significant figures, Types of errors (Determinate and Indeterminate). Minimization of errors, Propagation of errors in addition and subtraction, multiplication and division, exponents, logarithms, precision and accuracy, selection of sample. **(10)**
- 2. Acid Base Titrations:** Acid base concept, role of the solvent, Relative strengths of acids and bases; Law of mass action; common ion effect, ionic product of water, pH, Hydrolysis of salts, Handerson – Hasselbach equation; Buffer and buffer capacity: Acid base indicators, Theory of indicators, Choice of indicators; Neutralization curves (Strong acid and strong base, strong acid weak base, weak acid strong base and weak acid weak base) Polyprotic system, dissociation calculations for polyprotic acids, fractions and equilibrium concentrations of dissociating species at a given pH, salts of polyprotic acids, (Amphoteric salts and unprotonated salts), Buffer calculations for polyprotic acids, titrations of polyprotic acid, amino acid system and its titrations. Application in assay of  $H_3BO_3$ , HCl, NaOH and  $Na_2CO_3$ . **(10)**

### PART-B

- 3. Oxidation-Reduction Titrations:** Concepts of oxidation and reduction, redox reactions, equivalent weights of oxidizing and reducing agents, electrochemical cells, reduction potential, standard reduction potential, Nernst equation, cell representations, measurement of electrode potential and its application in determining the equilibrium constant of a reaction, concept of formal potential, oxidation reduction curves, redox indicators, potassium permanganate titrations, iodimetry and iodometry, ceric sulphate titrations, potassium iodate titrations, sodium 2, 6- dichlorophenol - indophenol titrations, pharmaceutical applications. **(10)**
- 4. Precipitation Titrations**  
Precipitation reactions, solubility product, effects of common ion, acids, temperature and solvent upon the solubility of a precipitate, conditional solubility

product, fractional precipitation, argentometric titrations, ammonium or potassium thiocyanate titrations, mercuric nitrate titrations, indicators, Gay-Lussac method, Mohr's method, Volhard's method, Fajan's method, Pharmaceutical applications.

(12)

- 5. Gravimetric Analysis:** Precipitation techniques, the colloidal state, gravimetric factor, supersaturation, co-precipitation and its types, Post precipitation, digestion, washing of the precipitate, filtration, filter papers and crucibles, ignition, thermogravimetric curves of copper sulphate, specific examples like barium as barium sulphate, aluminium as aluminium oxide, calcium as calcium oxalate and magnesium as magnesium pyrophosphate, organic precipitants. (5)

**Suggested Readings/ Books:**

1. Becket & Stenlake. Practical Pharmaceutical Chemistry. Vol. 1 & 2. 4th edition, 2005. CBS Publishers, New Delhi.
2. Jeffery, Bassett & Mendham. Vogel's text book of Quantitative chemical analysis. 5th edition, 1996. Addison Wesley Longman Ltd England.
3. Danzer K, Analytical Chemistry, 2007, Springer.
4. R.M. Verma. Analytical Chemistry. IIIrd edition, 2007. CBS Publishers, New Delhi.
5. Alexeyev. Qualitative Analysis. 2<sup>nd</sup> edition, 2005. CBS Publishers, New Delhi.
6. L. M. Atherden, Bentley and Driver's Textbook of Pharmaceutical Chemistry, Oxford University Press, Delhi (Latest Edition).

## BPHM 104 Computer Science and Applications

**Scope of the Subject:** Subject deals with computer fundamentals and operating system. Computer applications are expected to offer various pharmaceutical services as drug information services, drug design and pharmacokinetic analysis.

**Objectives of the Subject:** Upon completion of the subject student shall be able to

- understand the basic MS-Word, MS- Excel and MS- Power point.
- know computer programming, data analysis, calculation and graphing using formulae and function.

### PART-A

#### 1. Computer Fundamentals:

**a. Introduction to Computers:** Characteristics of computers, Historical perspectives of computers, Computer generations, types of computers and uses, Software, Hardware, Basic architecture and functions of CPU and its parts, Important I/O devices like Keyboard, Mouse, Printers, Video Monitors. **(2)**

**b. Number System:** Decimal, Binary, Basic Binary arithmetic (Conversion to and from decimal numbers, Binary addition and subtraction). **(4)**

**c. Memory Storage:** Memory Cells, Semiconductor and Magnetic core memory, ROM (its types), RAM, Cache and Virtual memory, Secondary storage devices and their organization (Hard disk, Floppy disk, CD, DVD). **(4)**

#### 2. Operating Systems:

Definitions, Need, Organization, Functions, Types of Operating Systems, DOS, Windows, Handling Drives, Directories and files, Commands (Internal & External), Icons, Clipboard, Folders, Major differences between DOS & Windows. **(5)**

**3. Communication Networks :** Hardware and software components, Seven layers of OSI architecture, Network Topologies (Ring, Star, Fully Connected and Bus), LAN and WAN, Bounded and unbounded communication media, Internet, World Wide Web and I.T., Browsers, Important terminology regarding Internet applications, Electronic Mail, Potential uses and abuses of Internet. **(5)**

### PART-B

**4. Computer Programming :** Programming languages, Classifications, Low level and high level languages, merits and demerits of languages, object oriented languages, Syntax and semantics, Basic steps involved in software development, Flow charts, Compilers and Interpreters. **(4)**

**5. Simple programming using 'C'** Data types, Constants, Variables, Arithmetic and relational expressions, Symbolic constants, Input and output assignment statements, If-else, Switch statements, Loops ( While, do-while and for), Transfer statements, Problem solving using 'C' taking simple algorithms. **(8)**

**6. Computer Applications:**

- a. **Word Processing:** Techniques, File manipulation, Formatting, Printing setups Table handling, Mail merge, etc. using MS-Word **(2)**
- b. **Spreadsheet Package:** Worksheets, Formatting sheets, Calculations and graphing using formulae and functions, Import and export of data using MS-Excel. **(2)**
- c. **Graphics:** Objectives and types of graphics , Presentation packages, Slides designing, Diagrams and graphs, Import & Export data using MS-Power Point. **(2)**
- d. **Data Security against Viruses:** Definition of computer viruses, Detection, prevention and cure against viruses using anti-virus software packages. **(2)**
- e. **Pharmaceutical Applications:** Basics of computer use in various pharmaceutical and clinical applications like drug information services, hospital and community pharmacy, drug design, pharmacokinetics and data analysis. **(2)**

**Suggested Readings/ Books:**

- 1. Fundamentals of Computers by Rajaraman, Prentice Hall of India.
- 2. Tiwari, NK, Computer Fundamental with Pharmacy Applications, 1st edition, 2008, Pharm Med Press
- 3. Learn MS-Office 2000 by Stultz, BPB Publications. 4. Using Microsoft Windows 1998 by Ivens, Prentice Hall of India.
- 4. Learn DOS in a day by Stultz, BPB Publications.

## BPHM 105 Introduction to Dosage Form

**Scope and objectives:** Subject deals with the basic knowledge of Pharmacopoeias, monographs, history of pharmacy and basic knowledge of different dosage forms. It prepares the students for most basics of the applied field of pharmacy.

**Objectives of the Subject:** Upon the completion of the course the student should be able to -

- know about the pharmacopoeias and the role of pharmacist.
- understand about pharmacy and brief about the dosage forms
- know various additives and technical terms commonly used in the field of pharmacy.
- know the method of preparation of extracts and principle of infusion, decoction etc.

### PART-A

- 1. Pharmacy Profession:** History of Pharmacy, Pharmacy as a career, Pharmaceutical education in India and abroad, Pharmacopoeia of India and other Pharmacopoeias, Other official books. **(4)**
- 2.** Introduction to different dosage forms, their classification with examples (Official formulation), their relative application. **(5)**
- 3.** Definitions, general formulation, manufacturing procedures and official products of solutions, aromatic waters, syrups, spirits, elixirs, glycerides, lotions, liniments, gargles, mouth washes, douches, draught preparation. **(10)**

### PART-B

- 4. Additive of dosage forms:** Introduction, classification and uses of following additives in formulation of different dosage forms: preservatives, antioxidants, surfactants, hydrocolloids, Diluents, binders, lubricants, organoleptic additives. **(6)**
- 5. Crude Extracts:** Infusion, decoction, tincture, and extracts, methods of preparation of dry, soft and liquid extracts of IP. **(5)**
- 6. Allergenic extracts:** Types of allergens, preparation of extracts testing and standardization of extracts. **(5)**
- 7. Important terms of Pharmaceutics:** Definition and examples of expectorant, pharmaceutical aid, additives. **(5)**

### Suggested Readings/ Books:

1. Remington's Pharmaceutical Sciences.
2. Pharmacopoeia of India, Govt. of India, Ministry of Health
3. Ansel : Introduction to Pharmaceutical Dosage Forms

### **BPHM 106 Lab Pharmacognosy-I**

1. Preparation, microscopic examination of stem, root and leaf of monocot and dicot plants. Morphological characteristics of plant families mentioned in Theory.
2. Microscopic measurements of cells and cell contents: Starch grains, calcium oxalate crystals and phloem fibres.
3. Determination of leaf constants such as stomatal index, stomatal number, veinislet number, vein-termination number and palisade ratio.
4. Identification of crude drugs belonging to carbohydrates and lipids.
5. Preparation of herbarium sheets.

### **BPHM 107 Lab Pharmaceutical Chemistry-I**

The background and systematic qualitative analysis of inorganic mixtures of up to four radicals. Six Mixtures to be analyzed, preferably by semi-micro methods. All identification tests for pharmacopoeal inorganic pharmaceuticals and qualitative tests for cations & anion should be covered.

Limit test for some selected compounds.

### **BPHM 108 Lab Pharmaceutical Analysis-I**

The students should be introduced to the main analytical tools through demonstrations. They should have a clear understanding of a typical analytical balance, the requirements of a good balance, weights, care and use of balance, methods of weighing and errors in weighing. The students should also be acquainted with the general apparatus required in various analytical procedures.

1. Standardization of analytical weights and calibration of volumetric apparatus.
2. **Acid base Titrations** : Preparation and standardization of acids and bases; some exercises related with determination of acids and bases separately or in mixture form, some official assay procedures e.g. boric acid should also be covered.
3. **Oxidation Reduction Titrations** : Preparation and standardization of some redox titrants e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate, etc. Some exercises related to determination of oxidizing and reducing agents in the sample shall be covered. Exercises involving potassium iodate, potassium bromate, iodine solution, titanous chloride, sodium 2, 6- dichlorophenol indophenol, and ceric ammonium sulphate.

**4. Precipitation Titrations** : Preparation and standardization of titrants like silver nitrate and, ammonium thiocyanate, Titrations according to Mohr's, Volhard's and Fajan's methods.

**5. Gravimetric Analysis** : Preparation of gooch crucible for filtration and use of sintered glass crucible, Determination of water of hydration, Some exercises related to gravimetric analysis should be covered.

### BPHM109 Lab Computer Science & Applications

Aim	Titles
Aim 01	Give the various components, their functions and identification of various parts of a computer and peripherals. Perform installation of a computer and loading system software and application software.
Aim 02	Installation of DOS and simple exercises on TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP commands.
Aim 03	Exercises on entering text and data (Typing Practice) Features of Windows as an operating system.
Aim 04	File Management using Ms Word, Page set up using Ms Word Editing a document using Ms Word.
Aim 05	Formatting a document using Ms Word Tables and Borders using Ms Word Working with more than one window in MS Word
Aim 06	Perform application of MS Excel
Aim 07	Application of Menu commands, Work books and Creating a chart
Aim 10	Customize MS-Excel
Aim 11	Introduction to MS-Power Point and use of Wizards and Templates Preparing Presentations.
Aim 12	Prepare and submit a scientific power point presentation using various effects and application of power point
Aim 13	Prepare a program in C language to find sum of any two numbers.
Aim 14	Prepare a program in C language to find gross salary
Aim 15	Prepare a program in C language to find table (mathematical) of any number.
Aim 16	Prepare a program in C language to find greatest in 3 numbers
Aim 17	Prepare a program in C language to show the use of conditional operator
Aim 18	Program to find that entered year is leap year or not
Aim 19	Prepare a program in C language to find whether given no is even or odd
Aim 20	Display the kind of output on screen (in the left of the screen) 1 22 333 4444
Aim 21	Write a C program to find the sum of first 100 natural number.
Aim 22	Prepare a program in C language to find the sum of first 100 odd or even numbers.
Aim 23	Write a C program to display first 25 Fibonacci number.
Aim 24	Write a C program to display first 100 prime numbers
Aim 25	Write a C program to find factorial numbers and to print the accepted no and its reverse numbers

# *Second Semester*

## HVPE 101 Human Values & Professional Ethics

### Objective and Expected Outcome:

The subject will help the students to discriminate between the valuable and superficial in the life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life - this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability, it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing) - it concentrates on providing to its students the skills to do things. In other words, it concentrates on providing "How to do" things. The aspects of understanding "What to do" or "Why something should be done" is assumed. No significant cogent material on understanding is included as a part of the curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course is an effort to fulfill our responsibility to provide our students this significant input about understanding. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. It has been experimented at IITB, IITK and UPTU on a large scale with significant results.

### PART A

#### 1. **Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** (6)

- Understanding the need, basic guidelines, content and process for Value Education.
- Self Exploration—what is it?- its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

- Method to fulfill the above human aspirations: understanding and living in **harmony** at various levels.

## **2. Understanding Harmony in the Human Being - Harmony in Myself! (6)**

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - *Sukh* and *Suvidha*
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure *Sanyam* and *Swasthya*

## **3. Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship (6)**

- Understanding harmony in the Family- the basic unit of human interaction
- Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
- Understanding the meaning of *Vishwas*; Difference between intention and competence
- Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha* )- from family to world family.

### **PART-B**

## **4. Understanding Harmony in the Nature and Existence - Whole existence as Co-existence (4)**

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
- Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
- Holistic perception of harmony at all levels of existence

## **5. Implications of the above Holistic Understanding of Harmony on Professional Ethics**

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics:
  - Ability to utilize the professional competence for augmenting universal human order
  - Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems
  - Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
  - At the level of individual: as socially and ecologically responsible engineers, technologists and managers
  - At the level of society: as mutually enriching institutions and organizations

**Text Book:**

1. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.

**Suggested Readings / Books:**

1. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
3. A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
6. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers
7. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome’s report*, Universe Books.
9. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers*, Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd
11. B P Banerjee, 2005, *Foundations of Ethics and Management*, Excel Books.
12. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.

## BPHM 201 Pharmaceutics –I (Dispensing and Community Pharmacy)

### Objective/s and Expected Outcome:

#### PART-A

1. **Introduction:** Definition, Scope and future trends in Dispensing (2)
2. **Prescription:** Definition, various part of prescription, Handling of prescription, source of errors in prescription, General dispensing procedures including labelling of dispensing products. (4)
3. **Pharmaceutical calculations:** Posology, calculation of doses for infants, adults and elderly patients; Enlarging and reducing recipes percentage solutions, allegation, alcohol dilution, proof spirit, isotonic solutions and displacement value. (10)
4. **Principles involved and procedures adopted in dispensing of:** Typical prescriptions like mixtures, solutions, emulsions, creams, ointments, powders, capsules, pastes, jellies, suppositories, ophthalmic, pastilles, lozenges, pills, lotions, liniments, inhalations, paints, sprays, tablet triturates etc. (18)

#### PART-B

5. **Incompatibilities:** Physical, therapeutic and chemical incompatibilities, inorganic incompatibilities including incompatibilities of metals and their salts, non-metals, acids, alkalis, organic incompatibilities. Purine bases, alkaloids, pyrazolone derivatives, amino acids, quaternary ammonium compounds, carbohydrates, glycosides, anaesthetics, dyes, surface active agents, correction of incompatibilities. Therapeutic incompatibilities. (7)
6. **Community Pharmacy:** Organization and structure of retail and wholesale drug store- types of drug store and design, legal requirements for establishment, maintenance and drug store, dispensing of proprietary products, maintenance of records of retail and wholesale, patient counselling, role of pharmacist in community healthcare & education.(7)

### Suggested Readings/ Books:

1. Carter SJ. "Cooper & Gunn's Tutorial Pharmacy", 6<sup>th</sup> edition, CBS Publishers & Distributors, New Delhi.
2. Indian Pharmacopoeia 2007, Vol I-III, 2008, Indian Pharmacopoeia Commission, Ghaziabad.
3. British Pharmacopoeia 2009, British Pharmacopoeia Commission, UK.
4. Remington's The Science & Practice of Pharmacy Mack Publishing Co. Easton, PA
5. Jain NK & Gupta GD. Modern Dispensing Pharmacy, II edition, 2009, Pharma Book Syndicate, Hyderabad
6. Gaud RS & Gupta GD. Practical Pharmaceutics, 1<sup>st</sup> edition, Reprint 2008, , CBS Publishers & Distributors, New Delhi.

## BPHM 202 Pharmaceutical Chemistry –II (Physical Chemistry)

### Objective/s and Expected Outcome:

#### PART-A

1. **Behaviour of Gases:** Kinetic theory of gases, Deviation from ideal behaviours and explanation. (5)
2. **The Liquid State:** Physical Properties (surface tension, parachor, viscosity, refractive index, optical rotation, dipole moments and chemical constituents). (5)
3. **Solutions:** Ideal and real solutions, solutions of gases in liquids, colligative properties, partition coefficient, conductance and its measurement, Debye Huckel Theory. (6)
4. **Thermodynamics:** First, Second and Third laws, Zeroth law, Absolute Temperature Scale, Thermochemical Equations, Phase-equilibria and Phase rule. (12)

#### PART-B

5. **Adsorption:** Freundlich and Gibbs adsorption, isotherms, Langmuir theory of adsorption (5)
6. **Photochemistry:** Consequences of light absorption, Jablenski diagram, Lambert-Beer Law, Quantum efficiency. (5)
7. **Chemical Kinetics:** Zero, first and second order reactions, complex reactions, theories of reaction kinetics, characteristics of homogeneous and heterogeneous catalysis, acid base and enzyme catalysis. (12)
8. **Quantum Mechanics:** Postulates of quantum mechanics, operators in quantum mechanics, the Schrodinger wave equation. (5)

### Suggested Readings / Books:

1. Laidler, K.J. Physical Chemistry with Biological Applications. Benjamin. 1980
2. Shoemaker, D.P. and Garland, C.W. Experiments in Physical Chemistry. McGraw Hill Book Co. New York.
3. Puri, B.R., Sharma, L.R. and Pathania, M.S. Principles of Physical Chemistry. Shoban Lal Nagin Chand & Co. 1993
4. Bahl, Bahl & Tuli. Essentials of Physical Chemistry. 14<sup>th</sup> edition, 2006. S. Chand & company, New Delhi.
5. Khosla, Garg & Gulati. Senior practical physical chemistry. 12<sup>th</sup> edition, 2006. R. Chand & company, New Delhi.
6. Mahadik & Bhosale. Hand book of practical chemistry. 9<sup>th</sup> edition, 2006. Nirali prakashan, Pune.

## BPHM 203 Pharmaceutical Chemistry –III (Organic Chemistry)

### Objective/s and Expected Outcome:

#### PART-A

- 1. Structure and Properties of Matter:** The structural theory, the chemical bond, quantum mechanics, atomic orbitals, electronic configuration, molecular orbitals, intramolecular forces, bond dissociation energy, polarity of bonds, polarity of molecules, structure and physical properties including melting point, boiling point and solubility, acids and bases, isomerism. **(6)**
- 2. Stereochemistry:** Introduction, stereoisomerism, enantiomerism, diastereoisomerism, optical activity, chiral center, racemic modification, meso-structures, configuration, reactions involving stereoisomers, stereoselective and stereospecific reactions. **(8)**
- 3. Role of Solvent:** Secondary bonding, solubility of non-ionic and ionic solutes, protic and aprotic solvents, ion pairs, role of solvent in substitution reactions, phase-transfer catalysis. **(3)**

#### PART-B

#### 4. Structure, Nomenclature, Preparation & Reactions of the following:

Reactive Intermediate carbo cation; carbanions; carbenes, nitrene and nitrenium ions are to be discussed whichever involved.

- **Alkanes:** Introduction, Shapes, Nomenclature, Preparation, Halogenation(Chain Reaction), Analysis **(2)**
- **Alkenes & Alkynes:** Introduction, Properties, Preparation(Elimination reaction), Electrophillic Reaction, Ozonolysis, Markornikovas rule, peroxide effect, Analysis **(3)**
- **Cyclic Analogs:** Baeyer strain theory, cyclopropane & cyclobutane, Angle Strain, cyclic ethers, crown ethers, epoxides, their analysis. **(2)**
- **Alkyl Halides:** Structure, Nomenclature, Properties, preparation, Reactions SN1 and SN2, Saytzeffs rule. **(5)**
- **Alcohols & Ethers:** Introduction, Structure, Nomenclature, Properties, Preparation, Williamsons Synthesis, their analysis **(3)**
- **Benzene and Arenes:** Aromaticity, properties, Nomenclature, Naphthalene, Anthracene, Electrophillic Aromatic substitution, Freidal Craft alkylation, Analysis **(6)**
- **Aldehydes and Ketones:** Introduction, Nomenclature, Preparation, Nucleophillic Addition reactions, analysis. **(5)**
- **Carboxylic Acids & their Functional Derivatives:** Introduction, Nomenclature, Preparation, Acidity constant, conversions, Nucleophillic Acyl substitution, Acid Chlorides, Acid Anhydrides, Amides, Esters. **(3)**

- **Amines and Diazonium Salts:** Introduction, Nomenclature, Preparation, Properties, Basicity, Hofmandegradation of Amides, Analysis. (3)
- **Phenol:** Introduction, Nomenclature, Preparation, Properties,Acidity, Kolbes Reaction, Riemer tiemer reaction, Analysis (4)

### Suggested Readings / Books:

1. Roberts, J.D. and Caserio, M.C. Basic Principles of Organic Chemistry. W.A. Benjamin, Inc., New York.
2. Vogel, A.I. A Textbook of Practical Organic Chemistry. ELBS/ Longman, London
3. Morrison & Boyd. Organic chemistry. 6<sup>th</sup> Edition, 2007. Dorling Kindersley India, Delhi.
4. Finar. Organic chemistry. Vol. 1& 2. 6<sup>th</sup> Edition, 2007. Dorling Kindersley India, Delhi.
5. Bentley & Drive. Text book of Pharmaceutical Chemistry. 8<sup>th</sup> Edition, 2005. Oxford University, New Delhi.
6. Mann & Saunders. Practical Organic Chemistry. 4<sup>th</sup> Edition, 2004. Orient Longman Ltd, New Delhi.
7. Ferguson, Textbook of Organic Chemistry, 2nd Edition, EWP
8. Gallego, Organic Reaction Mechanisms, Springer

## BPHM 204 Anatomy, Physiology and Health Education –I (APHE –I)

### Objective & Expected Outcome:

#### PART-A

- 1. Scope of Anatomy and Physiology:** scope, basic medical terminology used in these subjects. Structure of cell, its components and their functions. Elementary Tissues of the Human Body: Epithelial, connective, muscular and nervous tissues, their sub-types and their characteristics. (8)
- 2. Osseous System:** Structure, composition and functions of skeleton, Classification of joints, types of movements of joints, Disorders of joints. (6)
- 3. Skeletal Muscles:** Gross anatomy; physiology of muscle contraction, physiological properties of skeletal muscles and their disorders. (3)
- 4. Smooth Muscles:** Morphology, Electrical and Mechanical Activity, molecular basis of contraction, relation of length to tension and plasticity. (3)
- 5. Haemopoietic System:** Composition and functions of blood and its elements, their disorders, blood groups and their significance, mechanism of coagulation, disorders of platelets and coagulation. (8)

#### PART-B

- 6. Lymph and Lymphatic System:** Composition, formulation and circulation of lymph; disorders of lymph and lymphatic system. Basic physiology and functions of spleen. (5)
- 7. Cardiovascular System:** Morphology, Electrical Properties, Pacemaker tissue Basic anatomy of the heart, Physiology of heart, blood vessels and circulation. Basic understanding of Cardiac cycle, heart sounds and understanding of Cardiac cycle, heart sounds and electrocardiogram. Blood pressure and its regulation. (5)
- 8. Communicable diseases:** Brief outline, their causative agents, modes of transmission and prevention (Chicken pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, helminthiasis, malaria, filariasis, rabies, trachoma, tetanus, leprosy, syphilis, gonorrhoea, and AIDS). (5)

### Suggested Readings/ Books

1. Tortora, G.J. and Grabowski, S. R. Principles of Anatomy and Physiology 9<sup>th</sup> ed. 2000 Collins College Publishers, Luciano, New York.
2. Guyton, A.C. & Hall, J.E. W.B. Textbook of Medical Physiology. 9<sup>th</sup> ed. 1996 Sanders Co. New York.
3. Chaurasia, B.D. Human Anatomy, Parts I, II & III. 8<sup>th</sup> ed. 1995 Regional and CBS Publishers & Distributors, New Delhi.
4. Chatterjee, C.C. Human Physiology, part I & II 11<sup>th</sup> ed. 1992 Medical Allied Agency, Calcutta.
5. Ghai, C.L. A Textbook of Practical Physiology 5<sup>th</sup> Edition. Jaypee Brother New Delhi.

## **BPHM 205 Pharmaceutics –II (Hospital Pharmacy)**

### **PART-A**

1. Organization & Structure: Organization of a hospital and hospital Pharmacy, Responsibilities of hospital pharmacist, Pharmacy and therapeutic committee, Budget preparation and Implementation. **(5)**
2. Hospital Formulary: Contents, preparation and revision of hospital formulary. **(2)**
3. Drug Store Management and Inventory Control: **(5)**
  - i. Organization of drug store, Types of materials stocked, storage conditions.
  - ii. Purchase and Inventory Control-principles, purchase procedures, Purchase order, Procurement and stocking.
4. Drug distribution System in Hospitals: **(5)**
  - i. Outpatient dispensing, methods adopted.
  - ii. Dispensing of drugs to in-patients. Types of drug distribution system/s. Charging policy, labeling.
  - iii. Dispensing of drugs to ambulatory patients.
  - iv. Dispensing of controlled drugs.

### **PART-B**

5. Central Sterile Supply Unit and their Management: Types of materials for sterilization, Packing of materials prior to sterilization, sterilization equipments, Supply of sterile materials. Manufacture of Sterile and Non-sterile Products: Policy making of manufacturable items, demand and costing, personnel requirements, manufacturing practice, Master formula Card, production control, manufacturing records. **(7)**
6. Drug Information Services: Sources of Information on drugs, disease, treatment schedules, procurement of information, computerized services (e.g., MEDLINE), Retrieval of information, Medication error. **(4)**
7. Records and Reports: Prescription filling, drug profile, patient medication profile, cases on drug interaction and adverse reactions, idiosyncratic cases etc. **(4)**
8. Nuclear Pharmacy: Introduction to Radio pharmaceuticals, radio-active half life, Units of radio-activity Production of radio-pharmaceuticals, Permissible radiation dose level, Radiation hazards and their prevention, specifications for radio-active laboratory. **(8)**

### **Suggested Readings/ Books**

1. Owunwonne Handbook of Radio pharmaceuticals. Narosa Publishing House, New Delhi.
2. Hassan, William E. Hospital Pharmacy. Lea & Febiger, Philadelphia.
3. Remington's The Science & Practice of Pharmacy Mack Publishing Co. Easton, PA
4. Turco. S, and King, R.E. Sterile Dosage Forms. Lea & Febiger, Philadelphia.

## **BPHM 206 Lab Pharmaceutics–I (Dispensing and Community Pharmacy)**

1. **Dispensing of prescription falling under the categories:** Mixtures, solutions, emulsions, creams, ointments, powders, suppositories, ophthalmic, capsules, paste, jellies, pastilles, lozenges, pills, tablet triturates, lotions, liniments, inhalations, paints, etc.
2. Identification of various types of incompatibilities in prescription, correction thereof and dispensing of such prescriptions.
3. Dispensing procedures involving pharmaceuticals calculations, pricing of prescriptions and dosage calculations for pediatric and geriatric patients.
4. Dispensing of prescriptions involving adjustment of tonicity.
5. Categorization and storage of Pharmaceutical products based on legal requirements of labeling and storage.
6. Project report on Visit to the nearby Community for Counseling on the rational use of drugs and aspects of healthcare.

## **BPHM 207 Lab Pharmaceutical Chemistry –II (Physical Chemistry)**

1. To determine molar mass by Rast method and cryoscopic method.
2. To determine refractive index of given liquids and find out the contribution of carbon, hydrogen and oxygen in molar refraction of a compound.
3. To determine molar mass of volatile liquids by Victor-Meyer method.
4. To determine the specific rotation of sucrose at various concentrations and determine the intrinsic rotation.
5. To determine the heat of solution, heat of hydration and heat of neutralization.
6. To determine the cell constant, verify Ostwald dilution law and perform conductometric titration.
7. To determine rate constant of simple reaction.

## **BPHM 208 Lab Pharmaceutical Chemistry –III (Organic Chemistry)**

1. The student should be introduced to the various laboratory techniques through demonstrations involving synthesis of selected organic compounds (e.g. aspirin, pbromoacetanilide, anthraquinone from anthracine, reduction of nitrobenzene, etc.)
2. Identification of organic compounds and their derivatization.
3. Introduction to the use of stereo models.

## BPHM 209 Lab Pharmaceutics –II (Hospital Pharmacy)

S. No.	Practical
01	To study different type of syringes and method of sterilization.
02	To sterilize the surgical cotton using autoclave.
03	To perform sterilization of surgical materials used in hospital.
04	To prepare and submit ascorbic acid injection.
05	To prepare and submit 500mL of dextrose infusion IP.
06	To test the sterility of the product provided to you.
07	To prepare and submit 10mL water for injection IP
08	To prepare and submit eye lotion for first aid.
09	To prepare and submit paraffin gauge.
10	To sterilize the surgical rubber gloves.
11	Preparations involving chemical and therapeutically incompatibility.
12	To examine the dressing material provided to you for different parameters.
13	Submit 10 gm of sterilize powder.
14	To prepare and submit oily phenol injection.
15	To prepare and submit 10 ml of eye drop.