

**Board of Studies in Pharmacy**  
**FACULTY OF TECHNOLOGY**  
**OSMANIA UNIVERSITY**

**RULES AND REGULATIONS FOR B. PHARMACY COURSE**  
**(EFFECTIVE FROM ACADEMIC YEAR 2009 - 2010)**

**SCHEME OF INSTRUCTION AND EXAMINATION FOR**  
**B. PHARMACY I YEAR**  
**(Effective for the Batch admitted during the Academic Year 2009-10)**

Course No	Subject	Periods / week Th. Pr.	Sess. Marks	Univ. Exam. Marks	Duration of Exam (HRS)
<b>PYT.1.101</b>	Anatomy, Physiology and Health Education	3 --	30	70	3
<b>PYT.1.102</b>	Pharmaceutical Inorganic Chemistry	3 --	30	70	3
<b>PYT.1.103</b>	Pharmaceutics-I (General and Dispensing Pharmacy)	3 --	30	70	3
<b>PYT.1.104</b>	Mathematics / Biology	4/4 --	30	70	3
<b>PYT.1.105</b>	Basic Computer Applications	3 --	30	70	3
<b>PYP.1.106</b>	Anatomy, Physiology and Health Education Practicals	-- 3	25	50	4
<b>PYP.1.107</b>	Ph. Inorganic Chemistry Lab	-- 3	25	50	4
<b>PYP.1.108</b>	Pharmaceutics-I (General & Dispensing Pharmacy) Lab	-- 3	25	50	4
<b>PYP.1.109</b>	Biology Lab	-- 3	25	50	4
<b>PYP.1.110</b>	Computer Lab (Basic Comp. Applications)	-- 3	25	50	4
		31	275	600	

# ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION

Subject Code : PYT.1.101                      Sessional                      : 30  
Periods / Week: 3                      Examination                      : 70  
Nature of Exam: Theory                      Exam Duration: 3 Hrs

## Unit – I

**Introduction:** Anatomical terms in relation to parts of the body, system and organs. Elementary knowledge of the human skeleton; Tissues of the body – properties and functions of epithelial, connective, muscular, nervous and osteous (bone) tissues; General principles of membrane permeability, diffusion, transport, membrane potentials and action potentials.

## Unit – II

**Nervous Systems:** Neuron, Synapses, ganglion, plexus, physiology of nerve impulse, neurotransmission, reflex arc, central nervous system (parts and functions) and autonomic nervous system.

**Cardiovascular System and Blood:** Heart, blood vessels, cardiac cycle, circulation, blood pressure and its regulations. Blood (composition and function).

## Unit – III

**Respiratory System:** Gross anatomy of respiratory passages, physiology of respiration, nervous control of respiration, vital capacity, respiratory volume, introduction to terms such as anoxia, hypoxia & dyspnoea.

**Digestive System:** Gross anatomy of alimentary canal, movements of alimentary canal, gastric secretions and the enzymes involved in digestion.

**Endocrine System:** Mechanisms of hormonal secretion, Physiological considerations of thyroid, pancreas, pituitary, parathyroid, adrenal glands & gonads; Disorders of hypo & hyper secretion.

## Unit – IV

**Urinogenital System:** Various parts, structure and functions of the kidney and urinary tract. Physiology of urine formation, output and factors controlling it.

**Physiology of Special Senses:** basic anatomy and physiology of the eye (vision), ear (hearing), taste buds (Tongue), nose (smell) and skin (touch and pain).

## Unit – V

Health Education (Epidemiology) and Family Planning.

Elementary pathology – Diseased and pathological processes.

Inflammation and repair, Retrograde changes including disturbances of metabolism, circulation like haemorrhage, thrombosis and growth including various tumors (Neoplasms).

Embolism, infarction, Oedema and shock. Nutritional disorder (Vitamin deficiency)

**Examination :** One question from each unit with internal choice.

## Text Books

1. Principles of anatomy and physiology by Tortora G.J., and N.P. Anagnokokos,
2. Principles of Anatomy and Physiology by Ross & Wilson.

## Reference Books

1. Human Physiology by C.C. Chatterjee, Medical Allied Agency, India.
2. Text Book of Medicinal Physiology by A.C. Guyton, W.B. Prism Books Pvt. Ltd.,

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## PHARMACEUTICAL INORGANIC CHEMISTRY

Subject Code : PYT.1.102      Sessional      : 30  
Periods / Week: 3      Examination      : 70  
Nature of Exam: Theory      Exam Duration: 3 Hrs

### Unit – I

- a) Classification of Inorganic Pharmaceuticals based on their applications, therapeutic classes with example and uses.
- b) Quality control and tests for purity, qualitative tests for anions and cations.
- c) Limit test for Arsenic, heavy metals, Mercury, lead, iron, chloride and Sulphate and Pharmacopoeial Standards.

Note: following units all the compounds are of IP except which are mentioned as BP.

### Unit – II

#### Definition, Preparation, Properties, Assay methods, Limit tests and Uses

##### a) Gastro – intestinal agents:

- (i) Acidifiers and Antacids: IP: Dilute hydrochloric acid, sodium acid phosphate, sodium bicarbonate, sodium citrate, Potassium citrate, Aluminum hydroxide gel, Dried Aluminum hydroxide gel, Magnesium oxide (Magnesia), Magnesium-hydroxide mixture, Magnesium carbonate, Magnesium trisilicate, Calcium carbonate.
- (ii) Adsorbents and Related Drugs: Light kaolin, Heavy kaolin, Activated charcoal.
- (iii) Laxatives: Magnesium Sulphate and sodium phosphate.

##### b) Electrolytes: Sodium, Potassium and Calcium replenishers.

- (i) Sodium and Potassium replenishers: Sodium chloride (compound, injection and Ringer solution), Sodium chloride and dextrose injection, Potassium chloride and oral electrolytes.
- (ii) Calcium Replenishers: Calcium chloride, Calcium gluconate, Dibasic calcium phosphate.

(c) **Acid base Regulators:** Sodium bicarbonate, sodium lactate injection, sodium citrate / Potassium citrate, sodium acetate, Ammonium chloride, Ammonium chloride injection.

(d) **Dialysis fluids:** Haemodialysis fluids and intraperitoneal dialysis fluids.

### Unit – III

#### Definition, Preparation, Properties, Assay methods, Limit tests and Uses

##### (a) Mineral Nutrients:

- i. Haematinics: Ferrous Sulphate, Ferrous fumarate, Ferrous gluconate, Ferric ammonium citrate, iron and dextrose injection.
- ii. Metallics: Copper, Manganese and Zinc compounds (zinc chloride);
- iii. Phosphates: Sodium acid phosphate and Sodium phosphate,
- iv. Halogens: Iodine and Iodides or fluorides.

##### (b) Pharmaceutical aids:

- i. Adsorbents & Absorbents: Activated charcoal, aluminium sulphate, aluminium phosphate.
- ii. Antioxidants: Sodium Sulphite, sodium bisulphate and sodium metabisulphite.
- iii. Desiccants: Silica gel.
- iv. Excipients: Dicalcium & Tricalcium Phosphate, Magnesium stearate, Talc & ppted chalk.
- v. Suspending agents: Bentonite, colloidal silica, aluminium stearate,.
- vi. Colourants: Titanium oxide, ferric oxide
- vii. Solvent and Vehicle: Purified water

## Unit – IV

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### Definition, Preparation, Properties, Assay methods, Limit tests and Uses

- i. **Expectorants:** of Ammonium chloride, Potassium Iodide.
- ii. **Emetics:** Potassium antimony tartarate, copper Sulphate, Zinc Sulphate.
- iii. **Antidotes:** Sodium thiosulphate, sodium thiosulphate injection, sodium nitrite.
- iv. **Inhalants:** Oxygen, Nitrous oxide, dilute solution of ammonia (BP), Ammonium carbonate (BP).

## Unit – V

### Definition, Preparation, Properties, Assay methods, Limit tests and Uses

#### (a) Topical agents:

- i. Astringents:  $ZnSO_4$ , Zinc Oxide, Calcium Hydroxide,  $CuSO_4$  and Bismuth subcarbonate.
- ii. Topical protectants: Zinc oxide, Calamine, Zinc stearate, Talc, Titanium-dioxide, Heavy kaolin and Light kaolin
- iii. Silicone polymers: Activated Dimethicone.
- iv. Anti infectives: Hydrogen peroxide, Potassium permanganate, Silver Nitrate (Silver protein), Iodine, (solutions, povidone – iodine), boric acid, zinc – undecylenate, Mercury compounds (Yellow mercuric oxide, Ammoniated Mercury). Sulphur, Selenium sulphide.

#### (b) Dental products:

- i. Fluorides: Sodium fluoride, Sodium Monofluorophosphate and stannous fluoride.
- ii. Oral antiseptics and Astringents: Hydrogen peroxide, Sodium peroxide (BP), Magnesium peroxide, Zinc peroxide and Mouth washes
- iii. Dentifrices: Calcium carbonate, dibasic calcium phosphate, calcium phosphate, sodium metaphosphate and strontium chloride.
- iv. Cements and Fillers: Zinc oxide.

#### (c) Other Medicinal agents:

- i. Internal parasiticides: Sodium Antimony Gluconate
- ii. Anti-neoplastic agents: Cisplatin.
- iii. Sedative-hypnotics: Potassium bromide
- iv. Anti-depressants: Lithium carbonate
- v. Anti-rheumatic agents: Sodium aurothiomalate
- vi. Anti-thyroid agents: Potassium perchlorate
- vii. Diagnostic agent: Barium Sulphate
- viii. Surgical aid: Plaster of Paris

**Examination :** One question from each unit with internal choice.

#### Text Books

1. Bentley & Driver's Text book of Pharmaceutical chemistry Ed: L. M. Atherden, 1983, Oxford University press, Delhi.
2. Inorganic Medicinal & Pharmaceutical chemistry; J. H. Block, F. B. Roche, T.O. Soine, C.V. Wilson, 1986, Varghese publishing house.
3. Inorganic Pharmaceutical chemistry; P. Gundu Rao, Vallabh Prakashan 1995, Delhi

#### Reference Books

1. Pharmacopoeia; (Indian, British, US and European)
2. Martindale: The Extra Pharmacopoeia; 31<sup>st</sup> Edn, 1996, The Royal Pharmaceutical Society.
3. Remington Pharmaceutical sciences; 20<sup>th</sup> Edition Lippincott Williams and Wilkins.
4. Hand Book of Pharmacy & Health care Ed: Robin. J. Haiwan 1990, The Pharm Press, UK

# PHARMACEUTICS – I

## (GENERAL & DISPENSING PHARMACY)

Subject Code : PYT.1.103      Sessional      : 30  
Periods / Week: 3      Examination      : 70  
Nature of Exam: Theory      Exam Duration: 3 Hrs

### Unit – I

**Pharmacy profession:** Pharmacy as a career, Pharmaceutical Education, Registration as a Pharmacist, Brief introduction to Evolution of Pharmacy, European and American Pharmacy. Pharmacopoeia (IP, BP, USP and International) and other sources, SI and imperial systems, inter conversions. Weighing - selection and care of weights and balances. Sensitivity and minimum weighable quantities.

**Pharmaceutical calculations:** Calculations of doses, enlarging and reducing recipes; Percentage solutions, alligation, alcohol dilutes and proof spirit.

### Unit – II

**Prescription:** Definition, Parts, sources of errors and care required in dispensing prescriptions, General Dispensing procedures, types of dispensing products. Dispensing of proprietary medicine. Prescription containers, closures and labeling of dispensed products, colors, flavors and sweeteners used in prescription.

**Dosage form:** Definition, Advantages and limitations of dosage form.

Principles involved and procedures adopted in preparation, labeling and dispensing of typical products (Unit III-IV). Uses of official and other products in common use.

### Unit – III

**Liquid preparation:** Aromatic waters, spirits, solutions, mixtures, syrups, elixirs, suspension, emulsion, lotions, liniments, eye, ear and nasal drops, inhalations, throat paints, gargles, glycerin and collodions.

### Unit – IV

**Semisolids:** Ointments and their bases, creams, jellies, suppositories and their bases, effervescent granules, tablet tritrates, pastilles, lozenges and pills.

**Incompatibilities:** Physical, Chemical and Therapeutic incompatibilities. Methods of overcoming and handling of incompatible prescriptions.

### Unit – V

**Tinctures and Extracts:** Methods of preparation and uses of Tinctures & Extracts official in IP.

**Medicinal Gases:** Official medical gases and uses, containers and fitting, handling and storage.

**Radio Pharmaceuticals:** Preparation, Therapeutic and Diagnostic uses.

**Examination :** One question from each unit with internal choice.

### Text Books

1. Bentley's text book of pharmaceuticals, Rawlkins, 8<sup>th</sup> edn. ELBS Publishers.
2. Cooper & Gunn's dispensing for Pharmaceutical students, Carter CBS Publishers, Delhi.

### Reference Books

1. Introduction to pharmaceutical dosage forms, HC. Ansel, 5<sup>th</sup> Edition. 1990.
2. Dispensing of Medication, Ed. E.W. Martin, Mach Publishing Co., Eastern PA.

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## BIOLOGY

Subject Code : PYT.1.104      Sessional      : 30  
Periods / Week: 4      Examination      : 70  
Nature of Exam: Theory      Exam Duration: 3 Hrs

### Unit – I

**Plant Kingdom:** Definition and Classification

**Plant cells:** Its structure, living and non-living inclusions. Different types of plant tissues and their functions, Mitosis and Meiosis.

**Morphology and Histology:** Roots, Stems, Barks, Woods, Leaf, Flower, Fruit and Seed.

**Modification:** Root, Stem, Leaf and Inflorescence.

### Unit – II

**Plant Taxonomy:** Classification, study of the following families with special references to medicinal and economical important plants

a) Apocynaceae b) Solanaceae c) Umbelliferae

d) Leguminosae e) Scrophulariaceae f)

Rubiaceae

### Unit – III

**Plant Physiology:** Absorption, transpiration, respiration photosynthesis, basis in DNA replication.

**Genetic code and Heredity:** Polyploidy, hybridization and mutation.

### Unit – IV

**The study of animal cell:** Animal tissue and cell division, difference between plant cell and animal cell, study of different systems of frog. Histology of liver, kidney, skeletal muscles, smooth muscles, pancreas, intestine and endocrine glands of rabbit.

### Unit – V

**Morphology and Life History of Human Parasites:** Plasmodium, Entamoeba, tapeworm, ascaris, leishmania, anchylostoma and trypanosoma. Life history of Mosquitoes and housefly as agents for spreading diseases.

**Examination :** One question from each unit with internal choice.

### Text books

1. A text book of botany, by A.C. Dutta
2. A text book of biology by Vikram series

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## MATHEMATICS

Subject Code : PYT.1.104      Sessional : 30  
Periods / Week: 4      Examination : 70  
Nature of Exam: Theory      Exam Duration: 3 Hrs

### Unit – I

**Logarithms:** Logarithm of a real number to an arbitrary base, Napierion Base - Theorems on Logarithms - Use of Tables.

**Trigonometry:** Measurement of angles, Trigonometrical ratios and simple relations connecting the complimentary and supplementary angles, Negative angles sum and difference of two angles, sine and cosine formulae for multiple angles and half angles.

### Unit – II

**Differential Calculus:** Functions, Limits, Differential coefficient rules, Differentiation of a sum, product and quotient of functions, Differentiation from first principles, Differentiation of implicit, Geometrical, composite and inverse functions, Partial Differentiation, Maxima and Minima.

### Unit – III

**Integral Calculus:** Integration considered as converse of differentiation, simple integrations, standard forms like  $x dx$ ,  $\sin(ax) dx$ ,  $\cos(ax) dx$ ,  $\sec(ax) dx$  etc. Methods of substitution, simple example integration by parts. Integration of rational, irrational, trigonometrical functions. Calculations of areas of standard bodies using integration.

### Unit – IV

**Matrices:** Matrices, basic definitions, matrix operations, transpose, adjoint, rank, inverse of a matrix, solution of linear systems of equations, matrix inversion, Gaussian elimination.

### Unit – V

**Biomathematics:** Basic Mathematical Principles that are commonly used in Biological testing, integers, linear and non-linear graphs; 2d Coordinate geometry, Equation of line, circle.

**Examination :** One question from each unit with internal choice.

### Text Books

1. A text book of Mathematics by N.Krishna Murthy, Chand series, Volume- I and II
2. Fundamentals of statistics by D.N. Elhance, Veena Elhance & B.M.Agarwal.

### Reference Book

1. Higher Engineering Mathematics by Grewal.

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## BASIC COMPUTER APPLICATIONS

Subject Code : PYT.1.105                      Sessional                      : 30  
Periods / Week: 3                      Examination                      : 70  
Nature of Exam: Theory                      Exam Duration: 3 Hrs

### **Unit – I Computer Concepts**

Evolution, Basic structure and Characteristics of computers; Types of memory chips; Study of various input - out put devices like magnetic tapes, magnetic discs, MICR, OCR, CDROMS etc., Types of printers; Principles of flow charting; Importance of operating systems, detailed study of the operating systems MSDOS , UNIX and WINDOWS; Computer Viruses;

### **Unit – II Programming In 'C' Language**

Operators, Expressions, Data input, Output, Control statements like - (IF-ELSE, WHILE DO, FOR, BREAK AND CONTINUE and GOTO) Functions, Library functions, Arrays.

### **Unit – III Introduction to Ms-Office (Word & Excel)**

**MS-Word:** Basics, working with files, working with text, formatting paragraphs, styles, lists, tables, Graphics, spellings and grammar and page formatting macros, table of contents.

**MS-Excel:** Basics, Spreadsheets, data types, formulas, Formatting, charts, graphs.

### **Unit – IV Introduction to Ms-Office (Power Point & Access)**

**MS-Power Point:** Power point basics, Views, Slide control, Apply design, Page setup, Templates, Background, Control, Color Screens, Transitions and animations, working with texts and working with graphics.

**MS-Access:** Data base concepts, Screen layouts, Creating tables, Data sheet records, table relation ships, Sorting and filtering, Queries, forms, form controls, Sub forms, reports, importing, exporting, linking.

### **Unit – V Information Infrastructure**

**Internet and World Wide Web (WWW):** Structure and Organization of the WWW, Browsers, Information search in WWW, search engines, Pharmaceutical resources in WWW Types of indexing tools & search strategies; Hyper Text Manuscript Language (HTML) and E-Mail.

**Introduction to Structured Query Language (SQL):** Overview of SQL Reserved Words; SQL Commands, Comparison for Access and SQL Server; Chemical Database Design & their Tools

**Examination :** One question from each unit with internal choice.

### **Text Books**

1. Fundamentals of Computers by P.K. Sinha
2. Let Us C by Yashvanth Kanetkar
3. Working in Microsoft Office By Ron Mansfield
4. SQL, PL/SQL The Programming Language of Oracle by Ivan Bayross

### **Reference Books**

1. Programming with 'C' by Byron Goltfield- Schum series
2. Computer programming in 'C' by Y. Raja Raman



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## ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION

Subject Code: PYP.1.106      Sessional      : 25  
Periods/Week: 3      Examination      : 50  
Nature of Examination: Practical      Exam Duration: 4 Hrs

### List of Experiments

1. Study of histological slides of different tissues / organs
2. Study of various models, specimens of bones / organs
3. Hematology - blood grouping
4. Hemoglobin content estimation
5. Estimation of bleeding time
6. Estimation of clotting time
7. Determination of RBC count
8. Determination of total WBC count
9. Measurement of blood pressure
10. Measurement of vital capacity
11. Estimation of ESR

### Reference Books

1. S.R. Kale and R.R. Kale, **Practical Human Anatomy & Physiology**, Nirali Prakashan, Pune, 2003.
2. CL Ghai, **Text book of Practical Physiology**, Jay Pee, New Delhi, 2005.

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## PHARMACEUTICAL INORGANIC CHEMISTRY

Subject Code: PYP.1.107      Sessional      : 25  
Periods / Week: 3      Examination      : 50  
Nature of Examination: Practical      Exam Duration: 4 Hrs

### List of Experiments

1. Systematic quantitative analysis for inorganic mixtures upto 4 radicals preferably by semi-micro methods.
2. Pharmacopoeial limit test for Chlorides
3. Pharmacopoeial limit test for Sulphates.
4. Pharmacopoeial limit test for lead.
5. Pharmacopoeial limit test for iron.
6. Preparation and purification of Boric acid
7. Preparation and purification of sodium citrate
8. Preparation and purification of potash alum.
9. Preparation and purification of yellow mercuric oxide
10. Preparation and purification of Ammoniated Mercury

### Reference Books

1. A.H Beckett and J.B Stenlake, **Practical Pharmaceutical Chemistry**, 4<sup>th</sup> Edition, CBS Publications, New Delhi, 2004.
2. G Svehla, **Vogel's Qualitative Inorganic Analysis**, 7<sup>th</sup> Edition, Pearson Education, New Delhi, 2003.
3. G. Devala Rao, **Practical Pharmaceutical Inorganic Chemistry**, Birla Publications, New Delhi, 2006.
4. K. R. Mahadik and S.H Bhosale, **Hand book of Practical Chemistry (Inorganic & Organic)**, Nirali Prakashan, Pune, 2005.
5. **Indian Pharmacopoeia**, Controller of Publications, Delhi. 1996.

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## PHARMACEUTICS – I (GENERAL & DISPENSING PHARMACY)

Subject Code: PYP.1.108                      Sessional                      : 25  
Periods / Week: 3                              Examination                      : 50  
Nature of Examination: Practical                      Exam Duration: 4 Hrs

### List of Experiments

1. Dispensing Procedures involving pharmaceutical calculation, dosage calculations for pediatric and geriatric patients
2. Incompatibility studies in few simple dosage forms.
3. Preparation of Aromatic waters
4. Preparation of spirits
5. Preparation of different types of iodine solution
6. Preparation of cresol soap solution
7. Preparation of compound Sulphur & Calamine lotion
8. Preparation of turpentine liniment
9. Preparation of gargles and throat paint
10. Preparation of sulphur ointment
11. Preparation simple ointment
12. Preparation of whitfield ointment
13. Preparation of non staining iodine ointment
14. Preparation of creams & pastes
15. Preparation of any glycerogelatine based suppository
16. Preparation of Tragacanth jelly
17. Preparation of effervescent granules
18. Preparation of simple syrup
19. Preparation of ear / eye drops

### Reference Books

1. C.V.S Subrahmanyam, J. Thimma Setty and G.C. Prabhu Shankar, **Laboratory Manual of Pharmaceutics**, Vallabh Publications, New Delhi, 2006.
2. R.S Gaud and G.D Gupta, Practical Pharmaceutics,

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## BIOLOGY

Subject Code: PYP.1.109                      Sessional                      : 25  
Periods / Week: 3                              Examination                      : 50  
Nature of Examination: Practical                      Exam Duration: 4 Hrs

## List of Experiments

1. Study of plant parts and their modification
2. Study of representative of families – Apocynaceae, Solanaceae, Umbelliferae, Rubiaceae
3. Histology of following crude drugs – Cinchona, Clove, Coriander, Linseed
4. Histological study of different organs through permanent slides
5. Study of various tissues through permanent slides
6. Study of digestive system of frog
7. Study of arterial and venous system of frog
8. Study of male urinogenital system of frog
9. Study of female urinogenital system of frog
10. Study of renal portal system of frog
11. Study of skeletal system of frog
12. Study of spinal nerves system of frog

## Reference Books

1. G. Venkateshwar Rao, G. V. Subbaiah and K Sheeba, **Intermediate Practical Manual for Botany**, Sai Apollo New Century Series, Hyderabad,
2. S. B. Gokhale, C. K. Kokate and D. B. Bidankar, **Pharmaceutical Biology**, Nirali Prakashan, Pune, 2005.
3. S. B. Gokhale, C. K. Kokate and D. B. Bidankar, **Practical Pharmacognosy**, Nirali Prakashan, Pune, 2003.
4. S. H. Ansari, **Guideline Series for Pharmacognosy**, Tata Publishers, New Delhi, 1997.

## BASIC COMPUTER APPLICATIONS

**Subject Code: PYP.1.110      Sessional : 25**

**Periods / Week: 3      Examination : 50**

**Nature of Examination: Practical      Exam Duration: 4 Hrs**

### LIST OF EXPERIMENTS:

01. Exercised Based on Dos commands
02. Programming in “C” Language.
03. Exercises on MS-Office.
04. Exercises based MS word
05. Exercises based on MS Excel
06. Exercises based on MS Access and Power Point.
07. Programming in SQL

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