



**VISWAMBHARA EDUCATIONAL SOCIETY**  
**VAAGDEVI COLLEGE OF PHARMACY**  
(Approved by AICTE & PCI, New Delhi & affiliated to Kakatiya University , Warangal, T.S)  
Ramnagar Dist. Hanamakonda- 506001, (T.S)

### 1.3.1(1) Cross cutting issues (Courses in curriculum)



  
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### 1.3. Curriculum Enrichment

1.3.1 Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum

Academic Year 2021-2022				
S.No.	Subject Name	Subject Code	Course & Year/ Semester	Cross Cutting Issue
1.	Human Anatomy and Physiology –I & II	BP101T & BP201T,1.1	B. Pharmacy-I & II Semester, Pharm D 1st year	Gender Equity
2.	Remedial Biology	BP106RBT & 1.6	B. Pharmacy-I Semester & Pharm D 1st year	Gender Equity & Environment Sustainability
3.	Medicinal Biochemistry	1.3	Pharm D 1st year	Gender Equity
4.	Communication Skills	BP105T	B. Pharmacy-I Semester	Gender Equity
5.	Pharmaceutical Jurisprudence	BP505T & 3.4	B. Pharmacy-V Semester & Pharm D 3year	Professional Ethics & Human Values
6.	Environmental Sciences	BP206T	B. Pharmacy-II Semester	Environment Sustainability
7.	Biochemistry	BP203T	B. Pharmacy-II Semester	Gender Equity
8.	Pharmacognosy and	BP405T &	B.	Environment



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	Phytochemistry I&II	BP504T	Pharmacy-IV &V Semester	Sustainability
9.	Social and Preventive Pharmacy	BP802T	B. Pharmacy-VIII Semester	Professional Ethics & Human Values
10	Pharmacognosy & Phytopharmaceuticals	2.3	Pharm D 2 <sup>nd</sup> year	Environment Sustainability
11	Community Pharmacy	2.5	Pharm D 2 <sup>nd</sup> year	Professional Ethics, Human Values & Gender Equity
12	Hospital Pharmacy	4.2	Pharm D 4 <sup>th</sup> year	Professional Ethics & Human Values
13	Clinical Pharmacy	4.3	Pharm D 4 <sup>th</sup> year	Professional Ethics & Human Values
14	Pharmacoepidemiology and Pharmacoeconomics	5.2	Pharm D 5 <sup>th</sup> year	Professional Ethics & Human Values
15	Pharmacotherapeutics-I, II & III	2.6, 3.3 & 4.1	Pharm D 2 <sup>nd</sup> , 3 <sup>rd</sup> & 4 <sup>th</sup> year	Professional Ethics, Human Values & Gender Equity
16.	Quality Assurance	2.1	M. Pharmacy 2 <sup>nd</sup> Semester	Professional Ethics, Human Values



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Academic Year 2020-2021

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2.	Remedial Biology	BP106RBT & 1.6	B. Pharmacy-I Semester & Pharm D 1st year	Gender Equity & Environment Sustainability
3.	Medicinal Biochemistry	1.3	Pharm D 1st year	Gender Equity
4.	Communication Skills	BP105T	B. Pharmacy-I Semester	Gender Equity
5.	Pharmaceutical Jurisprudence	BP505T & 3.4	B. Pharmacy-V Semester & Pharm D 3year	Professional Ethics & Human Values
6.	Environmental Sciences	BP206T	B. Pharmacy-II Semester	Environment Sustainability
7.	Biochemistry	BP203T	B. Pharmacy-II Semester	Gender Equity
8.	Pharmacognosy and Phytochemistry I&II	BP405T & BP504T	B. Pharmacy-IV & V Semester	Environment Sustainability
9.	Social and Preventive Pharmacy	BP802T	B. Pharmacy-VIII Semester	Professional Ethics & Human Values
10	Pharmacognosy &	2.3	Pharm D 2 <sup>nd</sup>	Environment



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	Phytopharmaceuticals		year	Sustainability
11	Community Pharmacy	2.5	Pharm D 2 <sup>nd</sup> year	Professional Ethics, Human Values & Gender Equity
12	Hospital Pharmacy	4.2	Pharm D 4 <sup>th</sup> year	Professional Ethics & Human Values
13	Clinical Pharmacy	4.3	Pharm D 4 <sup>th</sup> year	Professional Ethics & Human Values
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Academic Year 2019-2020

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6.	Environmental Sciences	BP206T	B. Pharmacy-II Semester	Environment Sustainability
7.	Biochemistry	BP203T	B. Pharmacy-II Semester	Gender Equity
8.	Pharmacognosy and Phytochemistry I&II	BP405T & BP504T	B. Pharmacy-IV & V Semester	Environment Sustainability
9.	Pharmacognosy-II	4.1.T.2	B. Pharmacy-IV year 1 <sup>st</sup> Semester	Environment Sustainability
10	Pharmacognosy & Phytopharmaceuticals	2.3	Pharm D 2 <sup>nd</sup> year	Environment Sustainability



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11	Community Pharmacy	2.5	Pharm D 2 <sup>nd</sup> year	Professional Ethics, Human Values & Gender Equity
12	Hospital Pharmacy	4.2	Pharm D 4 <sup>th</sup> year	Professional Ethics & Human Values
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16.	Quality Assurance	2.1	M Pharmacy 2 <sup>nd</sup> Semester	Professional Ethics, Human Values
17	Hospital and Clinical Pharmacy	4.2.T.4	B. Pharmacy- IV year 2 <sup>nd</sup> Semester	Professional Ethics & Human Values



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Academic Year 2018-2019				
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2.	Remedial Biology	BP106RBT & 1.6	B. Pharmacy-I Semester & Pharm D 1st year	Gender Equity & Environment Sustainability
3.	Medicinal Biochemistry	1.3	Pharm D 1st year	Gender Equity
4.	Communication Skills	BP105T	B. Pharmacy-I Semester	Gender Equity
5.	Pharmaceutical Jurisprudence	BP505T & 3.2.T.4	Pharm D 3yr &B. Pharmacy- III year 2 <sup>nd</sup> Semester	Professional Ethics &Human Values
6.	Environmental Sciences	BP206T	B. Pharmacy-II Semester	Environment Sustainability
7.	Biochemistry	BP203T	B. Pharmacy-II Semester	Gender Equity
8.	Pharmacognosy and Phytochemistry I&II	BP405T & BP504T	B. Pharmacy-IV Semester & B. Pharmacy-V Semester	Environment Sustainability



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9.	Pharmacognosy-II	4.1.T.2	B. Pharmacy-IV year 1 <sup>st</sup> Semester	Environment Sustainability
10	Pharmacognosy & Phytopharmaceuticals	2.3	Pharm D 2 <sup>nd</sup> year	Environment Sustainability
11	Community Pharmacy	2.5	Pharm D 2 <sup>nd</sup> year	Professional Ethics, Human Values & Gender Equity
12	Hospital Pharmacy	4.2	Pharm D 4 <sup>th</sup> year	Professional Ethics & Human Values
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16.	Quality Assurance	2.1	M Pharmacy 2 <sup>nd</sup> Semester	Professional Ethics, Human Values
17	Hospital and Clinical Pharmacy	4.2.T.4	B. Pharmacy-IV year 2 <sup>nd</sup> Semester	Professional Ethics & Human Values
18	Pharmacognosy-I	3.2.T.2	B. Pharmacy-III year 2 <sup>nd</sup> Semester	Environment Sustainability



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AY 2017-2018

S.No.	Subject Name	Subject Code	Course & Year/ Semester	Cross Cutting Issue
1.	Human Anatomy and Physiology –I & II	BP101T & BP201T,1.1,2.1.T.4,2.2.T.4	B. Pharmacy-I & II Semester, Pharm D 1 <sup>st</sup> year, B. Pharmacy-II year 1 <sup>st</sup> and 2nd Semester	Gender Equity
2.	Remedial Biology	BP106RBT & 1.6	B. Pharmacy-I Semester & Pharm D 1 <sup>st</sup> year	Gender Equity & Environment Sustainability
3.	Medicinal Biochemistry	1.3	Pharm D 1st year	Gender Equity
4.	Communication Skills	BP105T	B. Pharmacy-I Semester	Gender Equity
5.	Pharmaceutical Jurisprudence	BP505T & 3.2.T.4	Pharm D 3year &B. Pharmacy-III year 2 <sup>nd</sup> Semester	Professional Ethics & Human Values
6.	Environmental Sciences	BP206T & 2.2.T.3	B. Pharmacy-II Semester & B. Pharmacy-II year 2 <sup>nd</sup> Semester	Environment Sustainability
7.	Biochemistry	BP203T	B. Pharmacy-II Semester	Gender Equity
9.	Pharmacognosy-II	4.1.T.2	B.	Environment



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			Pharmacy- IV year 1 <sup>st</sup> Semester	Sustainability
10	Pharmacognosy & Phytopharmaceuticals	2.3	Pharm D 2 <sup>nd</sup> year	Environment Sustainability
11	Community Pharmacy	2.5	Pharm D 2 <sup>nd</sup> year	Professional Ethics, Human Values & Gender Equity
12	Hospital Pharmacy	4.2	Pharm D 4 <sup>th</sup> year	Professional Ethics & Human Values
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18	Pharmacognosy-I	3.2.T.2	B. Pharmacy- III year 2 <sup>nd</sup> Semester	Environment Sustainability



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**RULES, REGULATIONS AND SYLLABUS FOR  
B.PHARM (FOUR YEAR COURSE)  
KAKATIYA UNIVERSITY, WARANGAL – 506 009**

**From the academic year 2008 – 2009 onwards**

(Applicable to the UCPSc and other Pharmacy colleges  
Affiliated to KU, Warangal)

**I. GENERAL RULES AND REGULATIONS**

**1. Eligibility for admission:**


Candidates for admission to the Degree of Bachelor of Pharmacy shall be required to have passed the Intermediate Examination of the Board of Intermediate Education, Andhra Pradesh or an Examination recognized as equivalent there to with Physics, Chemistry and Mathematics or biology as subjects.

**OR**

The Diploma in Pharmacy Examination from an Institute in AP recognized by the Pharmacy Council of India (or a local candidate with a Diploma in Pharmacy from outside AP).

2. The degree of Bachelor of Pharmacy will be conferred on the candidates who have subsequently undergone the prescribed course of study of the Kakatiya University for a period of not less than four academic years.
3. The course and Examination for the four year shall be designated as I-B Pharm, II-B.Pharm, III-B.Pharm, IV-B.Pharm. The examination for each year shall be on the basis of the Scheme of Examination.
4. The distribution of marks shall be as indicated in the Scheme of Examination and the scope of subjects as indicated in the syllabus.
5. In every academic year there shall be one annual examination, ordinarily in April/May and one supplementary examination in October/November or on such dates as may be fixed by the University.
6. Candidates admitted to any year of the course of study shall pursue in each academic year, the regular courses of lecturers, tutorials, practicals etc, as mentioned in the Scheme of Instructions and after satisfying the conditions laid down in these ordinances will be eligible to appear for the examinations on such dates as may be fixed by the University.
7. A candidate to be eligible to take an examination specified in paragraph [4] shall prosecute a regular course of study in the course prescribed for the examination concerned, for not less then one academic year in the University College of Pharmaceutical Sciences and affiliated colleges of Kakatiya University.



  
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Communication through letters; official and personal letters; letters of complaint; letters of enquiries; and responses; writing memos, circulars and notices; what to avoid while writing; paragraph writing; scientific/technical report writing; drafting and delivering a speech, resume writing and interview techniques.

#### UNIT-IV

Grammar: Sequence of tenses, voice, articles, direct and indirect speech; degrees of comparison; common errors in English made by Indian learners of English. Concepts of learning and listening: types and methods of learning and listening; learning and listening of knowledge, attitudes, skills, and practices.

#### UNIT-V

The following four essays from "*Selections from Modern English*" prose Edited by Haladhar Panda are prescribed:

- |                                |                           |
|--------------------------------|---------------------------|
| 1. <b>Our Own Civilization</b> | <b>-C.E.M.Joad</b>        |
| 2. <b>Andrew Carnegie</b>      | <b>-E.H Carter</b>        |
| 3. <b>The Secret of work</b>   | <b>-Swami Vivekananda</b> |
| 4. <b>The Generation Gap</b>   | <b>-Benjamin Spock</b>    |

### B.PHARM II YEAR

#### 2.1. Semester

#### THEORY PAPERS:

S.No	Subjects	Hours/Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	Biostatistics & Computer Applications	4	20	80	100	3
2	Pharm. Engineering	4	20	80	100	3
3	Pharm. Org. Chemistry-II	3	20	80	100	3
4	Human Anatomy & Physiology - I	3	20	80	100	3
5	Pharm. Microbiology & Immunology-I	3	20	80	100	3
6	Tutorial	1				
	Total	18	100	400	500	



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- v) Starch Hydrolysis Test
  - vi) Gelatin Liquefaction Test
  - vii) Fermentation of Carbohydrates
  - viii) H<sub>2</sub>S Production Test
- 15) Morphology of Molds  
 16) Morphology of Yeasts  
 17) Microbial Limit Tests – Viable Count  
 18) Microbial Limit Tests for *E. coli*, *Proteus*, *Pseudomonas*, etc.  
 Minimum no of experiments to be performed: At least 5 bio chemical tests, at least 14 other experiments.  
 Scheme for practical examinations- 3 experiments + spotting (minimum 5 )

## B.PHARM II YEAR

### 2.2. Semester

#### THEORY PAPERS:

S.No	Subjects	Hours/Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	Pharm. Org. Chemistry-III	4	20	80	100	3
2	Human Anatomy & Physiology-II	4	20	80	100	3
3	Pharm. Microbiology & Immunology-II	4	20	80	100	3
4	Environmental sciences	4	20	80	100	3
5	PHARMACY MANAGEMENT	4	20	80	100	3
6.	tutorials	4				
	Total	24	100	400	500	

#### PRATICAL PAPERS:

S.No	Subjects	Hours/Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	Pharm. Org. Chemistry-II	6	20	80	100	4
2	Human Anatomy & Physiology	6	20	80	100	4
	Total	12	40	160	200	

@ Two sessional exams will be conducted and their average will be taken



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### 3.2. Semester B.PHARM III YEAR

#### THEORY PAPERS:

S.No	Subjects	Hours/ Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	MEDICINAL CHEMISTRY – I (Natural Products)	5	20	80	100	3
2	PHARMACOGNOSY – I	5	20	80	100	3
3	PHARMACOLOGY – I	4	20	80	100	3
4.	Pharmaceutical Jurisprudence	4	20	80	100	3
		18	100	400	500	

#### PRATICAL PAPERS:

S.No	Subjects	Hours/ Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	MEDICINAL CHEMISTRY – I (Natural Products)	6	20	80	100	4
2	PHARMACOGNOSY – I	6	20	80	100	4
3	Pharmacology -I	6	20	80	100	4
	Total	18	60	240	300	



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Note: The Students are expected to be acquainted with amendments to the above Acts.

#### 4.1. Semester B.PHARM IV YEAR

##### THEORY PAPERS:

S.No	Subjects	Hours/Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	PHARMACEUTICAL TECHNOLOGY-I (Dosage forms)	6	20	80	100	3
2	PHARMACOGNOSY – II	6	20	80	100	3
3	PHARMACOLOGY – II AND TOXICOLOGY	6	20	80	100	3
		18	60	240	300	

##### PRATICAL PAPERS:

S.No	Subjects	Hours/Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	PHARMACEUTICAL TECHNOLOGY-I (Dosage forms)	6	20	80	100	4
2	PHARMACOGNOSY – II	6	20	80	100	4
3	Pharmacology –II and TOXICOLOGY	6	20	80	100	4
	Total	18	60	240	300	



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16. Bio-assay of Acetylcholine on Frog Rectus Abdominus Muscle by different Methods.
17. Recording of DRC of Histamine on Guinea-pig ileum.
18. Bioassay of Histamine on Guinea pig ileum.
19. Demonstration of difference between Cardiac Stimulants and Cardiotonic Agents (DEMONSTRATION).
20. Drug Interaction studies ACh X SCh, ACh X Pilocarpine.
21. Study of Different types of Antagonism in from rectus abdominis / Rat Colon.
22. Demonstration of Effect of local Anaesthetics on Isolated preparation like rectus abdominus or rat intestine or frog rectum. Demonstration of type of antagonism by local anaesthetics.
23. Demonstration of effect of drugs on coronary blood vessels (DEMONSTRATION).

#### 4.2. Semester B.PHARM IV YEAR

##### THEORY PAPERS:

S.No	Subjects	Hours/Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	PHARMACEUTICAL BIOTECHNOLOGY	6	20	80	100	3
2	BIOPHARMACEUTICS AND PHARMACOKINETICS	4	20	80	100	3
3	MEDICINAL CHEMISTRY – II (Synthetic)	6	20	80	100	3
4	Hospital and clinical Pharmacy	4	60	240	300	

##### PRATICAL PAPERS:

S.No	Subjects	Hours/Week	Sessional Marks	Annual Marks	Total Marks	Exam Duration (hrs)
1	PHARMACEUTICAL BIOTECHNOLOGY	6	20	80	100	4
2	BIOPHARMACEUTICS AND PHARMACOKINETICS	6	20	80	100	4
3	MEDICINAL CHEMISTRY – II (Synthetic)	6	20	80	100	4
	Total	18	60	240	300	



  
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**Glycosides:** Definition, and  $\alpha$ ,  $\beta$  – glycosidic linkages, chemical and Enzymatic hydrolysis, examples of c-glycosides, N-glycosides, S –glycosides, O –glycosides, ester glycosides and uses glycosides (physiological/ pharmaceutical importance.)

### UNIT - III

**Amino acids:** Definition, Classification, Essential amino acids, configuration, Three important methods of preparation of amino acids, physical properties. Zwitter ionic nature, isoelectric point, peptide synthesis and important reactions of amino acids.

### Unit -IV

**Polypeptides and proteins:** Definition, Classification of proteins, Denaturation of proteins, Isoelectric point, C-terminal and N-terminal concept end group analysis peptide synthesis, Brief account of primary, secondary and tertiary structure. A brief account of the Pharmaceutical importance of amino acids, polypeptides and proteins.

### UNIT - V

**Stereochemistry of Carbon compounds (with only one Chiral centre):** Optical rotation, plane polarized light, optical activity, chirality, Notations (Assignment of Configuration), Relative Configuration (Fischer D, L configuration), Absolute configuration, Sequence rules (with examples), Enantiomers, Meso Compounds, Racemic Mixture.

**Stereochemistry of Alkenes** – cis-trans isomerism, Concept of E & Z configurations. Importance of stereochemistry in biological activity/drug action

## 2.1 T.4.HUMAN ANATOMY AND PHYSIOLOGY-I (Theory: 3hrs/week)

### UNIT – I


An introduction to human body, the tissue level organization of human body, Fundamentals of anatomy of different systems of human body – Skeletal system, Nervous system, Muscular system, Joints.

### UNIT- II

**Control system of the human body:** The special senses-sense of smell and taste, vision, hearing and equilibrium, skin, Disorders of vision and hearing

### UNIT-III



  
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**Haemopoietic system:** Composition, functions and properties of blood, formation of blood cells-RBC, WBC and platelets, blood clotting mechanism ,factors effecting blood clottong,disorders of platelets and coagulation, blood groups and their significance

**Lymphatic system:** structure and functions of lymphatic system-lymph vessels and lymph circulation, lymph organs and tissue-thymus, lymph nodes, spleen, lymph nodules, disorders of lymph and lymphatic system

#### UNIT-IV

**Respiratory system:** Anatomy of respiratory system, mechanism and regulation of respiration-exchange and transport of oxygen and carbon di oxide, control of respiration; lung volumes and capacities, respiratory disorders

#### UNIT-V

**Digestive system:** Anatomy and functions of GIT-peritoneum, mouth, pharynx, esophagus, stomach, pancreas, liver&gall bladder, small intestine and large intestine, Mechanical ,chemical digestion and absorption of food in small intestine and large intestine, nerves innervation of GIT,different types of GI motility.  
Knowledge on emesis, pyloric stenosis, peptic&duodenalulcers, dispepsis, constipation, diarrhea, piles, jaundice, cirrhosis.

### 2.1.T.5 PHARMACEUTICAL MICROBIOLOGY AND IMMUNOLOGY - I

(Theory) 3 hrs/ week]

#### UNIT – I

Scope and Introduction to Pharmaceutical Microbiology.

Study of morphology, broad classification of bacteria, yeasts, actinomycetes, protozoa, fungi and viruses.

Identification of Bacteria, theory of staining, simple, Gram`s, acid fast, negative, flagella and spore staining methods.


#### UNIT - II

Culture media, different types, Preparation, Media for bacterial, fungal & actinomycetes cultures.

Culture methods – aerobic and anaerobic cultures.

Pure culture, Different methods of isolating pure cultures, methods of preservation of microbial cultures.



  
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## **II.2.2.T.3 ENVIRONMENTAL SCIENCES**

**(Theory) [2hrs/week]**

### **UNIT-I**

#### **The Multidisciplinary nature of environmental studies:**

#### **Definition, scope and importance.**

#### **Natural Resources:**

- a) *Forest resources:* Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- b) *Water resources:* Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- c) *Mineral resources:* Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) *Food resources:* World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies
- e) *Energy resources:* Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources, case studies.  
*Land resources:* Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

### **UNIT-II**

#### **Ecosystems**

Concept of an ecosystem. Structure and function of an ecosystem. Producers, Consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

- a) Forest ecosystem
- b) Grassland ecosystem,
- c) Desert ecosystem,
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

### **UNIT-III**

#### **Biodiversity and its conservation**

Introduction- Definition: genetic, species and ecosystem diversity.



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Biogeographically, classification of India. Value of biodiversity: consumptive use, productive use, and social, ethical, aesthetic and option values, Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ conservation of biodiversity

## UNIT-IV

### Environmental Pollution

Definition, causes, effects and control measures of:

- a) Air pollution, b) Water pollution, c) Soil pollution, d) Marine pollution, e) Noise pollution, f) Thermal pollution and g) Nuclear hazards solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

## UNIT-V

### Social Issues and the Environment

From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear Accidents and holocaust.

*Case studies:* Wasteland reclamation. Consumerism and waste products. Environment protection Act. Air (prevention and Control of pollution) Act. Water (prevention and control of pollution) Act, Wildlife protection Act, and Forest conservation Act, Issues involved in enforcement of environmental legislation. Public awareness.

Human population and the Environment

Population growth, variation among nations. Population explosion – Family welfare programme. Environment and human health, Human Rights. Value Education. HIV / AIDS Women and child welfare, Role of Information, Technology in Environment and human health. Case studies.



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## 2.2 T.4.HUMAN ANATOMY AND PHYSIOLOGY-II (Theory: 4hrs/week)

### UNIT-I

**Central nervous system:** Classification of nerves, their origin, innervation, transmission and functions – spinal nerves and cranial nerves, electrical signals in neurons, signal transmission at synapses, introduction to neurotransmitters, physiology of different parts of brain and spinal cord

### Unit-II

**Autonomous nervous system:** ANS neurotransmitters, physiological effects of ANS neurotransmitters, autonomic reflexes

### Unit-III

**Cardio vascular system:** Anatomy of heart, heart valves and circulation of blood, cardiac muscle tissue and cardiac conduction system, cardiac cycle, cardiac output, disorders of cardiac rhythm.

Knowledge on hypertension, myocardial ischemia and infarction and congestive heart failure.

Structure and functions of blood vessels, capillary exchange, factors effecting blood flow, control of B.P and blood flow.

### UNIT-IV

**Endocrine system:** Principles of hormone activity and mechanism of hormone action control of hormone secretion, hypothalamus&pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreatic islets.

Hormonal regulation of metabolism, growth development, testicular fuction, ovary, fertilization, pregnenecy and lactation.

### UNIT – V

**Body fluids and renal function:** Anatomy of kidneys, nephron and their functions.

Fluid compartments and fluid balance, electrolyte in body fluid and their balance.

Acid-base balance.



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### **3.2. T.4. PHARMACEUTICAL JURISPRUDENCE**

(Theory) [4Hrs\week]

#### **UNIT - I**

Development of Pharmaceutical and drug legislation in India.

Legislation to regulate the import, manufacture, distribution and sale of drugs and cosmetics. The Drugs and Cosmetic Act, 1940 and Drugs and Cosmetics Rules, 1945, as corrected up to-date.

Legislation to regulate the profession of pharmacy. The Pharmacy Act, 1948.

#### **UNIT - II**

Legislation to control the advertisements, excise duties and prices of drugs.

- a) The Drugs and Magic Remedies (Objectionable Advertisement) Act.
- b) The Medicinal and Toilet Preparations (Excise duties) Act, and Rule of 1956.
- c) Drugs (Prices Control) Order, as corrected up to –date.

#### **UNIT – III**

Legislations to control the operations regulating the Dangerous Drugs, Poisons and Opium, the Narcotic Drugs and Psychotropic Substances Act, 1985.

#### **UNIT – IV**

Legislations affecting Pharmaceutical and Food Industry.

Industries (Development and Regulations) Act, 1951.

#### **UNIT – V**

- a) The India Patents and Design Act, 1970 with reference to the Drugs and Pharmaceutical, only.
- b) Prevention of Food Adulteration Act.
- c) The factories act 1948 and the amendments
- d) Consumer protection act 1986
- e) Intellectual property rights – a brief introduction to various IPRs.
- f) Case histories involving different Acts.



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### 3.2. P.1. MEDICINAL CHEMISTRY – I

#### (Natural Products)

(Practical) [6 Hrs/week]

1. Preparation of different Alkaloid testing reagents like Dragendroff, Mayer's Wagner's, etc. and testing some alkaloids and Plant extracts using these reagents.
2. Identification of Alkaloids by specific colour tests.
3. Tests for steroids, steroidal glycosides and cardiac glycosides. Liberman-Burchard test, Salkowski reaction, Kedde reaction, etc.
4. Tests for flavanoids and their glycosides. Shinoda Test (Mg /Hcl test), FeCl<sub>3</sub> test.
5. TLC Examination of Alkaloids, Steroids, Steroidal Glycosides and Cardiac Glycosides.
6. Identification of natural products.
7. Isolation of phytochemicals:
  - a. Diosgenin - from Fenugreek or Dioscorea Yams.
  - b. Strychnine & Brucine - from Nux-vomica seeds.
8. Estimations of the following.
9. Ascorbic acid(Raw materila, tablets and injections)
10. Vitamin B1(Gravimetry).
11. Penicillin(alkalimetry).
12. Alkaloid (by gravimetry).
13. Eugenol content in Clove oil.
14. Citral by Hydroxylamine hydrochloride.
15. Assay of camphor by gravimetry (hydroxylamine method)
16. organoleptic testing of terpenoids and terpenoid containing materials

### 3.2. T.2. PHARMACOGNOSY – I

(Theory)[5 hrs/week]

#### UNIT – I

A) Definition, History, and Scope of Pharmacognosy.

Crude drugs: Organized and unorganized crude drugs, Classification of crude drugs.

Scheme for pharmacognostic study of crude drugs.

Cultivation, Collection, Processing of Crude drugs:



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Merits and demerits of cultivation of crude drugs. Exogenous factors affecting cultivation. A brief account of pests and methods of pest control. A brief introduction to plant growth regulators. Collection and processing of crude drugs.

Quality Control of Crude Drugs: Crude drug adulteration; Types of adulterants, evaluation of a crude drug and methods of evaluation.

## **UNIT – II**

Biogenesis of natural products:

- A) A brief introduction to biosynthesis.
- B) A brief account of primary and secondary metabolite's production from carbon metabolism in plants.
- C) Production of amino acid by shikimic acid pathway.
- D) Biogenesis of Atropine, Morphine, Isoprenoid compounds and cardiac glycosides.

## **UNIT – III**

- A) A brief introduction to Ayurveda and to its preparation like Arishtas, Asavas, Gutikas, Tailas, Churnas, Lehyas and Bhasmas.
- B) A brief account phytopharmaceuticals of commercial significance.

## **UNIT – IV**

- A) General introduction to carbohydrates, lipids, enzymes and proteins and tannins.
- B) Systematic pharmacognostic study of agar and isapgol.
- C) Biological source, collection, preparation, chemical constituents, tests for identification and uses of following.  
Guargum, Gum acacia, Honey, Pectin, Starch, Sterculia and Tragacanth, Almond oil, Bees wax, Castor oil, Cocoa butter, Cod-liver, Hydnocarpus oil, Kokum butter, Lard, Linseed oil, Olive oil, Shark liver oil and Wool fat, Diastase, Papain, Pepsin, Trypsin, Pancreatin and Gelatin, Pale catechu, Black catechu, Gall and Myrobalan.

## **UNIT – V**

1. Study of mineral drugs; Bentonite, Kaolin, Kieselguhr and Talc.



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2. Study of fibers used in pharmacy; Asbestos, Cotton, Glass-wool, Nylon, Polyester, Silk and Wool.
3. A brief introduction to plant bitters and sweeteners.
4. A brief introduction to natural colors and dyes.
5. An introduction to potential cardio-vascular, anticancer/cytotoxic and antibiotic drugs from marine sources.



  
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7. Matrix sustained release tablets

**4.1. T.2. PHARMACOGNOSY-II**  
(Theory) [6hrs/week]

**UNIT – I**

General introduction to Volatile Oils and Resins.  
Systematic pharmacognostic study of following: Cardamom, Cinnamon, Cassia, Clove and Nutmeg, Capsicum, Ginger and Turmeric.  
Biological source, collection and preparation, chemical constituents and tests for identification, uses, Substitutes and adulterants of following:  
Chenopodium, Eucalyptus oil, Gaultheria, Lemon peel, Lemon grass oil, Oil of citronella, Orange peel, Mentha oil, Musk, palmarosa and Sandalwood.  
Asafoetida, Balsam of Tolu, Balsam of Peru, Benzoin, Guggul, Myrrh, Podophyllum and Storax.  
General pharmacognostic features of Umbelliferous fruit (Fennel, Dill, Coriander, Caraway) and their biological sources, chemical constituents, uses and adulterants / substituents (if any).

**UNIT – II**

General introduction to Alkaloids.  
Systematic pharmacognostic study of following:  
Cinchona, Ergot, Ephedra, Ipecac, Kurchi, Rauwolfia and Vasaka.  
Biological source, diagnostic features, chemical constituents and Tests for identification, uses, adulterants and substituents of following:  
Belladonna, Catharanthus, Coca, Cola, Coffee, Colchicum, Datura, Duboisia, Hyosyamus, Lobelia, Opium, Nux-vomoca, Pilocarpus, Solanum, Tobacco, Tea and Withania.

**UNIT – III**

General introduction to Glycosides.  
Systematic pharmacognostic study of following:  
Aloe, Ammi majus, Digitalis, Liquorice, Senna and Saffron.  
Biological source, diagnostic features, chemical constituents and tests for identification, uses, adulterants and substitutes of following:  
Ammi visnaga, Cascara, Chirata, Dioscoria, Gentian, Ginseng, Squill, Strophanthus and Quassia.



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## UNIT – IV

Historical development of plant tissue culture: Types of cultures, Nutritional requirements, growth and their maintenance. Applications of plant tissue culture in production of pharmaceutically important secondary metabolites.

## UNIT – V

Source, structure, commercial significance and uses of novel biochemicals – Artemisinin, Asiaticosides, Bacoposides, Camptothecin, Gymnemic acid, Neem derivatives and taxol.

### 4.1.P.2. PHARMACOGNOSY – II

(Practicals) [6hrs/week]

#### List of experiments

1. Isolation of starch from potatoes.
2. Preparation of cetyl alcohol from Spermaceti.
3. Isolation of Piperine from black pepper.
4. Isolation of Bixin.
5. Isolation of Curcuminoids.
6. TLC profile of nux vomica / cinchona alkaloids.
7. TLC of glycosides
8. TLC profile of peppermint oil.
9. Detection of alkaloids by chemical tests.
10. Detection of glycosides.
11. Detection of steroidal compounds.
12. Detection of flavonoids.
13. Identification of following powdered crude drugs and their combinations with the help of organoleptic, microscopic, micro chemical nadf chemical methods (if any).

a. Senna	b. Vasaka.	c. Cinchona.	d. Consia.
e. Kurchi.	f. Quassia.	G. Ipecac.	h. Rauwolfia.
i. Squill.	J. Ginger	k. Fennel/ Coriander	
l. Nux Vomica.	m. Clove.		

And some exercises on powdered crude drug mixtures

14. Anatomy of following crude drugs.

a. Senna.	b. Cassia/ Cinnamon	c. Clove.
d. Ephedra.	E. Fennel.	f. Linseed/nux vomica.
g. Ipecac.	h. Quassia	I. Ginger.
15. Spotting of crude drugs mentioned in theory (minimum 30 crude drugs).



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Definition Chemical Classification, SAR and mechanism of action and synthesis of the specified drugs in the following:

<b>Sulpha drugs</b>	:	Sulphamethoxazole, Sulphameter
<b>Anti tuberculars</b>	:	Isonicotinic acid hydrazide and ethambutol
<b>Anti leprotics</b>	:	Dapsone
<b>Antiamoebics</b>	:	Metronidazole, Diloxanide furoate
<b>Anthelmintics</b>	:	Diethylcarbamazine citrate, pyrantel pamoate, mebendazole.
<b>Antimalarial Drugs</b>	:	Chloroquine, Primaquine and pyrimethamine
<b>Anticancer Drugs</b>	:	Chlorambucil, Busulphan, Procarbazine, Carmustine, 5-Fluorourasil, 5-Mercaptopurine and Methotrexate.
<b>Anti viral Drugs</b>	:	Aciclovir, Zidovudine
<b>Antifungal Agents</b>	:	Clotrimazole and Ketoconazole.

#### 4.2. T.4. HOSPITAL AND CLINICAL PHARMACY

(Theory) [4Hrs/Week]

##### SECTION – A: Hospital Pharmacy

##### UNIT – I

###### **Introduction to hospitals and hospital pharmacy**

**Hospital pharmacy:** Objectives and functions, organization, planning and administration of modern hospital pharmacy services, location, layout, personal, qualifications, requirements, abilities and evaluation of hospital pharmacist, workload and remuneration of hospital pharmacist.

**Pharmacy and therapeutic committee** – Purpose, organization and functions.

**Hospital formulary** – Organization, formulary content, preparation and distribution. Pharmacy procedural manual preparation and publication.

**Hospital committees** – Infection control committee, Antibiotic committee and Research and ethics committee.

Role of hospital pharmacist in hospital committees and practice of Rational Drug Therapy . Drug exchange program.

##### UNIT – II

**Hospital manufacturing:** Economical considerations and estimation of demands lay out, raw materials, production, planning, requirements, manpower requirements and quality assurance, manufacturing of (including repacking and



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prepacking ) sterile products (small and large volume Parenteral), non sterile products, total parenteral nutrition and intravenous additives.

**Drug distribution:** Outpatient and Inpatient services, unit dose drug distribution systems, floor ward stock systems, satellite pharmacy services, central sterile services and bedside pharmacy.

**Radiopharmaceuticals:** Radioisotope committee, role of hospital pharmacist in isotope and non-isotope pharmacy.

### **SECTION – B: Clinical Pharmacy**

#### **UNIT - III**

Definition, scope, history and development of clinical pharmacy.

**Professional activities of the clinical pharmacist:** Drug therapy monitoring (medication chart review, clinical review, TDM and pharmacist interventions), drug interactions, adverse drug reaction management, medication history review and patient counseling.

**Patient data analysis:** Clinical laboratory tests used in the evaluation of common disease states, interpretation of test results of liver function tests, pulmonary function tests, haemogram and renal function tests.

**Drug and poison information services:** Introduction of drug information, resources available, design of literature searches, critical evaluation of drug information and literature, preparation of written and verbal reports, development of a drug information data base and emergency treatment of poisoning.

#### **UNIT – IV**

**Pathophysiology, drug therapy and critical analysis of rational use of drugs in the following disorders:**

**Cardiovascular disorders:** Hypertension, congestive cardiac failure, ischemic heart disease.

**Respiratory disorders:** Asthma and chronic obstructive airways disease.

**Renal disorders:** Acute and chronic renal failure.

**Hematological disorders:** Anemia.

**Endocrine disorders:** Diabetes mellitus.

**Bone & Joint disorders:** Rheumatoid arthritis, Osteoarthritis, Gout.

**Ophthalmic disorders:** Glaucoma.

#### **UNIT – V**



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**Pathophysiology, drug therapy and critical analysis of rational use of drugs in the following disorders:**

**Nervous diseases:** Epilepsy and Parkinson's disease.

**Psychiatric disorders:** Schizophrenia, depression and anxiety.

**Gastrointestinal disorders:** Peptic ulcer disease, inflammatory bowel diseases and hepatitis.

**Infectious disease:** Respiratory tract infections, Typhoid, Urinary tract infections, tuberculosis, leprosy and AIDS.

**Oncological disorders:** Leukaemia, Hodgkin's disease.



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# Kakatiya University, Warangal



## Syllabus for the Bachelor of Pharmacy (B. Pharm) Four Years Course From the academic year 2017-2018 onwards

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### 9. Course of study

The course of study for B. Pharm shall include Semester Wise Theory & Practical as given in Table – I to VIII. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – I to VIII.

**Table-I: Course of study for semester I**

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP101T	Human Anatomy and Physiology I- Theory	3	1	4
BP102T	Pharmaceutical Analysis I – Theory	3	1	4
BP103T	Pharmaceutics I – Theory	3	1	4
BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	1	4
BP105T	Communication skills – Theory *	2	-	2
BP106RBT	Remedial Biology/	2	-	2
BP106RMT	Remedial Mathematics – Theory*	2	-	2
BP107P	Human Anatomy and Physiology – Practical	4	-	2
BP108P	Pharmaceutical Analysis I – Practical	4	-	2
BP109P	Pharmaceutics I – Practical	4	-	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical	4	-	2
BP111P	Communication skills – Practical*	2	-	1
BP112RBP	Remedial Biology – Practical*	2	-	1
<b>Total</b>		<b>32/34<sup>S</sup>/36<sup>#</sup></b>	<b>4</b>	<b>27/29<sup>S</sup>/30<sup>#</sup></b>

<sup>#</sup>Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

<sup>S</sup>Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

\* Non University Examination (NUE)



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**Table-II: Course of study for semester II**

Course Code	Name of the course	No. of hours	Tutorial	Credit points
BP201T	Human Anatomy and Physiology II – Theory	3	1	4
BP202T	Pharmaceutical Organic Chemistry I – Theory	3	1	4
BP203T	Biochemistry – Theory	3	1	4
BP204T	Pathophysiology – Theory	3	1	4
BP205T	Computer Applications in Pharmacy – Theory *	3	-	3
BP206T	Environmental sciences – Theory *	3	-	3
BP207P	Human Anatomy and Physiology II –Practical	4	-	2
BP208P	Pharmaceutical Organic Chemistry I– Practical	4	-	2
BP209P	Biochemistry – Practical	4	-	2
BP210P	Computer Applications in Pharmacy – Practical*	2	-	1
<b>Total</b>		<b>32</b>	<b>4</b>	<b>29</b>

\*Non University Examination (NUE)

**Table-III: Course of study for semester III**

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1	4
BP302T	Physical Pharmaceutics I – Theory	3	1	4
BP303T	Pharmaceutical Microbiology – Theory	3	1	4
BP304T	Pharmaceutical Engineering – Theory	3	1	4
BP305P	Pharmaceutical Organic Chemistry II – Practical	4	-	2
BP306P	Physical Pharmaceutics I – Practical	4	-	2
BP307P	Pharmaceutical Microbiology – Practical	4	-	2
BP 308P	Pharmaceutical Engineering –Practical	4	-	2
<b>Total</b>		<b>28</b>	<b>4</b>	<b>24</b>



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**Table-IV: Course of study for semester IV**

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP401T	Pharmaceutical Organic Chemistry III– Theory	3	1	4
BP402T	Medicinal Chemistry I – Theory	3	1	4
BP403T	Physical Pharmaceutics II – Theory	3	1	4
BP404T	Pharmacology I – Theory	3	1	4
BP405T	Pharmacognosy and Phytochemistry I– Theory	3	1	4
BP406P	Medicinal Chemistry I – Practical	4	-	2
BP407P	Physical Pharmaceutics II – Practical	4		2
BP408P	Pharmacology I – Practical	4	-	2
BP409P	Pharmacognosy and Phytochemistry I – Practical	4	-	2
<b>Total</b>		<b>31</b>	<b>5</b>	<b>28</b>

**Table-V: Course of study for semester V**

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP501T	Medicinal Chemistry II – Theory	3	1	4
BP502T	Industrial PharmacyI– Theory	3	1	4
BP503T	Pharmacology II – Theory	3	1	4
BP504T	Pharmacognosy and Phytochemistry II– Theory	3	1	4
BP505T	Pharmaceutical Jurisprudence – Theory	3	1	4
BP506P	Industrial PharmacyI – Practical	4	-	2
BP507P	Pharmacology II – Practical	4	-	2
BP508P	Pharmacognosy and Phytochemistry II – Practical	4	-	2
<b>Total</b>		<b>27</b>	<b>5</b>	<b>26</b>



  
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**Table-VIII: Course of study for semester VIII**

Course code	Name of the course	No. of hours	Tutorial	Credit points
BP801T	Biostatistics and Research Methodology	3	1	4
BP802T	Social and Preventive Pharmacy	3	1	4
BP803ET	<b>Elective – 1</b>	3	1	4
I	Pharmaceutical Marketing			
II	Pharmaceutical Regulatory Science			
III	Pharmacovigilance			
IV	Quality Control and Standardizations of Herbals			
V	Computer Aided Drug Design			
BP804ET	<b>Elective – 2</b>	3	1	4
I	Cell and Molecular Biology			
II	Cosmetic Science			
III	Experimental Pharmacology			
IV	Advanced Instrumentation Techniques			
V	Dietary Supplements and Nutraceuticals			
BP805PW	Project Work	12	-	6
<b>Total</b>		<b>24</b>	<b>4</b>	<b>22</b>

**Table-IX: Semester wise credits distribution**

Semester	Credit Points
I	27/29 <sup>§</sup> /30 <sup>#</sup>
II	29
III	24
IV	28
V	26
VI	30
VII	24
VIII	22
Extracurricular/ Co curricular activities	01*
<b>Total credit points for the program</b>	<b>211/213<sup>§</sup>/214<sup>#</sup></b>

\* The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the university from time to time.

<sup>§</sup>Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

<sup>#</sup>Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.





## BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

45 Hours

**Scope:** This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

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

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

### Course Content:

#### Unit I

10 hours

- **Introduction to human body**

Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

- **Cellular level of organization**

Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine

- **Tissue level of organization**

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

#### Unit II

10 hours

- **Integumentary system**

Structure and functions of skin

- **Skeletal system**

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system

Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction



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- **Joints**  
Structural and functional classification, types of joints movements and its articulation

### Unit III

10 hours

- **Body fluids and blood**
- Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.
- **Lymphatic system**  
Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

### Unit IV

08 hours

#### **Peripheral nervous system:**

Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.

Origin and functions of spinal and cranial nerves.

- **Special senses**  
Structure and functions of eye, ear, nose and tongue and their disorders.

### Unit V

07 hours

- **Cardiovascular system**  
Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.



  
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## BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)

45 Hours

**Scope:** This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

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

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

### Course Content:

#### Unit I

10 hours

- **Nervous system**

Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

#### Unit II

06 hours

- **Digestive system**

Anatomy of GI Tract with special reference to anatomy and functions of stomach, ( Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine



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and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.

- **Energetics**

Formation and role of ATP, Creatinine Phosphate and BMR.

### Unit III

- **Respiratory system**

**10 hours**

Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration

Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

- **Urinary system**

Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

### Unit IV

**10 hours**

- **Endocrine system**

Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

### Unit V

**09 hours**

- **Reproductive system**

Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition

- **Introduction to genetics**

Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance



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## BP 106RBT.REMEDIAL BIOLOGY (Theory)

30 Hours

**Scope:** To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

**Objectives:** Upon completion of the course, the student shall be able to

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant
- know understand the basic components of anatomy & physiology animal with special reference to human

### UNIT I

07 Hours

#### Living world:

- Definition and characters of living organisms
- Diversity in the living world
- Binomial nomenclature
- Five kingdoms of life and basis of classification. Salient features of Monera, Potista, Fungi, Animalia and Plantae, Virus,

#### Morphology of Flowering plants

- Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.
- General Anatomy of Root, stem, leaf of monocotyledons & Dicotylidones.

### UNIT II

07 Hours

#### Body fluids and circulation

- Composition of blood, blood groups, coagulation of blood
- Composition and functions of lymph
- Human circulatory system
- Structure of human heart and blood vessels
- Cardiac cycle, cardiac output and ECG

#### Digestion and Absorption

- Human alimentary canal and digestive glands
- Role of digestive enzymes
- Digestion, absorption and assimilation of digested food

#### Breathing and respiration

- Human respiratory system
- Mechanism of breathing and its regulation
- Exchange of gases, transport of gases and regulation of respiration
- Respiratory volumes



### UNIT III

07 Hours

#### Excretory products and their elimination

- Modes of excretion
- Human excretory system- structure and function
- Urine formation
- Rennin angiotensin system

#### Neural control and coordination

- Definition and classification of nervous system
- Structure of a neuron
- Generation and conduction of nerve impulse
- Structure of brain and spinal cord
- Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

#### Chemical coordination and regulation

- Endocrine glands and their secretions
- Functions of hormones secreted by endocrine glands

#### Human reproduction

- Parts of female reproductive system
- Parts of male reproductive system
- Spermatogenesis and Oogenesis
- Menstrual cycle

### UNIT IV

05 Hours

#### Plants and mineral nutrition:

- Essential mineral, macro and micronutrients
- Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

#### Photosynthesis

- Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

### UNIT V

04 Hours

**Plant respiration:**Respiration, glycolysis, fermentation (anaerobic).

#### Plant growth and development

- Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators

#### Cell - The unit of life

- Structure and functions of cell and cell organelles.Cell division

#### Tissues

- Definition, types of tissues, location and functions.



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### **Text Books**

- a. Text book of Biology by S. B. Gokhale
- b. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

### **Reference Books**

- a. A Text book of Biology by B.V. Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy
- c. Botany for Degree students By A.C.Dutta.
- d. Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthkrishnan.
- e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate



  
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## BP105T.COMMUNICATION SKILLS (Theory)

30 Hours

**Scope:** This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

### Objectives:

Upon completion of the course the student shall be able to

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively manage the team as a team player
4. Develop interview skills
5. Develop Leadership qualities and essentials

### Course content:

#### UNIT – I

07 Hours

- **Communication Skills:** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
- **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers
- **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

#### UNIT – II

07 Hours

- **Elements of Communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication
- **Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style



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**UNIT – III**

**07 Hours**

- **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations
- **Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication
- **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

**UNIT – IV**

**05 Hours**

- **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview
- **Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

**UNIT – V**

**04 Hours**

- **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion



  
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## BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)

45 Hours

**Scope:** This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

**Objectives:** Upon completion of the course, the student shall be able to understand:

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
4. The code of ethics during the pharmaceutical practice

### Course Content:

#### UNIT-I

10 Hours

##### Drugs and Cosmetics Act, 1940 and its rules 1945:

Objectives, Definitions, Legal definitions of schedules to the Act and Rules

Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties.

Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,

Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

#### UNIT-II

10 Hours

##### Drugs and Cosmetics Act, 1940 and its rules 1945.

Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)

Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties

Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.

Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

#### UNIT-III

10 Hours

- **Pharmacy Act –1948:** Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and





#### Penalties

- **Medicinal and Toilet Preparation Act –1955:** Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.
- **Narcotic Drugs and Psychotropic substances Act-1985 and Rules:** Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

#### UNIT-IV

08 Hours

- **Study of Salient Features of Drugs and Magic Remedies Act and its rules:** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties
- **Prevention of Cruelty to animals Act-1960:** Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties
- **National Pharmaceutical Pricing Authority:** Drugs Price Control Order (DPCO)-2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

#### UNIT-V

07 Hours

- **Pharmaceutical Legislations** – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee
- **Code of Pharmaceutical ethics** Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath
- **Medical Termination of Pregnancy Act**
- **Right to Information Act**
- **Introduction to Intellectual Property Rights (IPR)**

#### Recommended books: (Latest Edition)

1. Forensic Pharmacy by B. Suresh



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2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K.Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9. Bare Acts of the said laws published by Government. Reference books (Theory)



  
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## BP 206 T. ENVIRONMENTAL SCIENCES (Theory)

30 hours

**Scope:** Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

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

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

### Course content:

#### Unit-I

10hours

The Multidisciplinary nature of environmental studies

Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

#### Unit-II

10hours

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### Unit- III

10hours

Environmental Pollution: Air pollution; Water pollution; Soil pollution



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**Recommended Books (Latest edition):**

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clarendon Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment



  
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## BP203 T. BIOCHEMISTRY (Theory)

45 Hours

**Scope:** Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

**Objectives:** Upon completion of course student shell able to

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

### Course Content:

#### UNIT I

08 Hours

- **Biomolecules**

Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

- **Bioenergetics**

Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.

Energy rich compounds; classification; biological significances of ATP and cyclic AMP

#### UNIT II

10 Hours

- **Carbohydrate metabolism**

Glycolysis – Pathway, energetics and significance

Citric acid cycle- Pathway, energetics and significance

HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency

Glycogen metabolism Pathways and glycogen storage diseases (GSD)

Gluconeogenesis- Pathway and its significance

Hormonal regulation of blood glucose level and Diabetes mellitus

- **Biological oxidation**

Electron transport chain (ETC) and its mechanism.



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Oxidative phosphorylation & its mechanism and substrate level phosphorylation

Inhibitors ETC and oxidative phosphorylation/Uncouplers

### UNIT III

10 Hours

- **Lipid metabolism**

- β-Oxidation of saturated fatty acid (Palmitic acid)



  
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Formation and utilization of ketone bodies; ketoacidosis

De novo synthesis of fatty acids (Palmitic acid)

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

- **Amino acid metabolism**

General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders

Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alkaptonuria, tyrosinemia)

Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline

Catabolism of heme; hyperbilirubinemia and jaundice

#### UNIT IV

10 Hours

- **Nucleic acid metabolism and genetic information transfer**

Biosynthesis of purine and pyrimidine nucleotides

Catabolism of purine nucleotides and Hyperuricemia and Gout disease

Organization of mammalian genome

Structure of DNA and RNA and their functions

DNA replication (semi conservative model)

Transcription or RNA synthesis

Genetic code, Translation or Protein synthesis and inhibitors



  
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## UNIT V

07 Hours

- **Enzymes**

Introduction, properties, nomenclature and IUB classification of enzymes

Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)

Enzyme inhibitors with examples

Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation

Therapeutic and diagnostic applications of enzymes and isoenzymes

Coenzymes –Structure and biochemical functions

### BP 209 P. BIOCHEMISTRY (Practical)

4 Hours / Week

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.



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## BP 405 T.PHARMACOGNOSY AND PHYTOCHEMISTRY I (Theory)

45 Hours

**Scope:** The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

**Objectives:** Upon completion of the course, the student shall be able

1. to know the techniques in the cultivation and production of crude drugs
2. to know the crude drugs, their uses and chemical nature
3. know the evaluation techniques for the herbal drugs
4. to carry out the microscopic and morphological evaluation of crude drugs

### Course Content:

#### UNIT-I

10 Hours

##### Introduction to Pharmacognosy:

- (a) Definition, history, scope and development of Pharmacognosy
- (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture
- (c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins).

##### Classification of drugs:

Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs

##### Quality control of Drugs of Natural Origin:

Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.

Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, camera lucida and diagrams of microscopic objects to scale with camera lucida.

#### UNIT-II

10 Hours

##### Cultivation, Collection, Processing and storage of drugs of natural origin:

Cultivation and Collection of drugs of natural origin  
Factors influencing cultivation of medicinal plants.  
Plant hormones and their applications.  
Polyploidy, mutation and hybridization with reference to medicinal plants

##### Conservation of medicinal plants

#### UNIT-III

07 Hours

##### Plant tissue culture:

Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance.  
Applications of plant tissue culture in pharmacognosy.  
Edible vaccines

  
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#### UNIT IV

10 Hours

##### **Pharmacognosy in various systems of medicine:**

Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.

##### **Introduction to secondary metabolites:**

Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins

#### UNIT V

08 Hours

Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs

##### **Plant Products:**

Fibers - Cotton, Jute, Hemp  
Hallucinogens, Teratogens, Natural allergens

##### **Primary metabolites:**

General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites:

**Carbohydrates:** Acacia, Agar, Tragacanth, Honey

**Proteins and Enzymes :** Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).

**Lipids(Waxes, fats, fixed oils) :** Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax

##### **Marine Drugs:**

Novel medicinal agents from marine sources

  
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## BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory)

45Hours

**Scope:** The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine

**Objectives:** Upon completion of the course, the student shall be able

1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
2. to understand the preparation and development of herbal formulation.
3. to understand the herbal drug interactions
4. to carryout isolation and identification of phytoconstituents

### Course Content:

#### UNIT-I

7 Hours

##### Metabolic pathways in higher plants and their determination

- a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway.
- b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

#### UNIT-II

14 Hours

General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites:

**Alkaloids:** Vinca, Rauwolfia, Belladonna, Opium,

**Phenylpropanoids and Flavonoids:** Lignans, Tea, Ruta

**Steroids, Cardiac Glycosides & Triterpenoids:** Liquorice, Dioscorea, Digitalis

**Volatile oils:** Mentha, Clove, Cinnamon, Fennel, Coriander,

**Tannins:** Catechu, Pterocarpus

**Resins:** Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony

**Glycosides:** Senna, Aloes, Bitter Almond

**Iridoids, Other terpenoids & Naphthaquinones:** Gentian, Artemisia, taxus, carotenoids

#### UNIT-III

06 Hours

Isolation, Identification and Analysis of Phytoconstituents

- a) Terpenoids: Menthol, Citral, Artemisin
- b) Glycosides: Glycyrrhetic acid & Rutin
- c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine
- d) Resins: Podophyllotoxin, Curcumin

#### UNIT-IV

10 Hours

Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

#### UNIT V

8 Hours

##### Basics of Phytochemistry

Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.





## BP 802T SOCIAL AND PREVENTIVE PHARMACY

Hours: 45

### Scope:

The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

### Objectives:

After the successful completion of this course, the student shall be able to:

- Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related to health and pharmaceutical issues

### Course content:

#### Unit I:

10 Hours

**Concept of health and disease:** Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

**Social and health education:** Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

**Sociology and health:** Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

**Hygiene and health:** personal hygiene and health care; avoidable habits

#### Unit II:

10 Hours

**Preventive medicine:** General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

#### Unit III:

10 Hours

**National health programs, its objectives, functioning and outcome of the following:** HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National





programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

**Unit IV:**

**08 Hours**

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

**Unit V:**

**07 Hours**

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

**Recommended Books (Latest edition):**

1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2<sup>nd</sup> Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4<sup>th</sup> Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6<sup>th</sup> Edition, 2014, ISBN: 9789351522331, JAYPEE Publications
4. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2<sup>nd</sup> Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
5. Park Textbook of Preventive and Social Medicine, K Park, 21<sup>st</sup> Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.
6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

**Recommended Journals:**

1. Research in Social and Administrative Pharmacy, Elsevier, Ireland



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# भारत का राजपत्र The Gazette of India

साप्ताहिक/WEEKLY

प्राधिकार से प्रकाशित  
PUBLISHED BY AUTHORITY

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इस भाग में भिन्न पृष्ठ संख्या दी जाती है जिससे कि यह अलग संकलन के रूप में रखा जा सके।  
(Separate paging is given to this Part in order that it may be filed as a separate compilation)

भाग III—खण्ड 4

[PART III—SECTION 4]

[सांविधिक निकायों द्वारा जारी की गई विविध अधिसूचनाएं जिसमें कि आदेश, विज्ञापन और सूचनाएं सम्मिलित हैं]  
[Miscellaneous Notifications including Notifications, Orders, Advertisements and Notices issued by  
Statutory Bodies]

भारतीय रिज़र्व बैंक

मुंबई-400001, दिनांक 9 अप्रैल 2008

सदर्भ : बैंपविवि. सं. आईबीडी.-14241/23.13.048/2007-08--भारतीय रिज़र्व बैंक अधिनियम, 1934 (1934 का 2) की धारा 42 की उप-धारा (6) के खण्ड (ग) के अनुसरण में भारतीय रिज़र्व बैंक इसके द्वारा निदेश देता है कि उक्त अधिनियम की दूसरी अनुसूची में निम्नलिखित परिवर्तन किये जाएं :--

“अरब बांगलादेश बैंक लिमिटेड” शब्दों के स्थान पर “एबी बैंक लिमिटेड” शब्द होंगे।

आनन्द सिन्हा

कार्यपालक निदेशक

  
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[PUBLISHED IN THE GAZETTE OF INDIA, No.19, PART III, SECTION 4]

Ministry of Health and Family Welfare  
(Pharmacy Council of India)

New Delhi, 10<sup>th</sup> May, 2008.

### **Pharm.D. Regulations 2008**

Regulations framed under section 10 of the Pharmacy Act, 1948 (8 of 1948).

(As approved by the Government of India, Ministry of Health vide, letter No.V.13013/1/2007-PMS, dated the 13<sup>th</sup> March, 2008 and notified by the Pharmacy Council of India).

No.14-126/2007-PCI.— In exercise of the powers conferred by section 10 of the Pharmacy Act, 1948 (8 of 1948), the Pharmacy Council of India, with the approval of the Central Government, hereby makes the following regulations, namely:-

#### **CHAPTER-I**

1. Short title and commencement. – (1) These regulations may be called the Pharm.D. Regulations 2008.  
(2) They shall come into force from the date of their publication in the official Gazette.
2. Pharm.D. shall consist of a certificate, having passed the course of study and examination as prescribed in these regulations, for the purpose of registration as a pharmacist to practice the profession under the Pharmacy Act, 1948.

  
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## b) Pharm.D. (Post Baccalaureate) Course -

A pass in B.Pharm from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act:

Provided that there shall be reservation of seats for the students belonging to the Scheduled Castes, Scheduled Tribes and other Backward Classes in accordance with the instructions issued by the Central Government/State Government/Union Territory Administration as the case may be from time to time.

5. Number of admissions in the above said programmes shall be as prescribed by the Pharmacy Council of India from time to time and presently be restricted as below –
  - i) Pharm.D. Programme – 30 students.
  - ii) Pharm.D. (Post Baccalaureate) Programme – 10 students.
6. Institutions running B.Pharm programme approved under section 12 of the Pharmacy Act, will only be permitted to run Pharm.D. programme. Pharm.D. (Post Baccalaureate) programme will be permitted only in those institutions which are permitted to run Pharm.D. programme.
7. Course of study. – The course of study for Pharm.D. shall include the subjects as given in the Tables below. The number of hours in a week, devoted to each subject for its teaching in theory, practical and tutorial shall not be less than that noted against it in columns (3), (4) and (5) below.

### T A B L E S

#### First Year :

S.No.	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
(1)	(2)	(3)	(4)	(5)
1.1	Human Anatomy and Physiology	3	3	1
1.2	Pharmaceutics	2	3	1
1.3	Medicinal Biochemistry	3	3	1
1.4	Pharmaceutical Organic Chemistry	3	3	1
1.5	Pharmaceutical Inorganic Chemistry	2	3	1
1.6	Remedial Mathematics/ Biology	3	3*	1
	<b>Total hours</b>	<b>16</b>	<b>18</b>	<b>6 = (40)</b>

\* For Biology

  
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**Second Year:**

S.No	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
(1)	(2)	(3)	(4)	(5)
2.1	Pathophysiology	3	-	1
2.2	Pharmaceutical Microbiology	3	3	1
2.3	Pharmacognosy & Phytopharmaceuticals	3	3	1
2.4	Pharmacology-I	3	-	1
2.5	Community Pharmacy	2	-	1
2.6	Pharmacotherapeutics-I	3	3	1
	<b>Total Hours</b>	<b>17</b>	<b>9</b>	<b>6 = 32</b>

**Third Year:**

S.No.	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
(1)	(2)	(3)	(4)	(5)
3.1	Pharmacology-II	3	3	1
3.2	Pharmaceutical Analysis	3	3	1
3.3	Pharmacotherapeutics-II	3	3	1
3.4	Pharmaceutical Jurisprudence	2	-	-
3.5	Medicinal Chemistry	3	3	1
3.6	Pharmaceutical Formulations	2	3	1
	<b>Total hours</b>	<b>16</b>	<b>15</b>	<b>5 = 36</b>

  
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**Fourth Year:**

S.No.	Name of Subject	No. of hours of Theory	No. of hours of Practical/ Hospital Posting	No. of hours of Tutorial
(1)	(2)	(3)	(4)	(5)
4.1	Pharmacotherapeutics-III	3	3	1
4.2	Hospital Pharmacy	2	3	1
4.3	Clinical Pharmacy	3	3	1
4.4	Biostatistics & Research Methodology	2	-	1
4.5	Biopharmaceutics & Pharmacokinetics	3	3	1
4.6	Clinical Toxicology	2	-	1
	<b>Total hours</b>	<b>15</b>	<b>12</b>	<b>6 = 33</b>

**Fifth Year:**

S.No.	Name of Subject	No. of hours of Theory	No. of hours of Hospital posting*	No. of hours of Seminar
(1)	(2)	(3)	(4)	(5)
5.1	Clinical Research	3	-	1
5.2	Pharmacoepidemiology and Pharmacoeconomics	3	-	1
5.3	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	2	-	1
5.4	Clerkship *	-	-	1
5.5	Project work (Six Months)	-	20	-
	<b>Total hours</b>	<b>8</b>	<b>20</b>	<b>4 = 32</b>

\* Attending ward rounds on daily basis.

  
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**APPENDIX-A**  
(See regulation 8)  
**PHARM.D. SYLLABUS**

**First Year**

**1.1 HUMAN ANATOMY & PHYSIOLOGY (THEORY)**

**Theory : 3 Hrs. /Week**

**1. Scope and Objectives:** This course is designed to impart a fundamental knowledge on the structure and functions of the human body. It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems. Since a medicament, which is produced by pharmacist, is used to correct the deviations in human body, it enhances the understanding of how the drugs act on the various body systems in correcting the disease state of the organs.

**2. Upon completion of the course the student shall be able to:**

- a. describe the structure (gross and histology) and functions of various organs of the human body;
- b. describe the various homeostatic mechanisms and their imbalances of various systems;
- c. identify the various tissues and organs of the different systems of the human body;
- d. perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes;
- e. appreciate coordinated working pattern of different organs of each system; and
- f. appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body

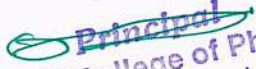
**3. Course materials:**

**Text books**

- a. Tortora Gerard J. and Nicholas, P. Principles of anatomy and physiology  
Publisher Harpercollins college New York.
- b. Wilson, K.J.W. Ross and Wilson's foundations of anatomy and physiology.  
Publisher: Churchill Livingstone, Edinburg.

**Reference books**

- a. Guyton arthur, C. *Physiology of human body*. Publisher: Holtsaunders.
- b. Chatterjee, C.C. *Human physiology*. Volume 1&11. Publisher: medical allied agency, Calcutta.
- c. Peter L. Williams, Roger Warwick, Mary Dyson and Lawrence, H.
- d. *Gray's anatomy*. Publisher: Churchill Livingstone, London.

  
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#### 4. Lecture wise program :

##### Topics

- 1 Scope of anatomy and physiology, basic terminologies used in this subject (Description of the body as such planes and terminologies)
- 2 Structure of cell – its components and their functions.
- 3 Elementary tissues of the human body: epithelial, connective, Muscular and nervous tissues-their sub-types and characteristics
- 4 a) Osseous system - structure, composition and functions of the Skeleton. (done in practical classes - 6hrs)  
b) Classification of joints, Types of movements of joints and disorders of joints (Definitions only)
- 5 Haemopoetic System  
a) Composition and functions of blood  
b) Haemopoiesis and disorders of blood components (definition of disorder)  
c) Blood groups  
d) Clotting factors and mechanism  
e) Platelets and disorders of coagulation
- 6 Lymph  
a) Lymph and lymphatic system, composition, formation and circulation.  
b) Spleen: structure and functions, Disorders  
c) Disorders of lymphatic system (definition only)
- 7 Cardiovascular system  
a) Anatomy and functions of heart  
b) Blood vessels and circulation (Pulmonary, coronary and systemic circulation)  
c) Electrocardiogram (ECG)  
d) Cardiac cycle and heart sounds  
e) Blood pressure – its maintenance and regulation  
f) Definition of the following disorders  
Hypertension, Hypotension, Arteriosclerosis, Atherosclerosis, Angina, Myocardial infarction, Congestive heart failure, Cardiac arrhythmias
- 8 Respiratory system  
a) Anatomy of respiratory organs and functions  
b) Mechanism / physiology of respiration and regulation of respiration  
c) Transport of respiratory gases  
d) Respiratory volumes and capacities, and Definition of: Hypoxia, Asphyxia, Dybarism, Oxygen therapy and resuscitation.
- 9 Digestive system  
a) Anatomy and physiology of GIT  
b) Anatomy and functions of accessory glands of GIT  
c) Digestion and absorption  
d) Disorders of GIT (definitions only)

  
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- 10 Nervous system
- a) Definition and classification of nervous system
  - b) Anatomy, physiology and functional areas of cerebrum
  - c) Anatomy and physiology of cerebellum
  - d) Anatomy and physiology of mid brain
  - e) Thalamus, hypothalamus and Basal Ganglia
  - f) Spinal cord: Structure & reflexes – mono-poly-planter
  - g) Cranial nerves – names and functions
  - h) ANS – Anatomy & functions of sympathetic & parasympathetic N.S.
- 11 Urinary system
- a) Anatomy and physiology of urinary system
  - b) Formation of urine
  - c) Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance
  - d) Clearance tests and micturition
- 12 Endocrine system
- a) Pituitary gland
  - b) Adrenal gland
  - c) Thyroid and Parathyroid glands
  - d) Pancreas and gonads
- 13 Reproductive system
- a) Male and female reproductive system
  - b) Their hormones – Physiology of menstruation
  - c) Spermatogenesis & Oogenesis
  - d) Sex determination (genetic basis)
  - e) Pregnancy and maintenance and parturition
  - f) Contraceptive devices
- 14 Sense organs
- a) Eye
  - b) Ear
  - c) Skin
  - d) Tongue & Nose
- 15 Skeletal muscles
- a) Histology
  - b) Physiology of Muscle contraction
  - c) Physiological properties of skeletal muscle and their disorders (definitions)
- 16 Sports physiology
- a) Muscles in exercise, Effect of athletic training on muscles and muscle performance,
  - b) Respiration in exercise, CVS in exercise, Body heat in exercise, Body fluids and salts in exercise,
  - c) Drugs and athletics

  
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### 1.3 MEDICINAL BIOCHEMISTRY (THEORY)

**Theory : 3 Hrs. /Week**

1. **Scope of the Subject:** Applied biochemistry deals with complete understanding of the molecular level of the chemical process associated with living cells. Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.
2. **Objectives of the Subject (Know, do, appreciate) :**  
The objective of the present course is providing biochemical facts and the principles to the students of pharmacy. Upon completion of the subject student shall be able to –
  - a. understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases;
  - b. know the metabolic process of biomolecules in health and illness (metabolic disorders);
  - c. understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism;
  - d. know the biochemical principles of organ function tests of kidney, liver and endocrine gland; and
  - e. do the qualitative analysis and determination of biomolecules in the body fluids.

**Text books (Theory)**

- a. Harpers review of biochemistry - Martin
- b. Text book of biochemistry – D.Satyanarayana
- c. Text book of clinical chemistry- Alex kaplan & Laverve L.Szabo

**Reference books (Theory)**

- a. Principles of biochemistry -- Lehninger
- b. Text book of biochemistry -- Ramarao
- c. Practical Biochemistry-David T.Plummer.
- d. Practical Biochemistry-Pattabhiraman.

**3. Lecture wise programme:**

**Topics**

- 1 **Introduction to biochemistry:** Cell and its biochemical organization, transport process across the cell membranes. Energy rich compounds; ATP, Cyclic AMP and their biological significance.
- 2 **Enzymes:** Definition; Nomenclature; IUB classification; Factor affecting enzyme activity; Enzyme action; enzyme inhibition. Isoenzymes and their therapeutic and diagnostic applications; Coenzymes and their biochemical role and deficiency diseases.
- 3 **Carbohydrate metabolism:** Glycolysis, Citric acid cycle (TCA cycle), HMP shunt, Glycogenolysis, gluconeogenesis, glycogenesis. Metabolic disorders of carbohydrate metabolism (diabetes mellitus and glycogen storage diseases); Glucose, Galactose tolerance test and their significance; hormonal regulation of carbohydrate metabolism.

  
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- 4 **Lipid metabolism:** Oxidation of saturated ( $\beta$ -oxidation); Ketogenesis and ketolysis; biosynthesis of fatty acids, lipids; metabolism of cholesterol; Hormonal regulation of lipid metabolism. Defective metabolism of lipids (Atherosclerosis, fatty liver, hypercholesterolemia).
- 5 **Biological oxidation:** Coenzyme system involved in Biological oxidation. Electron transport chain (its mechanism in energy capture; regulation and inhibition); Uncouplers of ETC; Oxidative phosphorylation;
- 6 **Protein and amino acid metabolism:** protein turn over; nitrogen balance; Catabolism of Amino acids (Transamination, deamination & decarboxylation). Urea cycle and its metabolic disorders; production of bile pigments; hyperbilirubinemia, porphoria, jaundice. Metabolic disorder of Amino acids.
- 7 **Nucleic acid metabolism:** Metabolism of purine and pyrimidine nucleotides; Protein synthesis; Genetic code; inhibition of protein synthesis; mutation and repair mechanism; DNA replication (semiconservative /onion peel models) and DNA repair mechanism.
- 8 **Introduction to clinical chemistry: Cell;** composition; malfunction; Roll of the clinical chemistry laboratory.
- 9 **The kidney function tests:** Role of kidney; Laboratory tests for normal function includes-
  - a) Urine analysis (macroscopic and physical examination, quantitative and semiquantitative tests.)
  - b) Test for NPN constituents. (Creatinine /urea clearance, determination of blood and urine creatinine, urea and uric acid)
  - c) Urine concentration test
  - d) Urinary tract calculi. (stones)
- 10 **Liver function tests:** Physiological role of liver, metabolic, storage, excretory, protective, circulatory functions and function in blood coagulation.
  - a) Test for hepatic dysfunction-Bile pigments metabolism.
  - b) Test for hepatic function test- Serum bilirubin, urine bilirubin, and urine urobilinogen.
  - c) Dye tests of excretory function.
  - d) Tests based upon abnormalities of serum proteins.
 Selected enzyme tests.
- 11 **Lipid profile tests:** Lipoproteins, composition, functions. Determination of serum lipids, total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides.
- 12 **Immunochemical techniques** for determination of hormone levels and protein levels in serum for endocrine diseases and infectious diseases.  
Radio immuno assay (RIA) and Enzyme Linked Immuno Sorbent Assay (ELISA)
- 13 **Electrolytes:** Body water, compartments, water balance, and electrolyte distribution. Determination of sodium, calcium potassium, chlorides, bicarbonates in the body fluids.



## 1.6 REMEDIAL MATHEMATICS/BIOLOGY (THEORY)

Theory : 3 Hrs. /Week

### REMEDIAL MATHEMATICS :

1. **Scope and objectives:** This is an introductory course in mathematics. This subjects deals with the introduction to matrices, determinants, trigonometry, analytical geometry, differential calculus, integral calculus, differential equations, laplace transform.
2. **Upon completion of the course the student shall be able to : –**
  - a. Know Trigonometry, Analytical geometry, Matrices, Determinant, Integration, Differential equation, Laplace transform and their applications;
  - b. solve the problems of different types by applying theory; and
  - c. appreciate the important applications of mathematics in pharmacy.

### 3. Course materials:

#### Text books

- a. Differential calculus By Shantinakaran
- b. Text book of Mathematics for second year pre-university by Prof.B.M.Sreenivas


#### Reference books

- a. Integral calculus By Shanthinarayan
- b. Engineering mathematics By B.S.Grewal
- c. Trigonometry Part-I By S.L.Loney

### 4. Lecture wise programme :

#### Topics

- 1 **Algebra :** Determinants, Matrices
- 2 **Trigonometry :** Sides and angles of a triangle, solution of triangles
- 3 **Analytical Geometry :**Points, Straight line, circle, parabola
- 4 **Differential calculus:** Limit of a function, Differential calculus, Differentiation of a sum, Product, Quotient Composite, Parametric, exponential, trigonometric and Logarithmic function. Successive differentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions of two variables
- 5 **Integral Calculus:** Definite integrals, integration by substitution and by parts, Properties of definite integrals.
- 6 **Differential equations:** Definition, order, degree, variable separable, homogeneous, Linear, heterogeneous, linear, differential equation with constant coefficient, simultaneous linear equation of second order.
- 7 **Laplace transform:** Definition, Laplace transform of elementary functions, Properties of linearity and shifting.

  
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**BIOLOGY :**

1. **Scope and objectives:** This is an introductory course in Biology, which gives detailed study of natural sources such as plant and animal origin. This subject has been introduced to the pharmacy course in order to make the student aware of various naturally occurring drugs and its history, sources, classification, distribution and the characters of the plants and animals. This subject gives basic foundation to Pharmacognosy.

2. **Course materials:**

**Text books**

- a. Text book of Biology by S.B.Gokhale
- b. A Text book of Biology by Dr.Thulajappa and Dr. Seetaram.

**Reference books**

- a. A Text book of Biology by B.V.Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy
- c. Botany for Degree students By A.C.Dutta.
- d. Outlines of Zoology by M.Ekambaranatha ayyer and T.N.Ananthakrishnan.
- e. A manual for pharmaceutical biology practical by S.B.Gokhale and C.K.Kokate.

3. **Lecture wise programme :**

**Topic**

**PART – A**

- 01 Introduction
- 02 General organization of plants and its inclusions
- 03 Plant tissues
- 04 Plant kingdom and its classification
- 05 Morphology of plants
- 06 Root, Stem, Leaf and Its modifications
- 07 Inflorescence and Pollination of flowers
- 08 Morphology of fruits and seeds
- 09 Plant physiology
- 10 Taxonomy of Leguminosae, umbelliferae, Solanaceae, Liliaceae, Zinziberaceae, Rubiaceae
- 11 Study of Fungi, Yeast, Penicillin and Bacteria

**PART-B**

- 01 Study of Animal cell
- 02 Study animal tissues
- 03 Detailed study of frog
- 04 Study of Pisces, Raptiles, Aves
- 05 General organization of mammals
- 06 Study of poisonous animals

  
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## 2.3 PHARMACOGNOSY & PHYTOPHARMACEUTICALS (THEORY)

Theory : 3 Hrs. /Week

1. **Scope and objectives:** This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.
2. **Upon completion of the course student shall be able to:**
  - a. understand the basic principles of cultivation, collection and storage of crude drugs;
  - b. know the source, active constituents and uses of crude drugs; and
  - c. appreciate the applications of primary and secondary metabolites of the plant.

### 3. Course materials:

#### Text books

- a. Pharmacognosy by G.E. Trease & W.C.Evans.
- b. Pharmacognosy by C.K.Kokate,Gokhale & A.C.Purohit.

#### Reference books

- a. Pharmacognosy by Brady & Tyler.E.
- b. Pharmacognosy by T.E.Wallis.
- c. Pharmacognosy by C.S. Shah & Qadery.
- d. Pharmacognosy by M.A. Iyengar.

### 4. Lecture wise programme:

#### Topics

- 1 Introduction.
- 2 Definition, history and scope of Pharmacognosy.
- 3 Classification of crude drugs.
- 4 Cultivation, collection, processing and storage of crude drugs.
- 5 Detailed method of cultivation of crude drugs.
- 6 Study of cell wall constituents and cell inclusions.
- 7 Microscopical and powder Microscopical study of crude drugs.
- 8 Study of natural pesticides.
- 9 Detailed study of various cell constituents.
- 10 Carbohydrates and related products.
- 11 Detailed study carbohydrates containing drugs.(11 drugs)
- 12 Definition sources, method extraction, chemistry and method of analysis of lipids.
- 13 Detailed study of oils.
- 14 Definition, classification, chemistry and method of analysis of protein.
- 15 Study of plants fibers used in surgical dressings and related products.
- 16 Different methods of adulteration of crude drugs.

  
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## 2.5 COMMUNITY PHARMACY (THEORY)

**Theory : 2 Hrs. /Week**

1. **Scope:** In the changing scenario of pharmacy practice in India, Community Pharmacists are expected to offer various pharmaceutical care services. In order to meet this demand, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling, health screening services for improved patient care in the community set up.
2. **Objectives:** Upon completion of the course, the student shall be able to –
  - a. know pharmaceutical care services;
  - b. know the business and professional practice management skills in community pharmacies;
  - c. do patient counselling & provide health screening services to public in community pharmacy;
  - d. respond to minor ailments and provide appropriate medication;
  - e. show empathy and sympathy to patients; and
  - f. appreciate the concept of Rational drug therapy.

**Text Books:**

- a. Health Education and Community Pharmacy by N.S.Parmar.
- b. WHO consultative group report.
- c. Drug store & Business management by Mohammed Ali & Jyoti.

**Reference books:**

- a. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.
- b. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams & Wilkins.

**Special requirements:**

1. Either the college is having model community pharmacy (meeting the schedule N requirement) or sign MoU with at least 4-5 community pharmacies nearby to the college for training the students on dispensing and counselling activities.
2. Special equipments like B.P apparatus, Glucometer, Peak flow meter, and apparatus for cholesterol estimation.

**3. Scheme of evaluation (80 Marks)**

1. Synopsis	10
2. Major Experiment (Counselling of patients with specific diseases – emphasis should be given on Counselling introduction, content, process and conclusion)	30
3. Minor Experiment(Ability to measure B.P/ CBG / Lung function)	15
4. Prescription Analysis (Analyzing the prescriptions for probable drug interaction and ability to tell the management)	15
5. Viva – Voce	10

  
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#### 4. Lecture wise programme :

##### Topics

- 1 Definition, scope, of community pharmacy  
Roles and responsibilities of Community pharmacist**
- 2 Community Pharmacy Management**
  - a) Selection of site, Space layout, and design
  - b) Staff, Materials- coding, stocking
  - c) Legal requirements
  - d) Maintenance of various registers
  - e) Use of Computers: Business and health care soft wares
- 3 Prescriptions** – parts of prescription, legality & identification of medication related problems like drug interactions.
- 4 Inventory control in community pharmacy**  
Definition, various methods of Inventory Control  
**ABC, VED, EOQ, Lead time, safety stock**
- 5 Pharmaceutical care**  
Definition and Principles of Pharmaceutical care.
- 6 Patient counselling**  
Definition, outcomes, various stages, barriers, Strategies to overcome barriers  
Patient information leaflets- content, design, & layouts, advisory labels
- 7 Patient medication adherence**  
Definition, Factors affecting medication adherence, role of pharmacist in improving the adherence.
- 8 Health screening services**  
Definition, importance, methods for screening  
Blood pressure/ blood sugar/ lung function  
and Cholesterol testing
- 9 OTC Medication- Definition, OTC medication list & Counselling**
- 10 Health Education**  
WHO Definition of health, and health promotion, care for children, pregnant & breast feeding women, and geriatric patients.  
Commonly occurring Communicable Diseases, causative agents,  
Clinical presentations and prevention of communicable diseases – Tuberculosis, Hepatitis, Typhoid, Amoebiasis, Malaria, Leprosy, Syphilis, Gonorrhoea and AIDS  
Balance diet, and treatment & prevention of deficiency disorders  
Family planning – role of pharmacist
- 11 Responding to symptoms of minor ailments**  
Relevant pathophysiology, common drug therapy to,  
Pain, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhea, constipation), Pyrexia, Ophthalmic symptoms, worms infestations.
- 12 Essential Drugs concept and Rational Drug Therapy  
Role of community pharmacist**
- 13 Code of ethics for community pharmacists**

  
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## 2.6 PHARMACOTHERAPEUTICS - I (THEORY)

**Theory : 3 Hrs. /Week**


1. **Scope of the Subject:** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
2. **Objectives:** At completion of this subject it is expected that students will be able to understand –
  - a. the pathophysiology of selected disease states and the rationale for drug therapy;
  - b. the therapeutic approach to management of these diseases;
  - c. the controversies in drug therapy;
  - d. the importance of preparation of individualised therapeutic plans based on diagnosis;
  - e. needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
  - f. describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
  - g. summarise the therapeutic approach to management of these diseases including reference to the latest available evidence;
  - h. discuss the controversies in drug therapy;
  - i. discuss the preparation of individualised therapeutic plans based on diagnosis; and
  - j. identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

### **Text Books**

- a. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication.
- b. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange.

### **Reference Books**

- a. Pathologic basis of disease - Robins SL, W.B.Saunders publication.
- b. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication.
- c. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication.
- d. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA
- e. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
- f. Relevant review articles from recent medical and pharmaceutical literature.

  
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### 3. Detailed syllabus and lecture wise schedule :

**Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases**

**Title of the topic**

- 1 **Cardiovascular system:** Hypertension, Congestive cardiac failure, Angina Pectoris, Myocardial infarction, , Hyperlipidaemias , Electrophysiology of heart and Arrhythmias
- 2 **Respiratory system :** Introduction to Pulmonary function test, Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases  
**Endocrine system :** Diabetes, Thyroid diseases, Oral contraceptives, Hormone replacement therapy, Osteoporosis
- 3 **General prescribing guidelines for**
  - a. Paediatric patients
  - b. Geriatric patients
  - c. Pregnancy and breast feeding
- 4 **Ophthalmology:** Glaucoma, Conjunctivitis- viral & bacterial
- 5 **Introduction to rational drug use**  
Definition, Role of pharmacist Essential drug concept Rational drug formulations

## 2.6 PHARMACOTHERAPEUTICS - I (PRACTICAL)


**Practical : 3 Hrs./Week**

**Practicals :**

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.

**Assignments :**

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

  
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### 3.3 PHARMACOTHERAPEUTICS – II (THEORY)

**Theory : 3 Hrs. /Week**

1. **Scope of the Subject:** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
2. **Objectives of the Subject Upon completion of the subject student shall be able to –**
  - a. know the pathophysiology of selected disease states and the rationale for drug therapy
  - b. know the therapeutic approach to management of these diseases;
  - c. know the controversies in drug therapy;
  - d. know the importance of preparation of individualised therapeutic plans based on diagnosis; and
  - e. appreciate the needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

**Text books (Theory)**

Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication

**Reference books (Theory)**

- a. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange
- b. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
- c. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA]

3. **Detailed syllabus and lecture wise schedule :**

**Etiopathogenesis and pharmacotherapy of diseases associated with following systems / diseases –**

**Title of the topic**

1. **Infectious disease:** Guidelines for the rational use of antibiotics and surgical Prophylaxis, Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis, Septicemia, Urinary tract infections, Protozoal infection- Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonorrhoea and Syphilis
- 2 **Musculoskeletal disorders**  
Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus.
- 3 **Renal system**  
Acute Renal Failure, Chronic Renal Failure, Renal Dialysis, Drug induced renal disorders

  
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- 4 **Oncology:** Basic principles of Cancer therapy, General introduction to cancer chemotherapeutic agents, Chemotherapy of breast cancer, leukemia. Management of chemotherapy nausea and emesis
- 5 **Dermatology:** Psoriasis, Scabies, Eczema, Impetigo

### 3.3 PHARMACOTHERAPEUTICS – II (PRACTICAL)

**Practical : 3 Hrs./Week**

**Practicals :**

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation.

The student shall be trained to understand the principle and practice involved in selection of drug therapy including clinical discussion.

A minimum of 20 cases should be presented and recorded covering most common diseases.

**Assignments :**

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

**Format of the assignment :**

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

**Scheme of Practical Examination :**

	<b>Sessionals</b>	<b>Annual</b>
Synopsis	05	15
Major Experiment	10	25
Minor Experiment	03	15
Viva	02	15
<b>Max Marks</b>	<b>20</b>	<b>70</b>
<b>Duration</b>	<b>03hrs</b>	<b>04hrs</b>

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

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### 3.4 PHARMACEUTICAL JURISPRUDENCE (THEORY)

**Theory : 2 Hrs. /Week**

1. **Scope of the Subject:** (4-6 lines): This course exposes the student to several important legislations related to the profession of pharmacy in India. The Drugs and Cosmetics Act, along with its amendments are the core of this course. Other acts, which are covered, include the Pharmacy Act, dangerous drugs, medicinal and toilet preparation Act etc. Besides this the new drug policy, professional ethics, DPCO, patent and design Act will be discussed.
2. **Objectives of the Subject:** Upon completion of the subject student shall be able to (Know, do, and appreciate) –
  - a. practice the Professional ethics;
  - b. understand the various concepts of the pharmaceutical legislation in India;
  - c. know the various parameters in the Drug and Cosmetic Act and rules;
  - d. know the Drug policy, DPCO, Patent and design act;
  - e. understand the labeling requirements and packaging guidelines for drugs and cosmetics;
  - f. be able to understand the concepts of Dangerous Drugs Act, Pharmacy Act and Excise duties Act; and
  - g. other laws as prescribed by the Pharmacy Council of India from time to time including International Laws.

**Text books (Theory)**

Mithal , B M. Textbook of Forensic Pharmacy. Calcutta :National; 1988.

**Reference books (Theory)**

- a. Singh, KK, editor. Beotra's the Laws of Drugs, Medicines & cosmetics. Allahabad: Law Book House; 1984.
- b. Jain, NK. A Textbook of forensic pharmacy. Delhi: Vallabh prakashan ; 1995.
- c. Reports of the Pharmaceutical enquiry Committee
- d. I.D.M.A., Mumbai. DPCO 1995
- e. Various reports of Amendments.
- f. Deshapande, S.W. The drugs and magic remedies act 1954 and rules 1955. Mumbai: Susmit Publications; 1998.
- g. Eastern Book Company .The narcotic and psychotropic substances act 1985, Lucknow: Eastern; 1987.

**3. Detailed syllabus and lecture wise schedule:**

**Title of the topic**

1. **Pharmaceutical Legislations** – A brief review.
2. Principle and Significance of professional ethics. Critical study of the code of pharmaceutical ethics drafted by PCI.
3. **Drugs and Cosmetics Act, 1940, and its rules 1945.**  
Objectives, Legal definition, Study of Schedule's with reference to Schedule B, C&C1, D, E1, F&F1, F2, F3, FF, G, H, J, K, M, N, P, R, V, W, X, Y.  
Sales, Import, labeling and packaging of Drugs And Cosmetics  
Provisions Relating to Indigenous Systems.  
Constitution and Functions of DTAB, DCC, CDL.  
Qualification and duties –Govt. analyst and Drugs Inspector.

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4. **Pharmacy Act –1948.**  
Objectives Legal Definitions, General Study, Constitution and Functions of State & Central Council, Registration & Procedure, ER.
5. **Medicinal and Toilet Preparation Act –1955.**  
Objectives, Legal Definitions, Licensing, Bonded and Non Bonded Laboratory, Ware Housing, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations.
6. **Narcotic Drugs and Psychotropic substances Act-1985 and Rules.** Objectives, Legal Definitions, General Study, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and regulations, Schedules to the Act.
7. **Study of Salient Features of Drugs and magic remedies Act and its rules.**
8. **Study of essential Commodities Act Relevant to drugs price control Order.**
9. **Drug Price control Order & National Drug Policy (Current).**
10. **Prevention Of Cruelty to animals Act-1960.**
11. **Patents & design Act-1970.**
12. **Brief study of prescription and Non-prescription Products.**

#### 4. Assignments:

##### Format of the assignment

1. Minimum & Maximum number of pages
2. It shall be a computer draft copy
3. Reference(s) shall be included at the end.
4. Name and signature of the student
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min

##### Case studies relating to

1. Drugs and Cosmetics Act and rules along with its amendments, Dangerous Drugs Act, Medicinal and Toilet preparation Act, New Drug Policy, Professional Ethics, Drugs (Price control) Order, Patent and Design Act.
2. Various prescription and non-prescription products.
3. Medical and surgical accessories.
4. Diagnostic aids and appliances available in the market.

  
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## Fourth Year

### 4.1 PHARMACOTHERAPEUTICS – III (THEORY)

**Theory : 3 Hrs. /Week**

1. **Scope :** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
2. **Objectives:** At completion of this subject it is expected that students will be able to understand –
  - a. the pathophysiology of selected disease states and the rationale for drug therapy;
  - b. the therapeutic approach to management of these diseases;
  - c. the controversies in drug therapy;
  - d. the importance of preparation of individualised therapeutic plans based on diagnosis;
  - e. needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
  - f. describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
  - g. to summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;
  - h. to discuss the controversies in drug therapy;
  - i. to discuss the preparation of individualised therapeutic plans based on diagnosis; and
  - j. identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

#### **Text Books**

- a. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication
- b. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange

#### **Reference Books**

- a. Pathologic basis of disease - Robins SL, W.B.Saunders publication
- b. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication
- c. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
- d. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA
- e. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
- f. Relevant review articles from recent medical and pharmaceutical literature.

  
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## 4.2 HOSPITAL PHARMACY (THEORY)

**Theory : 2 Hrs. /Week**

1. **Scope:** In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug dispensing, manufacturing of parenteral preparations, drug information, patient counselling, and therapeutic drug monitoring for improved patient care.
2. **Objectives:** Upon completion of the course, the student shall be able to –
  - a. know various drug distribution methods;
  - b. know the professional practice management skills in hospital pharmacies;
  - c. provide unbiased drug information to the doctors;
  - d. know the manufacturing practices of various formulations in hospital set up;
  - e. appreciate the practice based research methods; and
  - f. appreciate the stores management and inventory control.

### **Text books: (latest editions)**

- a. Hospital pharmacy by William .E. Hassan
- b. A text book of Hospital Pharmacy by S.H.Merchant & Dr. J.S. Qadry. Revised by R.K.Goyal & R.K. Parikh

### **References:**

- a. WHO consultative group report.
- b. R.P.S. Vol.2. Part –B; Pharmacy Practice section.
- c. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.

### **3. Lecture wise programme :**

#### **Topics**

- 1 **Hospital - its Organisation and functions**
- 2 **Hospital pharmacy-Organisation and management**
  - a) Organizational structure-Staff, Infrastructure & work load statistics
  - b) Management of materials and finance
  - c) Roles & responsibilities of hospital pharmacist
- 3 **The Budget – Preparation and implementation**
- 4 **Hospital drug policy**
  - a) Pharmacy and Therapeutic committee (PTC)
  - b) Hospital formulary
  - c) Hospital committees
    - Infection committee
    - Research and ethical committee
  - d) developing therapeutic guidelines
  - e) Hospital pharmacy communication - Newsletter

  
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**5 Hospital pharmacy services**

- a) Procurement & warehousing of drugs and Pharmaceuticals
- b) Inventory control  
Definition, various methods of Inventory Control  
ABC, VED, EOQ, Lead time, safety stock
- c) Drug distribution in the hospital
  - i) Individual prescription method
  - ii) Floor stock method
  - iii) Unit dose drug distribution method
- d) Distribution of Narcotic and other controlled substances
- e) Central sterile supply services – Role of pharmacist

**6 Manufacture of Pharmaceutical preparations**

- a) Sterile formulations – large and small volume parenterals
- b) Manufacture of Ointments, Liquids, and creams
- c) Manufacturing of Tablets, granules, capsules, and powders
- d) Total parenteral nutrition

**7 Continuing professional development programs**

Education and training

**8 Radio Pharmaceuticals – Handling and packaging****9 Professional Relations and practices of hospital pharmacist****4.2 HOSPITAL PHARMACY (PRACTICAL)**

**Practical : 3 Hrs./Week**

1. Assessment of drug interactions in the given prescriptions
2. Manufacture of parenteral formulations, powders.
3. Drug information queries.
4. Inventory control

**List of Assignments:**

1. Design and Management of Hospital pharmacy department for a 300 bedded hospital.
2. Pharmacy and Therapeutics committee – Organization, functions, and limitations.
3. Development of a hospital formulary for 300 bedded teaching hospital
4. Preparation of ABC analysis of drugs sold in one month from the pharmacy.
5. Different phases of clinical trials with elements to be evaluated.
6. Various sources of drug information and systematic approach to provide unbiased drug information.
7. Evaluation of prescriptions generated in hospital for drug interactions and find out the suitable management.

  
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### 4.3 CLINICAL PHARMACY (THEORY)

**Theory : 3 Hrs. /Week**

#### 1. Objectives of the Subject :

Upon completion of the subject student shall be able to (Know, do, appreciate) –

- a. monitor drug therapy of patient through medication chart review and clinical review;
- b. obtain medication history interview and counsel the patients;
- c. identify and resolve drug related problems;
- d. detect, assess and monitor adverse drug reaction;
- e. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and
- f. retrieve, analyse, interpret and formulate drug or medicine information.

#### Text books (Theory)

- a. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia.
- b. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
- c. Biopharmaceutics and Applied Pharmacokinetics - Leon Shargel, Prentice Hall publication.
- d. A text book of Clinical Pharmacy Practice; Essential concepts and skills, Dr.G.Parthasarathi etal, Orient Orient Langram Pvt.Ltd. ISSN8125026

#### References

- a. Australian drug information -Procedure manual. The Society of Hospital Pharmacists of Australia.
- b. Clinical Pharmacokinetics - Rowland and Tozer, Williams and Wilkins Publication.
- c. Pharmaceutical statistics. Practical and clinical applications. Sanford Bolton, Marcel Dekker, Inc.

#### 2. Detailed syllabus and lecture wise schedule:

##### Title of the topic

1. **Definitions, development and scope of clinical pharmacy**
2. **Introduction to daily activities of a clinical pharmacist**
  - a. Drug therapy monitoring (medication chart review, clinical review, pharmacist interventions)
  - b. Ward round participation
  - c. Adverse drug reaction management
  - d. Drug information and poisons information
  - e. Medication history
  - f. Patient counseling
  - g. Drug utilisation evaluation (DUE) and review (DUR)
  - h. Quality assurance of clinical pharmacy services

  
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3. **Patient data analysis**  
The patient's case history, its structure and use in evaluation of drug therapy & Understanding common medical abbreviations and terminologies used in clinical practices.
4. **Clinical laboratory tests used in the evaluation of disease states, and interpretation of test results**
  - a. Haematological, Liver function, Renal function, thyroid function tests
  - b. Tests associated with cardiac disorders
  - c. Fluid and electrolyte balance
  - d. Microbiological culture sensitivity tests
  - e. Pulmonary Function Tests
5. **Drug & Poison information**
  - a. Introduction to drug information resources available
  - b. Systematic approach in answering DI queries
  - c. Critical evaluation of drug information and literature
  - d. Preparation of written and verbal reports
  - e. Establishing a Drug Information Centre
  - f. Poisons information- organization & information resources
6. **Pharmacovigilance**
  - a. Scope, definition and aims of pharmacovigilance
  - b. Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used]
  - c. Reporting, evaluation, monitoring, preventing & management of ADRs
  - d. Role of pharmacist in management of ADR.
7. Communication skills, including patient counselling techniques, medication history interview, presentation of cases.
8. Pharmaceutical care concepts
9. Critical evaluation of biomedical literature
10. Medication errors

### 4.3 CLINICAL PHARMACY (PRACTICAL)

#### Practical : 3 Hrs./Week

Students are expected to perform 15 practicals in the following areas covering the topics dealt in theory class.

- a. Answering drug information questions (4 Nos)
- b. Patient medication counselling (4 Nos)
- c. Case studies related to laboratory investigations (4 Nos)
- d. Patient medication history interview (3 Nos)

  
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## 5.2 PHARMACOEPIDEMOLOGY AND PHARMACOECONOMICS (THEORY)

**Theory : 3 Hrs. /Week**

### 1. Pharmacoepidemiology :

**Definition and scope:**

Origin and evaluation of pharmacoepidemiology need for pharmacoepidemiology, aims and applications.

**Measurement of outcomes in pharmacoepidemiology**

Outcome measure and drug use measures

Prevalence, incidence and incidence rate. Monetary units, number of prescriptions, units of drugs dispensed, defined daily doses and prescribed daily doses, medication adherence measurement

**Concept of risk in pharmacoepidemiology**

Measurement of risk, attributable risk and relative risk, time-risk relationship and odds ratio

**Pharmacoepidemiological methods**

Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods

Drug utilization review, case reports, case series, surveys of drug use, cross – sectional studies, cohort studies, case control studies, case –cohort studies, meta – analysis studies, spontaneous reporting, prescription event monitoring and record linkage system.

**Sources of data for pharmacoepidemiological studies**

Ad Hoc data sources and automated data systems.

**Selected special applications of pharmacoepidemiology**

Studies of vaccine safety, hospital pharmacoepidemiology, pharmacoepidemiology and risk management, drug induced birth defects.

### 2. Phrmacoeconomics:

**Definition, history, needs of pharmacoeconomic evaluations**

Role in formulary management decisions

**Pharmacoeconomic evaluation**

Outcome assessment and types of evaluation

Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods:

Cost – minimization, cost- benefit, cost – effectiveness, cost utility

### 3. Applications of Pharmacoeconomics

Software and case studies

  
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**M. PHARM REVISED SYLLABUS  
(2008-2009)**

**EFFECTIVE FROM 2008-2009  
ACADEMIC YEAR ONWARDS**

**UNIVERSITY COLLEGE OF PHARMACEUTICAL SCIENCES  
KAKATIYA UNIVERSITY, WARANGAL-506 009.  
KAKATIYA UNIVERSITY  
WARANGAL**

**RULES AND REGULATIONS TO M.PHARM. COURSES OFFERED UNDER SEMESTER SYSTEM**

**General Schedule**

There shall be 16 weeks for each semester and it takes two years to complete the course. III and IV semester contains the project work

**Academic Schedule**

Each semester will have **4 theory and two practical papers** with **six periods** per week. There also seminars and assignments in I and II semester and comprehensive viva in third semester

**Question Paper Pattern**

There will be **four questions** in each paper. Each question will have 3 bits

**Distribution of marks:**

**I and II semester ( 4 theory and 2 practical and seminar and assignment)**

**Theory**

Four question 4x25=100 marks

**Practicals:**

Seminar 100 marks  
50 marks

Assignments 50 marks

III semester seminar 50 marks



  
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## M.PHARM. (PHARMACEUTICAL ANALYSIS)

### I SEMESTER

<u>Theory</u>	hours/week
1.1.T Advanced Pharmaceutical analytical techniques	3
1.2.T Pharmaceutical Analysis-I	3
1.3.T Quality control of Pharmaceutical dosage forms	3
1.4.T Biological standardization	3

### Practicals

1.1.P Advanced Pharmaceutical analytical techniques	9
1.2.P Pharmaceutical Analysis-I	9

### II SEMESTER

#### Theory

2.1.T Quality assurance	3
2.2.T Pharmaceutical Analysis-II	3
2.3.T Analytical method development and validation	3
2.4.T Regulatory Affairs	3

#### Practicals

2.1. P Analytical method development and validation	9
2.2.P. Pharmaceutical Analysis-II	9

### III SEMESTER

Comprehensive Viva-voce  
Seminar on Dissertation Topic (Project Work) (Introductory)

### IV SEMESTER

Final Seminar of Dissertation (Results)  
Dissertation



  
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## 2.1. QUALITY ASSURANCE

### Unit I

Concept of quality assurance, total quality management, philosophy of GMP, cGMP and GLP, organization and functioning of accreditation bodies: ISO 9000, ISO 14000, NBL and OSHA 18000

### Unit II

- a. Organization and personal, responsibilities, training hygiene
- b. Premises: Location, design, plan layout, construction, maintenance and sanitations, environmental control, sterile area, control of contamination
- c. Equipments: selection, purchase, specifications, maintenance, clean in place, sterilized in place - Raw – materials; purchase specifications, maintenance of stores, selection of vendors, controls and raw materials

### Unit III

Manufacture and controls on dosage forms

- a. Manufacturing documents, master formula records, batch formula records, standard operating procedures, Quality audits of manufacturing processes and facilities
- b. In process quality control on various dosage forms sterile, biological products and non-sterile, standard operating procedures for various operations like cleaning, filling, drying, compression, coating, disinfection, sterilization, membrane filtration etc.
- c. Guideline for Quality Assurance of Human Blood Products and large volume parenterals.

### Unit-IV

- a. Packaging and labeling controls, line clearance and other packaging materials.
- b. Quality Control Laboratory: Responsibilities, good laboratory practices, routine controls, instruments, protocols, non-clinical testing, controls on animal house, data generation and storage, quality control documents, retention samples, records, audits of quality control facilities – finished products release: quality review, quality audits and batch release document.


### Unit V

- a. Distribution and Distribution records: Handling of returned goods recovered materials and reprocessing.
- b. Complaints and recalls, evaluation of complaints recall procedures, related records and documents.

### TEXT BOOKS:

1. The International Pharmacopoeia Vol 1,2,3,4, 3<sup>rd</sup> edition: General methods of analysis quality specifications for Pharmaceutical substances, Excipients, dosage forms.



  
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2. Quality Assurance of Pharmaceuticals. A compendium of guidelines and related material Vol.1 and Vol.2, WHO (1999)
3. GMP- Mehra
4. Pharmaceutical Process Validation – Berry and Nash

**REFERENCE BOOKS:**

1. Basic tests for Pharmaceutical substances – WHO (1988)
2. Basic tests for Pharmaceutical substances – WHO (1991)
3. How to practice GMP's – P.P.Sharma
4. The Drugs and Cosmetic Act 1940 – Vijay Malik
5. Q.A. Manual - D.H. Shah
6. SOP Guide lines - D.H. Shah
7. Quality Assurance Guide - OPP



A handwritten signature in green ink, consisting of a series of loops and a long horizontal stroke.

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