

Jagadguru Sri Shivarathreeshwara University

## **JSS College of Pharmacy**

Sri Shivarathreeshwara Nagar, Mysuru-570015

Ph: 0821-2548353, Fax: 0821-2548359, Email: [jsscpmy@jssuni.edu.in](mailto:jsscpmy@jssuni.edu.in)

Website: [www.jssuni.edu.in](http://www.jssuni.edu.in)

***An ISO 9001:2008 Certified Institution***



**Accredited  
'A' Grade by NAAC**

### **Course Handout**

**2017-18**

**Class: I Pharm.D.**

**Name** : \_\_\_\_\_

**Roll No.** : \_\_\_\_\_



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**JSS College of Pharmacy**

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### VISION

To be a leader in pharmaceutical sciences & pharmacy practice education, training, research and continuous professional development for pharmacists and Pharmaceutical Scientists providing competent patient care and nurturing drug discovery and development.

### MISSION

- To impart knowledge, develop skills and competencies in students in pharmaceutical sciences and pharmacy practice.
- Develop and advance the knowledge, attitude and skills of pharmacists and faculty members who can provide comprehensive pharmaceutical care to patients, improve patient outcomes, and meet societal needs for safe and effective drug therapy.
- To develop, promote and nurture research activities in pharmaceutical sciences and pharmacy practice and translating research into healthcare

### CORE VALUES

- Innovation, Leadership, Excellence, Integrity, Respect, Professionalism

## Academic Calendar 2017-18 (I Pharm.D.)

### 1. Commencement of Classes

I Pharm.D.

- 03<sup>rd</sup> July, 2017

### 2. Sessional Examination Schedule

I	II	III
18, 20, 21, 22 & 23 <sup>rd</sup> Sep 2017	18, 19, 20, 21 & 22 <sup>nd</sup> Dec 2017	2, 3, 4, 5 & 6 <sup>th</sup> April 2018

### 3. Closure of Term

- 6<sup>th</sup> April, 2018

### 4. Annual Examination

- 2<sup>nd</sup> May, 2018

### 5. Midterm Vacation

- From 24<sup>th</sup> Dec' 2017 to 16<sup>th</sup> Jan' 2018

### 6. Annual Vacation

- From 25<sup>th</sup> May' 2018 to 24<sup>th</sup> June 2018

### Teacher's Incharge

Class	Class Teacher	Batch No.	Batch Teacher
I Pharm.D.	Ms. Seema Mehdi	I	Vertical mentorship
		II	Vertical mentorship

## ACTIVITIES AND COORDINATORS 2017-18

### Curricular & Co curricular activities

Sl. No	Activities	Coordinators	Schedule
1.	Induction, learning skills and personality development programmes for fresher's	DHPG	First Week of Commencement of First year of each course
2.	Anti ragging cell	JS/AMM/JUS	June 17 - May 18
3.	Grievance and redressal cell	PKK	June 17 - May 18
4.	Industrial Visits, Training and placements	MNP/ABP	June 17 - May 18
5.	Guest lectures & Seminars/conferences/training/workshop <ul style="list-style-type: none"> <li>• organized at college</li> <li>• delivered/attended by staff</li> </ul>	HVG	June 17 - May 18
6.	Internal Assessment Committee Chairperson Members	GVP KM/RSS/SNM/BMV	June 17 - May 18
7.	<ul style="list-style-type: none"> <li>• Academic Council Board</li> <li>• Identification of Advanced/ Medium/ Slow learners</li> </ul>	Class Teachers	June 17 - May 18
8.	Ethics committee Meeting <ul style="list-style-type: none"> <li>• Animal</li> <li>• Human</li> </ul>	KLK MR	June 17 - May 18
9.	Time table	MSV/UM/AKT/HKS /AMR/NPK	June 17 - May 18
10.	IQAC	MNP/VKG/VJ/AMM/JL	June 17 - May 18
11.	Women's cell (Prevention of Sexual Harassment Cell)	MNN	June 17 - May 18
12.	Scholarship Bureau	RSC	June 17 - May 18
13.	Compilation of publications (Research papers/books/chapters)	BMG	June 17 - May 18
14.	Research Review Committee -Compilation of Ph.D details and funded projects - Plagiarism - Review of publications	Chairperson – DVG Members – BMG/BRP/HVG/KU	June 17 - May 18
15.	Pharmacy Education Unit (CCLPE)	PKK/KU/AMR	June 17 - May 18
16.	Admission Facilitation Cell	TMP/BV/JS/HP	June 17 - May 18
17.	Annual result analysis List of merit students	Exam section/ Program committee	June 17 - May 18

18.	GPAT and other competitive exams (TOEFL, GRE etc.)	AMM	June 17 - May 18
19.	Innovative Pedagogy	Pharmacy Education Unit	June 17 - May 18
20.	Library orientation	NS	June 17 - May 18
21.	Soft Skills Training	VKG	June 17 - May 18

### Program Committee

Sl. No.	Program	Chairperson	Member Secretary	Schedule
22.	D.Pharm	GP	BMV	June 17 - May 18
23.	B.Pharm	PKK	KM	June 17 - May 18
24.	Pharm.D	MR	RSS	June 17 - May 18
25.	M.Pharm	GP	SNM	June 17 - May 18

### Extracurricular activities

Sl. No.	Activities	Coordinators	Schedule
26.	<ul style="list-style-type: none"> <li>• Selection of Class Representatives, Pharmaceutical society members</li> <li>• Annual planning and execution of Student centered and professional activities including inauguration of IPS</li> </ul>	AKT	Within a month of Commencement of course  June 17 - May 18
27.	JASPHARM	BMV	June 17 - May 18
28.	STUMAG	JUS	June 17 - May 18
29.	Sports coordinators	KLK/JK/NPK	June 17 - May 18
30.	NSS coordinators	BRJ/MPG	June 17 - May 18
31.	Cultural & Literary coordinators	MNN/SP/RSC	June 17 - May 18

### Other Institutional activities

Sl. No.	Activities	Coordinators	Period
32.	Annual Day celebration	HVG/SM	March 2018
33.	Course handouts/ Teachers diary/ Student handbook/faculty handbook	MPV/RSC	June 2017
34.	National Pharmacy Week (NPW) & Pharmacists Day	UM + IPA team	Nov 2017
35.	Alumni association	PKK/HVG/SM/BS	June 17 - May 18
36.	Herbal and College Garden	JS	June 17 - May 18
37.	ISO	MSV/DHPG	June 17 - May 18
38.	Press and publicity	BMV	June 17 - May 18
39.	Foreign students cell	MPV	June 17 - May 18
40.	Governing council meeting	Principal's Office	June 17 - May 18

41.	Monthly/Annual report of college activities to JSSU and other agencies	HoDs/JL	June 17 - May 18
42.	College website	HKS/VKG	June 17 - May 18
43.	Research & Consultancy Co-ordinator • Collaboration with Industries/organizations • Interdepartment/Interdisciplinary research	SBC	June 17 - May 18
44.	Co-ordinator - JSSUonline.com	VKG/ABP	June 17 - May 18
45.	JSSU Newsletter	BMV	June 17 - May 18
46.	Annual group photo session	KM/Shivanna	June 17 - May 18
47.	Lab coat and Blazers	JS	June 17 - May 18
48.	Notice Board (SNB, LNB and IIPC), Departmental staff list	Nagaraju	June 17 - May 18
49.	Stock verification	Office staff/Librarian	June 17 - May 18
50.	Student Liaison	Ms. Divya S	June 17 - May 18
51.	Feedback	VKG/Class teachers, Course Coordinators	June 17- May 18

## PHARM.D

### Expected Competencies and outcomes:

1. Development of knowledge and skills
2. Assessment of patient medical condition
3. Development of pharmaceutical care plan
4. Management of patient medication therapy
5. Pharmacotherapeutic decision-making skills
6. Hospital pharmacy management
7. Promote public health care program
8. Ethics and professionalism
9. Analytical thinking and interpretational skills
10. Communication skills
11. Management skills
12. Design and conduct of need based research projects
13. Life-long learning

**COURSE HAND OUT 2017-18****Class: I Pharm. D****I Course Details**

S. No.	Name of Subject	No. of hours of Theory	No. of hours of Practical	No. of hours of Tutorial
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>13/16<sup>+</sup></b>	<b>15/18*</b>	<b>5/6<sup>+</sup>*</b> <b>= 33/37<sup>+</sup>/40*</b>

<sup>+</sup> For Mathematics (PCB students)

\* For Biology (PCM students)

**2. Evaluation:**

**Theory:** Internal assessment Marks: 30. Three periodic Internal assessment will be conducted in theory for 30 marks (*duration 1.5 Hour*) and average of best two will be considered for evaluation.

In Mathematics or Biology and Computer Science & Statistics, college will conduct final examination. You must score a minimum of 40% in these subjects to become eligible to write university examination.

**Practical:** Internal assessment Marks: 30. Three periodic Internal assessment will be conducted in practical for 20 marks and average of best two will be considered for evaluation, plus 10 marks are awarded for regularity, promptness, viva-voce and record maintenance.

JSS University will conduct annual examination for 70 marks in theory & practical at end of the academic session.

Classes will be awarded on the basis of total (sessional and annual examination) marks secured.

Class	Marks
Distinction	75% and above
First class	60% and above and less than 75%
Second class	50% and above and less than 60%
Pass class	Passed examination in more than one attempt.

**3 Sessional examination schedule:** I, II and III sessional dates will be announced separately.

**4 Attendance:** Minimum of 80% attendance is necessary to appear for both Sessional and Annual examination.

**5 Chamber consultation hours:** Any time during college hours.

**6 Tutorial Class**

Objective of the tutorial is to enhance the learning ability and help students in better understanding of the subject. This provides a best opportunity for the students to clarify their subject doubts. This involves discussions, presentations on specified topics, assignments and evaluation.

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## 1.1 HUMAN ANATOMY & PHYSIOLOGY (THEORY)

**Theory: 3 Hrs. /Week**

**Responsible member/s of the academic staff: Ms. Seema Mehdi (SM)**

**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.

**At completion of this course it is expected that students will be able to:**  
(Student learning outcomes)

1. Describe the structure and functions of cellular organelles
2. Explain the anatomy and physiology of tissues and organs
3. Illustrate the integrated functions of organ systems
4. Summarize the various homeostatic mechanisms
5. Define the disorders of various organ systems
6. Explain the effect exercise on muscles and different organ systems

**Teaching/learning methodologies used:**

1. Lecture
2. Practical/Lab

**Course materials:**

### TEXT BOOKS

- a) Gerard J. Tortora and Bryan Derrickson. Principles of anatomy and physiology, Publisher Harpercollins College New York.
- b) Anne Waught & Allison Grant. Ross and Wilson's foundations of Anatomy and Physiology in Health and Illness. 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. *Gray's anatomy*. Publisher: Churchill Livingstone, London.
- d) K. Sembulingam & Prema Sembulingam, *Medical Physiology*, 4<sup>th</sup> Edition. Publisher: Jaypee Brothers.

**Lecture wise program:**

<b>No.</b>	<b>Topics</b>	<b>Hrs</b>
1.	Scope of anatomy and physiology, basic terminologies used in this subject. (Description of the body as such planes and terminologies)	<b>01</b>
2.	General Physiology: Structure of cell – its components and their functions. Homeostasis, Mechanism of transport across cell membrane, Secondary messengers and Ion channels	<b>04</b>
3.	Elementary tissues of the human body: epithelial, connective, muscular and nervous tissues-their sub-types and characteristics.	<b>04</b>
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)	<b>01</b>
5.	<u>Haemopoetic system</u> a) Composition and functions of blood b) Haemopoiesis and disorders of blood components. (Definition only) c) Blood groups d) Clotting factors and mechanism e) Platelets and disorders of coagulation	<b>05</b>
6.	<u>Lymph</u> a) Lymph and lymphatic system, composition, formation and circulation. b) Spleen: structure and functions, disorders c) Disorders of lymphatic system (Definition only)	<b>04</b>
7.	<u>Cardiovascular system</u> 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 and cardiac arrhythmias	<b>06</b>
8.	<u>Respiratory system</u> 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, oxygen therapy and resuscitation	<b>05</b>

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|-----|---|-----------|
| 9.  | <u>Digestive system</u>   | <b>06</b> |
|     | 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)  |           |
| 10. | <u>Nervous system</u>   | <b>08</b> |
|     | a) Definition and classification of nervous system.                                     |           |
|     | b) Synapse and neurotransmitter, meninges, ventricles of the brain and CSF              |           |
|     | 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 nervous system            |           |
| 11. | <u>Urinary system</u>   | <b>05</b> |
|     | a) Anatomy and physiology of urinary system   |           |
|     | b) Formation of urine   |           |
|     | c) Renin angiotensin aldosterone system – Juxtaglomerular apparatus - acid base balance |           |
|     | d) Clearance tests and micturition  |           |
| 12. | <u>Endocrine system</u>   | <b>06</b> |
|     | a) Pituitary gland  |           |
|     | b) Adrenal gland  |           |
|     | c) Thyroid and Parathyroid glands   |           |
|     | d) Pancreas and gonads  |           |
| 13. | <u>Reproductive system</u>  | <b>07</b> |
|     | a) Male and female reproductive system organs anatomy and physiology                    |           |
|     | b) Their hormones – physiology of menstruation  |           |
|     | c) Spermatogenesis & Oogenesis  |           |
|     | d) Sex determination (genetic basis)  |           |
|     | e) Pregnancy, maintenance and Parturition   |           |
|     | f) Contraceptive devices  |           |
| 14. | <u>Sense organs</u>   | <b>06</b> |
|     | a) Eye  |           |
|     | b) Ear  |           |
|     | c) Skin   |           |
|     | d) Tongue & Nose  |           |
| 15. | <u>Skeletal muscles</u>   | <b>03</b> |
|     | a) Histology  |           |
|     | b) Physiology of Muscle contraction   |           |
|     | c) Physiological properties of skeletal muscle and their disorders (Definitions)        |           |
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only)

16. Sports physiology **03**
- 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

#### Theory Sessional Examination Syllabus

Sessional No.	Syllabus
	Chapters no.
I	1-7
II	8-11
III	12-16

### 1.1 HUMAN ANATOMY & PHYSIOLOGY (PRACTICALS)

**Practical: 75 hrs (3 Hrs/Week)**

**Responsible member/s of the academic staff: Ms. Seema Mehdi (SM)**

**General Requirements:** Laboratory napkin, muslin cloth, record, observation book (100pages), stationary items, and blood lancet.

#### **List of Experiments:**

1. Study of compound microscope.
2. Study of tissues of human body.
  - (a) Epithelial tissue.
  - (b) Muscular tissue.
3. Study of tissues of human body.
  - (a) Connective tissue.
  - (b) Nervous tissue.
4. Study of appliances used in haematological experiments.
5. Determination of total WBC count of blood.
6. Determination of total RBC count of blood.
7. Determination of differential leukocyte count of blood.
8. Determination of
  - (a) Erythrocyte Sedimentation Rate. (ESR)
  - (b) Hemoglobin content of blood.
  - (c) Bleeding time & clotting time.
8. Determination of
  - (a) Blood pressure. (b) Blood group.
9. Study of various systems with the help of charts, models & specimens
  - (a) Skeleton system part I-axial skeleton. (b) Skeleton system part II- appendicular skeleton.
  - (c) Cardiovascular system. (d) Respiratory system.

- (e) Digestive system.                      (f) Urinary system.  
 (g) Nervous system.                        (h) Special senses.  
 (i) Reproductive system.
10. Study of different family planning appliances.
  11. Study of pregnancy diagnosis test.
  12. Study of appliances used in experimental physiology.
  13. Study of record of simple muscle curve using gastrocnemius sciatic nerve preparation.
  14. Study of simple summation curve using gastrocnemius sciatic nerve preparation.
  15. Study of simple effect of temperature using gastrocnemius sciatic nerve preparation.
  16. Study of simple effect of load & after load using gastrocnemius sciatic nerve preparation.
  17. Study of fatigue curve using gastrocnemius sciatic nerve preparation.

### Scheme of Practical Examination

	Sessionals	Annual
Identification	04	10
Synopsis	04	10
Major Experiment	07	20
Minor Experiment	03	15
Viva	02	15
<b>Max Marks</b>	<b>20</b>	<b>70</b>
<b>Duration</b>	<b>03 hrs</b>	<b>04 hrs</b>

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

## 1.2 PHARMACEUTICS (THEORY)

**Theory: 2 Hrs. /Week**

**Responsible member/s of the academic staff: Dr. Vishal Kumar Gupta (VKG)**

**Scope and objectives:** This course is designed to impart a fundamental knowledge on the art and science of formulating different dosage forms. It prepares the students for most basics of the applied field of pharmacy.

**At completion of this course it is expected that students will be able to:**

**(Student learning outcomes)**

1. Describe the formulation aspects of different dosage forms including their evaluation and stability;
2. Explain the various parts and dispensing of prescription
3. Perform different pharmaceutical calculation involved in formulation with respect to doses and age
4. Describe different extraction processes for galenicals
5. Discuss the incompatibilities in prescriptions

**Teaching/learning methodologies used:**

1. Lecture
2. Practical/Lab
3. Discussion

**Course materials:**

### TEXT BOOKS

- a. Cooper and Gunns Dispensing for pharmacy students.
- b. A text book Professional Pharmacy by N.K.Jain and S.N.Sharma.

### REFERENCE BOOKS

- a. Introduction to Pharmaceutical dosage forms by Howard C. Ansel.
- b. Remington's Pharmaceutical Sciences.
- c. Register of General Pharmacy by Cooper and Gunn.
- d. General Pharmacy by M.L.Schroff.

**Lecture wise programme:**

Topics	Hrs
1. a. Introduction to dosage forms - classification and definitions b. Prescription: definition, parts and handling c. Posology: Definition, Factors affecting dose selection. Calculation of children and infant doses.	<b>06</b>
2. History of profession of Pharmacy in India in relation to pharmacy education, industry and organization in brief.	<b>03</b>

3. Development of Indian Pharmacopoeia. Salient features of latest edition of IP (IP 2008) and introduction to other Pharmacopoeias such as BP, USP, European Pharmacopoeia, Extra pharmacopoeia and Indian National formulary. **03**
4. Weights and measures, Calculations involving percentage solutions, allegation, proof spirit, isotonic solutions. **06**
5. Powders and Granules: Classification advantages and disadvantages, Preparation of simple, compound powders, Insufflations, Dusting powders, Eutectic and Explosive powders, Tooth powder and effervescent powders and granules. **05**
6. Monophasic Dosage forms: Theoretical aspects of formulation including adjuvant like Vehicles, Organoleptic additives and Stabilizers, with examples. Study of Monophasic liquids (formulation aspects and examples) like gargles, mouth washes, Throat paint, Ear drops, Nasal drops, Liniments and lotions, Enemas and collodions. **06**
7. Biphasic dosage forms: Suspensions and emulsions, Definition, advantages and disadvantages, classification and formulation of Suspensions and Emulsions. Test for the type of emulsion and stability problems in emulsions. **06**
8. Suppositories: Definition, advantages and disadvantages, types of base, method of preparation, Displacement value and evaluation. **03**
9. Galenicals: Definition, of different extraction processes like infusion, Decoction, Maceration and Percolation. Study of Maceration and Percolation processes **06**
10. Surgical aids: Surgical dressings, sutures, ligatures and preparation of surgical catgut. **04**
11. Incompatibilities: Introduction, classification, Examples and methods to overcome Physical and therapeutic incompatibilities. **02**

#### Theory Sessional examination syllabus

Sessional No.	Syllabus
	Chapters no.
I	1 to 4
II	5 to 7
III	8 to 11

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## 1.2 PHARMACEUTICS (PRACTICALS)

**Practical: 75 Hours (3 hrs/week)**

**Responsible member/s of the academic staff: Dr. Vishal Kumar Gupta (VKG) & Ms. Chandini Saha**

### List of Experiments:

#### 1. Syrups

- a. Simple Syrup I.P
- b. Syrup of Ephedrine Hydrochloride NF
- c. Orange Syrup

#### 2. Elixir

- a. Piperazine citrate elixir BP
- b. Paracetamol elixir BPC

#### 3. Linctus

- a. Simple linctus BPC
- b. Pediatric simple linctus BPC

#### 4. Solutions

- a. Solution of cresol with soap IP
- b. Aqueous Iodine Solution IP
- d. Strong solution of Iodine IP
- e. Strong solution of ammonium acetate IP

#### 5. Liniments

- a. Liniment of turpentine IP\*
- b. Liniment of camphor IP

#### 6. Suspensions\*

- a. Calamine lotion
- b. Magnesium Hydroxide mixture BP

#### 7. Emulsions\*

- a. Cod liver oil emulsion
- b. Liquid paraffin emulsion

#### 8. Powders\*

- a. Eutectic powder
- b. Dusting powder
- d. Insufflations

#### 9. Suppositories\*

- a. Boric acid suppositories
- b. Chloral suppositories

#### 10. Incompatibilities

- a. Preparations having with Physical Incompatibilities (3 Nos)

\* colourless bottles required for dispensing \* Paper envelope (white), butter paper and white paper required for dispensing.

**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>03 hrs</b>	<b>04 hrs</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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### 1.3 MEDICINAL BIOCHEMISTRY (THEORY)

**Theory: 3 Hrs/Week**

**Responsible member/s of the academic staff: Dr. G.V. Pujar (GVP)**

**Scope and Objectives:** Biochemistry deals with complete understanding of the molecular level of the chemical process associated with living cells in normal and abnormal state. It is also emphasize on chemical aspects of human life in health & illness and the application of chemical laboratory methods in the diagnosis, control of treatment and prevention of diseases. The objectives of the present course are providing biochemical facts and the principles to the students.

**At completion of this course it is expected that students will be able to:**

**(Student learning outcomes)**

1. account the catalysis, kinetics, therapeutic and diagnostic applications of enzymes
2. write the classification, chemical nature and biological role of energy rich molecules
3. correlate the relationship between free energy, enthalpy, entropy and redox potential
4. explain the metabolic pathways of major nutrient molecules in physiological and pathological conditions
5. summarize the metabolic disorders and their clinical significances
6. explain the genetic organization of mammalian genome and functions of DNA (Replication, transcription and translation)
7. summarize the principles of organ function tests and their clinical significances

**Teaching/learning methodologies used:**

1. Lecture
2. Practical/Lab

**Course materials**

**TEXT BOOKS**

- 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**

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

**Lecture wise programme:**

<b>Topic</b>	<b>Hrs</b>
<b>1. Introduction to biochemistry:</b> Cell and its biochemical organization, transport process across the cell membrane. Energy rich compounds: ATP, Cyclic AMP and their biological significance.	<b>05</b>
<b>2. Enzymes:</b> 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.	<b>10</b>
<b>3. Carbohydrate metabolism:</b> Glycolysis, citric acid cycle (TCA cycle), HMP shunt, Glycogenolysis, glycogenesis, gluconeogenesis. Metabolic disorders of Carbohydrate metabolism (diabetes mellitus and glycogen storage diseases); Glucose tolerance test and its significance; hormonal regulation of carbohydrate metabolism.	<b>11</b>
<b>4. Lipid metabolism:</b> - Oxidation of saturated fatty acid; Ketogenesis and ketolysis; biosynthesis of fatty acids and lipids; metabolism of cholesterol; Hormonal regulation of lipid metabolism. Defective metabolism of lipids (Atherosclerosis, fatty liver, hypercholesterolemia).	<b>09</b>
<b>5. Biological oxidation:</b> Enzymes and Coenzyme system involved in Biological oxidation. Electron transport chain (its mechanism in energy capture, regulation and inhibition); Oxidative phosphorylation and uncouplers of ETC.	<b>04</b>
<b>6. Protein and amino acid metabolism:</b> protein turn over; nitrogen balance; general reactions of catabolism of amino acids (Transamination, deamination & decarboxylation). Urea cycle and its metabolic disorders; production of bile pigments; hyperbilirubinemia, porphorias, jaundice. Metabolic disorder of Amino acids.	<b>08</b>
<b>7. Nucleic acid metabolism:</b> Metabolism of purine and pyrimidine nucleotides; Protein, synthesis; Genetic code; inhibition of protein synthesis; DNA damage and repair mechanism; DNA replication (semi conservative).	<b>12</b>
<b>8. The kidney function tests:</b> Role of kidney; Laboratory tests for normal function includes- Urine analysis (macroscopic and physical examination, quantitative and	<b>03</b>

semi quantitative tests.); Test for NPN constituents (Creatinine /urea clearance, determination of blood/ urine creatinine, urea and uric acid); Urine concentration test; Urinary tract calculi. (stones)

- 9. Liver function tests:** Physiological role of liver, metabolic, storage, excretory, protective, circulatory functions and function in blood coagulation. Test for hepatic dysfunction-Bile pigments metabolism; Test for hepatic function test- Serum bilirubin, urine bilirubin, and urine urobilinogen; Dye tests of excretory function; Tests based upon abnormalities of serum proteins; Selected enzyme activity determination tests. **04**
- 10. Lipid profile tests:** Lipoproteins, composition, functions. Determination of serum lipids, total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides. **02**
- 11. 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). **03**
- 12. Electrolytes:** Body water, compartments, water balance, and electrolyte distribution. Determination of sodium, calcium potassium, chlorides, bicarbonates in the body fluids **03**

#### Theory Sessional examination syllabus

Sessional No.	Syllabus
	Chapters no.
I	1 to 3
II	4, 5, 6 and 8
III	7, 9-12

## 1.3 MEDICINAL BIOCHEMISTRY (PRACTICALS)

**Practical: 75 Hours (3 hrs/ week)**

**Responsible member/s of the academic staff: Dr. G.V. Pujar (GVP)**

**Title of the Experiment:**

- 1 Qualitative analysis of normal constituents of urine.
- 2 Qualitative analysis of abnormal constituents of urine.
- 3 Quantitative estimation of urine chlorides by Volhard's method.
- 4 Quantitative estimation of urine creatinine by Jaffe's method.
- 5 Quantitative estimation of urine calcium by precipitation method.
- 6 Quantitative estimation of serum cholesterol.
- 7 Preparation of Folin Wu filtrate from blood.
- 8 Quantitative estimation of blood creatinine.
- 9 Quantitative estimation of blood sugar Folin-Wu tube method.
- 10 Estimation of SGOT in serum.
- 11 Estimation of SGPT in serum.
- 12 Estimation of Urea in Serum.
- 13 Estimation of Proteins in Serum.
- 14 Determination of serum bilirubin
- 15 Determination of Glucose by means of Glucoseoxidase.
- 16 Enzymatic hydrolysis of Glycogen/Starch by Amylases.
- 17 Study of factors affecting Enzyme activity. (pH & Temp.)
- 18 Preparation of standard buffer solutions and its pH measurements (any two)
- 19 Experiment on lipid profile tests
- 20 Determination of sodium/calcium / potassium in serum.

**Scheme of Practical Examination:**

	Sessionals	Annual
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>03 hrs</b>	<b>04 hrs</b>

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

## 1.4 PHARMACEUTICAL ORGANIC CHEMISTRY (THEORY)

**Theory: 3 Hrs/Week**

**Responsible member of the academic staff: Dr. B.R. Prashantha Kumar (BRP)**

**Scope and objectives:** Imparts knowledge about IUPAC / Common systems of nomenclature, physical properties, mechanism and uses of different classes of organic compounds.

**At completion of this course it is expected that students will be able to understand:(Student learning outcomes)**

1. name and write the structure of organic compounds
2. identify kind of isomerism and name the isomer
3. compare physical and chemical properties organic compounds
4. identify the name of the chemical reaction and its class
5. explain the reaction mechanisms and stability of organic intermediates
6. explain orientation and reactivity of various organic reactions

**Teaching/learning methodologies used:**

1. Lecture
2. Practical/Lab

**Course materials:**

### TEXT BOOKS

- a. Organic chemistry- T.R.Morrison and R. Boyd
- b. Text book of Pharmaceutical chemistry - Bentley and Driver
- c. Organic chemistry, the fundamentals of chemistry - I.L.Finar
- d. Organic chemistry - P.L.Soni
- e. Text book of organic chemistry - B.S.Bahl and Arun Bahl

### REFERENCE BOOKS

- a. Organic chemistry – J.M.Cram and D.J.Cram
- b. Organic chemistry- Brown
- c. Advanced organic chemistry- Jerry March, Wiley
- d. Organic chemistry- Cram and Hammered, Pine Hendrickson

**Lecture wise programme :**

<b>Topic</b>	<b>Hrs</b>
<b>1. Classification and Nomenclature</b>	<b>10</b>
Different types of classification of organic compounds	
i. Common- IUPAC systems of nomenclature of following classes of open chain compounds. Hydrocarbons, halohydrocarbons, alcohols, aldehydes, ketones, carboxylic acids, carboxylic acid halides, carboxylic acid amides, carboxylic acid esters, acid anhydrides, amines, ethers	

- ii. Nomenclature of alicyclic compounds and aromatic compounds (non heterocyclic)
- 2. Isomerism** **04**
- a. Structural isomerism, chain isomerism, positional isomerism, functional isomerism, metamerism, tautomerism
  - b. Stereo isomerism, optical isomerism, geometrical isomerism, specification of configuration, conformational isomerism
- 3. Structure and Properties** **05**
- a. Polar molecules, nonpolar molecules, protic molecules, aprotic molecules
  - b. Inter molecular forces
  - c. Melting point, boiling point of organic compounds, solubility of organic compounds
- 4. Alkanes** **03**
- Free radical substitution reactions of alkanes- reactivity, inhibition. Reaction between methane, ethane, propane and halogens
- 5. Alkenes** **08**
- a. i. Dehydrohalogenation reactions of alkyl halides- kinetics, rearrangement of carbo cations, reactivity, orientation
  - ii. Dehydration of alcohols reactions- kinetics, rearrangement of carbo cations, reactivity, orientation
  - iii. E<sub>1</sub> versus E<sub>2</sub> reactions
  - b. Electrophilic addition reactions of alkenes- orientation, rearrangement of carbo cations, reactivity
  - c. Free radical addition reactions of alkenes- orientation, reactivity
- 6. Alkyl halides** **03**
- Preparation of alkyl halides from alcohols by Nucleophilic substitution reactions, Nucleophilic substitution reactions of alkyl halides- kinetics, reactivity, rearrangement of carbocations, solvent effect, stereochemistry.
- SN<sup>1</sup> versus SN<sup>2</sup> reactions
- 7. Alicyclic compounds** **03**
- a. Baeyer's strain theory, Sachse Mohr theory
  - b. General methods of preparation
- 8. Dienes** **03**
- Classification, stability, ease of formation of conjugated dienes, electrophilic and free radical addition reactions of conjugated dienes
- 9. Aromatic compounds** **08**
- a) Evidences in the derivation of structure of Benzene, aromatic characters
  - b) i. Electrophilic substitution reactions of Benzene- nitration, sulfonation, halogenations, reactivity of halogens, Friedel craft's alkylation, reactivity of alkyl halides and limitation of Friedel crafts alkylation reactions, Friedel crafts acylation reactions.
  - ii. Classification of substituents
  - iii. Orientation of mono substituted Benzene compounds towards electrophilic substitution reactions.
  - c). Nucleophilic aromatic substitution reactions- reactivity, comparison with aliphatic nucleophilic substitution reactions

<b>10. Carbonyl compounds</b>	<b>06</b>
a). Nucleophilic addition reactions, reactions between carbonyl compounds and hydrogen cyanide, Sodium bisulphite, hydroxyl amine, hydrazine, phenyl hydrazine, 2,4- dinitro phenyl hydrazine, alcohol	
b). Aldol, crossed aldol, Cannizaro, crossed Cannizaro, Benzoin, Perkin reactions	
<b>11. Carboxylic acids and derivatives</b>	<b>05</b>
a). Acidity of carboxylic acids and effect of substituents on it.	
b). Nucleophilic acyl substitution reactions, esterification.	
c). Comparison of alkyl nucleophilic substitution with nucleophilic acyl substitution reactions	
<b>12. Amines</b>	<b>03</b>
a. Basicity of amines	
b. Hoffmanns degradation of amides, diazotization reactions, coupling reactions, replacement reactions of aromatic diazonium salts	
<b>13. Phenols</b>	<b>03</b>
a. Acidity of phenols	
b. Kolbe's synthesis, Riemeier tiemann reactions, phtalein reaction, Schotten Bauman reaction, Libermann's nitrosation reaction	
<b>14. Heterocyclic compounds</b>	<b>04</b>
Classification, nomenclature of mono and bicyclic compounds, medicinal uses of some important heterocyclic compounds	
<b>15. Carbohydrates</b>	<b>03</b>
Classification, qualitative tests	
<b>16. Amino acids and proteins</b>	<b>04</b>
a) Classification of amino acids, qualitative tests for amino acids	
b) Classification, structure, color reactions of proteins. Qualitative tests for proteins	

**Theory Sessional examination syllabus**

Sessional No.	Syllabus
	Chapters no.
I	1 to 5
II	6 to 10
III	11 to 16

## 1.4 PHARMACEUTICAL ORGANIC CHEMISTRY (PRACTICALS)

**Practical: 75 Hours (3 hrs/ week)**

**Responsible member/s of the academic staff: Dr. B.R. Prashantha Kumar (BRP)**

**Title of the Experiment:**

- 1 Recrystallisation of organic compounds
- 2 Preparation of simple non hetero cyclic organic compounds and recrystallisation of compounds prepared. (Minimum of 08 compounds)  
Aspirin/Benzanilide/Phenyl benzoate/Acetanilide by acylation  
2,4,6-Tribromo aniline/Para bromo acetanilide by halogenation  
5-Nitro salicylic acid/ p-Nitroacetanilide/m-dinitro benzene by nitration  
Dibenzal acetone from benzaldehyde by Claisen Schmidt  
Benzoic acid from benzyl chloride by oxidation  
Benzoic acid/Salicylic acid by hydrolysis  
1- Phenyl azo -2- naphthol from aniline by diazotization and coupling  
Benzophenone oxime from benzophenone
- 3 Systematic qualitative analysis of unknown organic compounds for preliminary and Lassaigns tests.
- 4 Systematic qualitative analysis of unknown organic compounds for functional groups (for preliminary / Lassaigns / solubility / functional group tests )  
Following classes of compounds may be analysed  
Phenols, amide/ urea, carbohydrate, amine, carboxylic acid, aldehyde, ketone, alcohol, carboxylic acid ester, hydrocarbon, halohydrocarbon, nitrocompound, anilide
- 5 Determination of melting and boiling points of organic compounds
- 6 Preparation of suitable solid derivatives from organic compounds
- 7 Introduction to the use of stereomodels – Methane, Ethane, Ethene, Acetylene, Cyclo hexane, Benzene (Students to prepare the ball and stick stereomodels using china clay, plastic sticks individually and to explain the formation of bonds & bond angles, bond lengths )

### Scheme of Practical Examination

	Sessional	Annual
Synopsis	04	15
Major Experiment	12	25
Minor Experiment	-	15
Viva	04	15
<b>Max Marks</b>	<b>20</b>	<b>70</b>
<b>Duration</b>	<b>03 hrs</b>	<b>04 hrs</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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## 1.5 PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)

**Theory: 2 Hrs / Week**

**Responsible member/s of the academic staff: Dr. B.M.Gurupadayya (BMG)**

**Scope and objectives:** This course mainly deals with fundamentals of analytical chemistry and also the study the Inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.

**Upon completion of course student shall be able to understand:  
(Student learning outcomes)**

1. explain errors, types and steps to minimizing errors.
2. summarize the classification of various inorganic therapeutic and pharmaceutical agents along with assay of selected Pharmacopoeal compounds
3. explain the principle of various volumetric analysis of inorganic pharmaceuticals
4. summarize the preparation and standardization of various molar and normal solutions
5. account the various sources of impurities in pharmaceuticals and their limit tests

**Teaching/learning methodologies used:**

1. Lecture
2. Practical/Lab

**Course materials:**

### TEXT BOOKS

- a. A.H.Beckett & J.B. Stenlake's -Practical Pharmaceutical Chemistry Vol I & II, Stahl one Press of University of London, 4th edition.
- b. Text Book of Quantitative Inorganic analysis by Vogel
- c. Inorganic Pharmaceutical Chemistry III-Edition P. Gundu Rao

### REFERENCE BOOKS

- a. A text book of Inorganic medicinal Chemistry by Surendra N. Pandey.
- b. Inorganic pharmaceutical Chemistry by M.L Schroff
- c. Bentley and Driver's Textbook of Pharmaceutical chemistry
- d. Pharmaceutical Analysis Vol – I, Dr. A.V. Kasture et al., Nirali Prakashan, 13th Edition.
- e. Inorganic Pharmaceutical Chemistry by Anand & Chetwal.
- f. Analytical chemistry principles by John H. Kennedy.
- g. I.P.1985,1996, 2008 Govt. of India, Ministry of Health

**Lecture wise programme:**

<b>Topic</b>	<b>Hrs</b>
1. Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures.	<b>02</b>
2. Fundamentals of volumetric analysis, theories of indicators and methods of expressing concentrations. Primary and secondary standard. Preparation and standardization of various volumetric solutions like oxalic acid, sodium hydroxide, hydrochloric acids, sodium thiosulphate, sulphuric acid, potassium permanganate, iodine and ceric ammonium sulphate solutions.	<b>04</b>
<b>3. Acid base titration:</b> Classification and estimation of strong, weak, and very weak acids and bases.	<b>02</b>
<b>4. Principles of redox titrations:</b> Concepts of oxidation and reduction. Redox reactions, strength and equivalent weights of oxidizing and reducing agents, theory of redox titrations, cerimetry, Iodimetry, Iodometry, bromometry, titrations with potassium iodate, potassium bromate, titanous chloride, 2,6-dichlorophenol indophenol.	<b>03</b>
<b>5. Non aqueous titration:</b> Introduction to solvents, classification and estimation of Sodium benzoate and ephedrine HCl.	<b>02</b>
<b>6. Principles of precipitation titrations:</b> Different methods-Mohr's, Modified Mohr's, Volhard's, Modified Volhard's, Fajans with example. Estimation of sodium chloride by modified volhards method.	<b>03</b>
<b>7. Complexometric titration and its classification:</b> Estimation of Magnesium sulphate, and Calcium Gluconate by complexometric method. Metal ion indicators.	<b>03</b>
<b>8. Gravimetry:</b> Introduction to gravimetric method, steps involved in gravimetric method, precipitants and estimation of Barium sulphate by gravimetric method.	<b>02</b>
<b>9. Limit test:</b> Source and effect of impurities in pharmacopoeial substances, importance of limit test, general principle and procedures for limit test, limit test for chloride, sulphate, iron, arsenic and lead and heavy metals. Special procedure for limit test for chloride and sulphate	<b>06</b>
<b>10. Medicinal gases:</b> Oxygen, Nitrous oxide, Carbon dioxide	<b>01</b>
<b>11. Acidifies:</b> Dil HCl, Ammonium Chloride*	<b>01</b>
<b>12. Antacid:</b> Aluminum hydroxide gel*, sodium bicarbonate*, Magnesium triisilicate, Magnesium carbonate (Light and Heavy), Magnesium hydroxide mixture*, Preparation containing combination of antacids.	<b>03</b>
<b>13. Cathartics:</b> Magnesium sulphate, Sodium orthophosphate	<b>01</b>
<b>14. Major extra and intracellular electrolytes:</b> Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Sodium chloride	

Injection, Sodium chloride compound injection, Potassium chloride, Potassium chloride injection, Calcium Gluconate\* and Electrolyte combination therapy and ORS, Physiological acid base balance. **04**

**15. Essential trace elements:** Copper, Iron, Iodine and Zinc **01**

**16. Antimicrobials:** Potassium permanganate\*, Hydrogen peroxide\*, Chlorinated lime\*, Iodine and its preparations, Boric acid\*. **03**

**17. Pharmaceutical aids:** Bentonite, sodium metabisulphite, Barium sulphate\* **01**

**18. Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, Stannous fluoride, Zinc Eugenol cement. **02**

**19. Miscellaneous compounds:** **i) Expectorants:** Potassium iodide\* **ii) Haematinics:** Ferrous sulphate\*, Ferrous gluconate, Ferrous fumarate, **iii) Emetics:** Copper sulphate\*, Sodium potassium tartarate **iv) Poison and Antidote:** Sodium thioisulphate, Activated charcoal. **04**

**20. Radiopharmaceuticals:** Radio activity, natural radio activity and artificial radio activity. Measurement of radioactivity, Properties of  $\alpha$ ,  $\beta$ ,  $\gamma$  radiations, Half life, radio isotopes and study of radio isotopes sodium iodide I-121, Ferric citrate Fe-59. Storage conditions, precautions & pharmaceutical application of radioactive substances. **02**

#### Theory Sessional examination syllabus

Sessional No.	Syllabus
	Chapters no.
I	1 to 6
II	7 to 13
III	14 to 20

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## 1.5 PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICALS)

**Theory: 75 Hours (3 hrs /week)**

**Responsible member/s of the academic staff: Dr. B. M. Gurupadayya (BMG) & Dr. B.R. Prashantha Kumar (BRP)**

### List of experiments:

1. Limit tests (7 exercises) \*
  1. Limit test for chlorides
  2. Limit test for sulphate
  3. Limit test for Iron
  4. Limit test for heavy metals
  5. Limit test for Arsenic
  6. Modifications in limit tests for chloride and sulphates in potassium permanganate, sodium bicarbonate, sodium benzoate and sodium Salicylate.
2. Preparation and standardization of the following (3 exercises)\*.
  1. 0.1N NaOH
  2. 0.1N KMnO<sub>4</sub>
  3. 0.1N Ceric ammonium sulphate
  4. 0.1N HClO<sub>4</sub>
  5. 0.05M Di sodium EDTA
  6. 0.1N Sodium thiosulphate
3. Assay of the following compounds \*\*
  1. Ammonium chloride-acid base titration (Formal titration)
  2. Ferrous sulphate- (redox) Ceric ammonium sulphate titration
  3. Copper sulphate- (redox) Iodometry
  4. Calcium gluconate-complexometry
  5. Hydrogen peroxide- (redox -Permanganometry)
  6. Sodium benzoate-nonaqueous titration
  7. Sodium chloride-Modified Volhard's method
  8. Assay of KI-KIO<sub>3</sub> titration
  9. Assay of Zinc oxide (acid base back titration)
4. Test for identify for the following (2 exercises)\*
  1. Sodium bicarbonate
  2. Ferrous sulphate
  3. Potassium iodide.
  4. Calcium chloride
5. Test for purity for the following (2 exercises)\*
  1. Swelling power in Bentonite
  2. Ammonium salts in Potash alum.
  3. Presence of Iodates in KI

## 6. Preparation of inorganic pharmaceuticals (2 exercises)\*

1. Boric acid
2. Potash alum
3. Magnesium hydroxide.
4. Magnesium sulphate

**Scheme of Practical Examination**

<b>Scheme of Practical Examination</b>	<b>Sessional</b>	<b>Annual</b>
Synopsis	05	15
Major Experiment (Experiment indicated by**)	10	25
Minor Experiment (Experiment indicated by*) 1&2	3	20
Viva-Voce	2	10
<b>Max. Marks</b>	<b>20</b>	<b>70</b>
<b>Duration</b>	<b>3 Hrs</b>	<b>4 Hrs</b>

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

## 1.6 REMEDIAL MATHEMATICS / BIOLOGY (THEORY)

**Theory: 3 hrs /week**

**Responsible Member of the academic staff: Mr. D.H. Panchaksharappa Gowda (DHP)**

**Scope and objectives:** This is an introductory course in mathematics. This subject deals with the introduction to matrices, determinants, trigonometry, analytical geometry, differential calculus, integral calculus, differential equations, laplace transform.

**Upon completion of course student shall be able to:**  
(Student learning outcomes)

1. Solve problems pertaining to Trigonometry, Analytical geometry, matrices, determinants, integration, differential equation, Laplace transform
2. Explain importance of mathematics in pharmacy

**Teaching / learning methodologies used:**

1. Lecture
2. Discussion

**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.Loncy

**Lecture wise programme:**

Note: To emphasis also on definition, examples and application in Pharmacy

	<b>Topic</b>	<b>Hrs</b>
1	<b>Algebra :</b> Matrices : Definition, Addition, Subtraction and Multiplication of matrices, Determinants: Determinants of order two and three, Properties of determinants (without Proof). Inverse of square Matrices, Adjoint of square matrix, Solution of linear equation by Matrix method, Cramer's rule, Characteristic equation, Statement of Cayley-Hamilton Theorem (Without Proof) – Pharmaceutical examples	<b>18</b>

- 2 **Trigonometry** : Relation between Sides and angles of a triangle, solution of triangles – Simple problems **05**
- 3 **Analytical Geometry** :Points, Straight line, Types of straight lines –  $Y = mx + c$ ,  $(y - y_1) = m(x - x_1)$ ,  $(y - y_1) = ((y_2 - y_1)/(x_2 - x_1))(x - x_1)$  Parallel and Perpendicular straight lines, Angle between two lines, Perpendicular distance from a point to the line, distance between parallel lines, Circle: General equation of circle, finding centre and radius of the circle, Parabola: Equation of the parabola  $y^2 = 4ax$ , Simple problems **15**
- 4 **Differential calculus**: Function, Limit, Differentiation, Differentiation of sum, Product, Quotient, Composite, Parametric, exponential, trigonometric and Logarithmic function. Successive differentiation, simple problems. **16**
- 5 **Integral Calculus**: Partial fractions, Definition of integration, integration by substitution and integration by parts, Properties of definite integrals, Simple problems. **07**
- 6 **Differential equations**: Definition, order, degree, variable separable, homogeneous differential equation, linear differential equation, exact differential equation, Simple problems **10**
- 7 **Laplace transform**: Definition, Laplace transform of elementary functions, linearity and shifting property, simple problems **04**

#### Theory Sessional examination syllabus

Sessional No.	Syllabus
	Chapters no.
I	3-4
II	5, 6 and 7
III	1-2

## 1.6 REMEDIAL BIOLOGY (THEORY)

**Theory: 75 Hours (3 Hrs /Week)**

**Responsible member of the academic staff: Dr. M. N. Naganandini (MNN)**

**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.

**At completion of this course it is expected that students will be able to understand: (Student Learning Outcomes)**

**Theory:**

1. Explain the different concept of classification of plants and animals.
2. Basic concepts of Plant physiology
3. Classify the various categories plants and animals.
4. Correlate the pharmaceutical products and conventional properties of ergastic substances
5. Explain the taxonomy.
6. Know poisonous animals.

**Practical:**

1. Identify the plants and animals of medicinal interest.
2. Explain the principle involved in the plant physiology.
3. Explain the Anatomy and physiology of animals.
4. To appreciate general organization of mammals.

**Teaching / Learning methodologies used:**

1. Lecture
2. Practical/ Lab
3. Discussion

**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.Ananthkrishnan.
- e. A manual for pharmaceutical biology practical by S.B.Gokhale and C.K.Kokate.

**Lecture wise programme:**

<b>Topic</b>	<b>75 Hrs</b>
<b>PART – A</b>	
1.Introduction	<b>06</b>
General organization of plant cell and its inclusions	
2.Plant tissues	<b>04</b>
3.Plant kingdom	<b>04</b>
4.Morphology of plant parts - Root, Stem, Leaf, Inflorescence, Flower and pollination, Fruits and seeds	<b>17</b>
5. Plant physiology	<b>04</b>
6. Taxonomy of Leguminosae, umbelliferae, Solanaceae, Lilliaceae, Zinziberaceae, Rubiaceae	<b>06</b>
1. Study of Fungi, Yeast, Penicillin and Bacteria	<b>04</b>
<b>PART-B</b>	
8.Study of Animal kingdom, Study of animal cell and tissues	<b>08</b>
9.Detailed study of frog	<b>08</b>
10. Study of Pisces, Reptiles, Aves	<b>05</b>
11. General organization of mammals	<b>05</b>
12.Study of poisonous animals	<b>04</b>

**Theory Sessional examination syllabus**

<b>Sessional No.</b>	<b>Syllabus</b>
	<b>Chapters no.</b>
I	1, 2 & 4
II	3, 5, 6, 7 & 8
III	9 to 12

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**REMEDIAL BIOLOGY (PRACTICAL)****Theory: 75 Hours (3 Hrs /Week)****Responsible member of the academic staff: Dr. M. N. Naganandini (MNN)****List of experiments:**

1. Introduction to biology experiments (section cutting techniques, Mounting and staining, slide preparation and Microscope)
2. Study of cell constituents and cell inclusions
3. Study of Stem modifications
4. Study of Root modifications
5. Study of Leaf modifications
6. Identification of Fruits and seeds
7. Preparation of Permanent slides
9. Simple plant physiological experiments
10. Identification of animals
11. Detailed study of Frog by using computer models
12. Computer based tutorials

**Scheme of Practical Examination**

	<b>Sessionals</b>	<b>Annual</b>
Identification	04	10
Synopsis	04	10
Major Experiment	07	20
Minor Experiment	03	15
Viva	02	15
<b>Max Marks</b>	<b>20</b>	<b>70</b>
<b>Duration</b>	<b>03 hrs</b>	<b>04 hrs</b>

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

Class: PHARM. D -FIRST YEAR

Lunch Break: 1.00 to 2.00 PM  
 Tea Break: 10.40 to 11.10 AM  
 3.50 PM to 4.05 PM

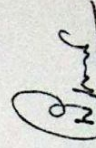
Time	9.00-9.50AM	9.50-10.40AM	11.10-12.05PM	12.05-1.00PM	2.00-2.55PM	2.55-3.50PM	4.05-5.00PM
Monday	← MNN Practical	Remedial Biology	Remedial Mathematics (Tu) DHP	Remedial Mathematics (Tu) DHP Remedial Biology MNN	← BI Pharmaceutics ← BII Medicinal Biochemistry	← BI Pharmaceutics ← BII Medicinal Biochemistry	VKG GVP
Tuesday	Pharmaceutics VKG	← BI BRP ← BII BMG	Pharm. Organic Chemistry Pharm. Inorganic Chemistry	Pharm. Organic Chemistry Pharm. Inorganic Chemistry	Pharm. Inorganic Chemistry BMG Human Anatomy & Physiology SM	Human Anatomy & Physiology SM	Medicinal Biochemistry GVP
Wednesday	Remedial Mathematics DHP Remedial Biology MNN	← BII BRP ← BI SM	Pharm. Organic Chemistry Human Anatomy & Physiology	Pharm. Organic Chemistry Human Anatomy & Physiology	Human Anatomy & Physiology SM	Pharm. Organic Chemistry BRP	Medicinal Biochemistry GVP
Thursday	Human Anatomy & Physiology SM	← BII SM ← BI BRP	Human Anatomy & Physiology Pharm. Inorganic Chemistry	Human Anatomy & Physiology Pharm. Inorganic Chemistry	← Communication Skills	Communication Skills	-----→
Friday	Pharm. Organic Chemistry BRP	← BI GVP ← BII C	Medicinal Biochemistry Pharmaceutics (Tu) VKG	Medicinal Biochemistry Pharmaceutics	Pharm. Organic Chemistry BRP	Pharmaceutics VKG	Medicinal Biochemistry GVP
Saturday	Pharm. Inorganic Chemistry BMG	Medicinal Biochemistry (Tu) GVP	Pharmaceutics (Tu) VKG Remedial Mathematics DHP Remedial Biology MNN	Remedial Mathematics DHP Remedial Biology MNN	Pharm. Organic Chemistry BRP	Pharmaceutics VKG	Medicinal Biochemistry GVP

\*Effective from: 6<sup>th</sup> July 2017 Note: 1. No tea break for practicals 2. Forenoon practical starts from 10.00AM

Time table Coordinator

Copy: SNB/LNB/SCF/SCC-Teachers/OC/TTF-MSV/PP Dept./Extra-MSV.

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 Principal