ACADEMIC BOOK 2018

PRAVARA

Better Science, Better Health.

PRAVARA RURAL EDUCATION SOCIETY's

COLLEGE OF PHARMACY (FOR WOMEN), CHINCHOLI,

Tal: Sinnar, Dist: Nashik

College Code PH - 5201

Approved by A.I.C.T.E., New Delhi,

Affiliated to Savitribai Phule Pune University, Pune

Permitted by Pharmacy Council of India, New Delhi

Recognized by Govt. of Maharashtra

Vision

To emerge as the most preferred pharmacy educational institute with global recognition and developing competent and socially sensitive pharmacists committed to healthcare needs of society.

Mission

To develop students as global citizen with conscience,
commitment and dedication.

To create world class facilities and ambience for advanced level of
teaching, research and practical training.

To recruit and retain highly motivated and qualified faculty to promote the cause of teaching and learning.

INDEX

ACADEMIC CALENDAR
(June 2018-May 2019)

Semester: All Semesters of B.Pharm and M.Pharm **Academic Year:** 2018-2019

Week No.	Month	Week Days						No. of Working Days	Events	Responsible Dept./Staff/Faculty
		Mon	Tue	Wed	Thu	Fri	sat			
1	Jun2018			13	14	15	16	3	13th-Reopening of III, V, VII Sem, M.Pharm III Sem 16th Ramzan ID	Academic dean Dr. C.J.Bhangale
2		18	19	20	21	22	23	6	21st-Yoga day 22nd- Guest lect.for VII Sem and M.Pharm III Sem 23rd-Alumni meet 27th . guest lecture for V Sem	Academic dean Dr. C.J.Bhangale
3		25	26	27	28	29	30	6	Regular lecture 30th -Teaching staff meeting	Academic dean Dr. C.J.Bhangale
4	July2018	2	3	4	5	6	7	5	Regular lecture III, V, VII Sem	Academic dean Dr. C.J. Bhangale
		9	10	11	12	13	14	6	3rd-Tree plantation 5th-Industrial visit for V Sem 6th –Guest Lect for M. Pharm 13th-GB and CDC meeting	Academic dean Dr. C.J. Bhangale
5		16	17	18	19	20	21	5	20th-Guest lecture for III Sem	Academic dean Dr. C.J. Bhangale
6		23	24	25	26	27	28	6	24th- Industrial visit for V Sem 17th-Parents meet V Sem 18th-Guest lect. for V Sem	Academic dean Dr. C.J. Bhangale

7		30	31					2	31st-Teaching staff meeting	Academic dean Dr. C.J. Bhangale
8	**Aug2018**			1	2	3	4	3	1st-Regular lecture of II,V,VII Sem, Reopening of I Sem, Parents meet of I Sem 3rd-Industrial visit for VII Sem	Academic dean Dr. C.J. Bhangale
9		6	7	8	9	10	11	4	10th-Freshers party Regular lecture of I, II,V,VII Sem.	Academic dean Dr. C.J. Bhangale
10		13	14	15	16	17	18	6	15-Independence day 16th-Guest lecture for III Sem 17th-Pateti	Academic dean Dr. C.J. Bhangale
11		20	21	22	23	24	25	3	22nd Bakri ID 23rd-Industrial visit for M.Pharm 25th-Hon'ble Shri Vitthalrao vikhe pail Jayanti	Academic dean- Dr. C.J.Bhangale
12		27	28	29	30	31		6	28 th -Guest lecture of VII Sem 25th-Ganesh Chaturthi 29th-External viva of M.Pham IV sem 31st-Teaching staff meeting	Academic dean- Dr. C.J.Bhangale
13							1	1	1streopening of M.Pharm I Sem Regular lecture	Academic dean- Dr. C.J.Bhangale
14		3	4	5	6	7	8	6	1st-Hospital visit I Sem 5th-Teachers	Academic dean- Dr. C.J.Bhangale

	Sept 2018								day	
15		10	11	12	13	14	15	5	10th-14th - Sessional exam of III, V, VII Sem	Academic dean- Dr. C.J.Bhangale
16		17	18	19	20	21	22	6	17th-Ganesh chaturthi 20th –Mohram 21st-Guest lecture of I Sem 22nd-National seminar	Academic dean- Dr. C.J.Bhangale
17		24	25	26	27	28	29	6	25th-World Pharmacist day 26th –HOD meeting 27th-Guest lecture-III Sem 28th -Industrial visit of I Sem	Academic dean- Dr. C.J.Bhangale
18		1	2	3	4	5	6	5	2nd –Mahatma Gandhi Jayanti 4th - Industrial visit of I Sem M. Pharm	Academic dean- Dr. C.J.Bhangale
19	**Oct.2018**	8	9	10	11	12	13	6	8th-13th- Sessional exam of I, III, V	Exam incharge- Mr.V.A.Kashid
21		15	16	17	18	19	20	3	18th - Vijayadashami	Academic dean Dr. C.J.Bhangale
22		22	23	24	25	26	27	6	27th-HOD meeting	Academic dean- Dr. C.J.Bhangale
23		29	30	31				2	29th-31st--Sem pract exam of VII Sem 31st-Teaching staff meeting	Academic dean Dr. C.J.Bhangale
24					1	2	3	3	Regular lecture	Academic dean- Dr. C.J.Bhangale
25		5	6	7	8	9	10	6	5th-10th- Diwali vacation	Exam Incharge- Mr.V.A.Kashid
26		12	13	14	15	16	17	5	Regular lecture of I, 12th-22nd III and V Sem final exam	Exam Incharge- Mr.V.A.Kashid

27	**Nov 2018**	19	20	21	22	23	24	6	19th-Regular lecture of Ist 19th-30th-Sem exam of VII Sem 20th- Ed-E-Milad 23rd- Gurunanak jayanti 24th-29th- Practical sem. Exam of III and V Sem 24th-30th- Sessional exam of I Sem	Exam Incharge- Mr.V.A.Kashid
28		26	27	28	29	30		4	24th-30th Sessional exam of I Sem 27th-HOD meeting 29th-Reopening of IV, VI sem. 29th-30th- M.Pharm Ist sem prac exam. 30th –Teaching staff meeting	Academic dean- Dr. C.J.Bhangale
29							1	0	1st-Eid-E-Milad	Academic dean- Dr. C.J.Bhangale
30	**Dec 2018**	3	4	5	6	7	8	6	4th-22nd- Semester I Sem Exam, M.Pharm I Sem final Exam 3rd to 8th – Project seminar of VII Sem 6th-M.Pharm. III Sem Seminar	Exam incharge Dr. C.J.Bhangale
31		10	11	12	13	14	15	5	10th-15th- NSS camp of VI Sem 11thReopening of VIII Sem	NSS Incharge-
32		17	18	19	20	21	22	6	Regular lecture of VII Sem	

33		24	25	26	27	28	29	5	24th-29th-- Practical sem. Exam of Ist sem 25th-X mas 30st- Hon'ble Shri balasaheb Vikhe patil death anniversary	Exam Incharge- Ms.K.T.Vaditake
34		31							31st- Teaching staff meeting	
35	**Jan 2019**		1	2	3	4	5	5	Regular lecture of IV, VI, VIII Sem	Academic dean- Dr. C.J.Bhangale
36		7	8	9	10	11	12	6	7th- Reopening of II sem, M.Pharm IInd sem 8th – Guest lecture of VII Sem 10th-17th- IPA-NPW	Academic dean- Dr. C.J.Bhangale
37		14	15	16	17	18	19	5	17th- Guest lecture of VIII Sem 16th- Women empowerment seminar 19th –Guest lect. of M.Pharm II	Academic dean- Dr. C.J.Bhangale
38		20	22	23	24	25	26	6	26th- Republic day	Academic dean- Dr. C.J.Bhangale
39		28	29	30	31			4	31st -Staff Meeting	Academic dean- Dr. C.J.Bhangale
40	**Feb2019**					1	2	1	1st State level seminar	Academic dean - Dr. C.J.Bhangale
41		4	5	6	7	8	9	6	5th -Vidyarrthi arogyavardhini seminar 8th-Skill development (Student welfare Scheme)	Academic dean- Dr. C.J.Bhangale Student welfare coordinator

									programme	
42		11	12	13	14	15	16	5	11th Guest lecture of M.Pharm 13th-HOD meeting 14th- Industrial visit of II Sem	Academic dean- Dr. C.J.Bhangale
43		18	19	20	21	22	23	5	19th-Shiv jayanti 18-22nd- Cultural days 23rd- Annual social gathering 23rd- State level seminar	Academic dean- Dr. C.J.Bhangale Cultural incharge- Mr.R.J.Bhor
44		25	26	27	28				25th- GB and CDC Meeting 26th- Industrial visit of VIII sem 28th- Guest lecture of II Sem 28th-Teaching staff meeting	Academic dean- Dr. C.J.Bhangale
45	**March 2019**					1	2		1st- Women empowerment seminar Regular lecture 2nd HOD meeting	Academic dean- Dr. C.J.Bhangale
46		4	5	6	7	8	9		2nd- Industrial visit for VIII thsem 5th- Guest lecture of IV sem 4th- Mahashivratri 8th-Nirbhay kanya abhiyan seminar	Academic dean- Dr. C.J.Bhangale
47		11	12	13	14	15	16		11th-20th- Sessional exam of VIII Sem and regular lecture of	Academic dean- Dr. C.J.Bhangale

									II,IV,VI ,II sem M.Pharm 15th-Guest lecture of II sem	
48		18	19	20	21	22	23		11th-20th- Sessional exam of VIII Sem and regular lecture of II,IV,VI , II Sem M.Pharm 21st-Holi	Academic dean- Dr. C.J.Bhangale
49		25	26	27	28	29	30		26th-Industrila visit of VI Sem 27th-Guest lecture for M. Pharm 28th-HOD meeting 29th- Guest lecture of VI Sem 30th-Industrial visit for M. Pharm 30th-Teaching staff meeting	Academic dean- Dr. C.J.Bhangale
40		1	2	3	4	5	6	5	Regular lecture 5th- Farewell for final year students 6th- Gudipadwa	Exam Incharge- Dr. C.J.Bhangale
41	**April 2019**	8	9	10	11	12	13	6	8th-10th-Sem. Practical exam of VIII sem and regualr lecture of II, IV, VI, M.Pharm 14th- Dr. Babasaheb Ambedkar Jayanti	Exam Incharge- Dr. C.J.Bhangale
42		15	16	17	18	19	20	5	15th -26th- Sem exam of VIII Sem, Regualr lecture of II, IV,VI, M. Pharm	Exam Incharge- Dr. C.J.Bhangale

43		22	23	24	25	26	27	6	22nd-29th Sessional exam of II,IV,VI Sem, M. Pharm 27th- Death anniversary of Hon'ble Shri Vitthalrao Vikhe Patil	Exam Incharge- Mr.V.A.Kashid
44		29	30					2	30th-Teaching staff meeting	Academic dean- Dr. C.J.Bhangale
45	**May 2019**			1	2	3	4	3	1st- Maharashtra din 1st-5th- Sem. Practical exam o f IV and VI Sem 5th- Hon'ble Shri Balasaheb vikhe patil Jayani	
46		6	7	8	9	10	11	6	6th-10th- Sem. Practical exam of II Sem 11th- M.Pharm II Sem Practical exam	Exam Incharge- Mr.V.A.Kashid
47		13	14	15	16	17	18	5	15th- M. Pharm submission 16th- M. Pharm IV sem seminar 17th- M.Pharm IV sem thesis submission 16th-30th- Sem theory exam of II,IV,VI Sem, M.Pharm	Exam Incharge- MrV.A.Kashid
48		20	21	22	23	24	25	6	16th-30th- Sem theory exam of II,IV,VI Sem,M.Pharm	Exam Incharge- Mr.V.A.Kashid
49		27	28	29	30	31			31st- Teachiing staff meeting	Academic dean- Dr. C.J.Bhangale

Academic Year 2018-19

First Year B. Pharmacy

Semester I

TIME TABLE 2018-2019 **W.E.F.01/08/2018**

TIME	BATCH	MON	TUE	WED	THU	FRI	SAT
1st SEMESTER							
10.00-11.00		Inorganic chem./ RJB	HAP/ MTG	Pharma analy-I/ KTV	Pharmaceutis-I/ VAK	Remedial biology/ SGL	Remedial Math
11.00-12.00		Pharma analy-I/ KTV	Inorganic chem./ RJB	HAP/MTG	Communication skills/ VMD	Pharmaceutis-I/ VAK	Communication skills/ VMD
12.00-1.00		HAP/ MTG	Pharma analy-I/ KTV	Inorganic chem./ RJB	Remedial biology/ SGL	Remedial math	Pharmaceutis-I/ VAK
LUNCH BREAK							
1.30-2.30	A	Inorganic chem./ RJB	HAP/ MTG	Pharma analy-I/ KTV	Pharmaceutis-I/ VAK	Remedial biology/ SGL	Communication skills/ VMD
2.30-3.30	B	Pharma analy-I/ KTV	Inorganic chem./ RJB	HAP/ MTG	Communication skills/ VMD	Pharmaceutis-I/ VAK	Remedial biology/ SGL
3.30-4.30	C	HAP/ MTG	Pharma analy-I/ KTV	Inorganic chem./ RJB	Remedial biology/ SGL	Communication skills/ VMD	Pharmaceutis-I/ VAK
4.30-5.00		Remedial/VMD	Remedial/ VAK	Remedial/SGL	Remedial/ MTG	Remedial/ RJB	Remedial/KTV

Teaching Staff:

1. RJB: Mr. R.J. Bhor

2. KTV-Ms. K.T. Vaditake

3. VAK-Mr. V.A. Kashid

4. SGL-Mr. S.G. Laware

5. VMD-Mr. V.M. Dhmak

6. MTG-Mr. M.T. Gaikar

Subject I

HUMAN ANATOMY AND PHYSIOLOGY-I

(HAP-I)

Scheme

Course of study

Course Code	Course Name	Lectures Assigned			
		Theory	Practical	Tutorial	Total
BP101T	HAP-I	03	-	01	04
BP107P	HAP-I	-	04	-	02

Schemes for internal assessments and end semester examinations

Course Code	Course Name	Internal Assessment				End Semester Exams		Total Marks
			Sessional Exams					
		Continuous Mode	Marks	Duration	Total	Marks	Duration	
BP101T	HAP-I	10	15	1 Hrs	25	75	3 Hrs	100
BP107P	HAP-I	5	10	4 Hrs	15	35	4 Hrs	50

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.

Course Delivery:

The course will be delivered through lectures, class room interaction, and presentations.

Course 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
- Joints

  Structural and functional classification, types of joints movements and its articulation

Unit III	**10 hours**

- **Nervous System**

  Organization of nervous system, Organization of neuron, Neuroglia, Classification & Properties of nerve fibre, Electrophysiology, Action potential, nerve impulse,

  Receptor, synapse, neurotransmitters.
- **Central nervous system**

  Meninges, ventricles of brain, Cerebrospinal fluid, structure of brain, Functions of brain (Cerebrum, brain tem, cerebellum), Spinal cords – Gross structure, Functions of afferent and efferent nerve tracts, reflex activity.

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

- 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.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.

2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York

3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA.

4. Text book of Medical Physiology- Arthur C. Guyton and John.E. Hall. Miamisburg, OH, U.S.A.

5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A

6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.

7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.

8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA.

2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.

3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata.

LESSON PLAN			
S. No	**Topic**	**No. of hours**	**Name of the faculty**
Unit I	**Introduction to human body** Definition and scope of anatomy and physiology	1	Mr. Mayur Gaikar
	Levels of structural organization and body systems,	1	
	Basic life processes, homeostasis, basic anatomical terminology	1	
	Cellular level of organization Structure and functions of cell, transport across cell membrane	1	
	Cell division, cell junctions. General principles of cell communication,	1	
	Intracellular signaling pathway activation by extracellular signal molecule,	1	
	Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine	1	
	Tissue level of organization Classification of tissues	1	
	Structure, location and functions of epithelial, muscular	1	
	Nervous and connective tissues	1	
Unit II	**Integumentary system** Structure of skin	1	Mr. Mayur Gaikar
	Functions of skin	1	
	Skeletal system Divisions of skeletal system	1	
	Types of bone	1	
	Salient features and functions of bones of axial skeletal system	1	
	Salient features and functions of bones of appendicular skeletal system	1	
	Organization of skeletal muscle,		
	Physiology of muscle contraction	1	
	Neuromuscular junction	1	
Unit III	**Nervous System** Organization of nervous system	1	Mr. Mayur Gaikar
	Organization of neuron, Neuroglia	1	
	Classification & Properties of nerve fibre	1	
	Electrophysiology, Action potential, nerve impulse	1	
	Receptor, synapse, neurotransmitters	1	

	Central nervous system Meninges, ventricles of brain	1	
	Cerebrospinal fluid, structure of brain	1	
	Functions of brain (Cerebrum, brain tem, cerebellum)	1	
	Spinal cords – Gross structure	1	
	Functions of afferent and efferent nerve tracts, reflex activity	1	
Unit IV	**Peripheral nervous system** Classification of peripheral nervous system	1	Mr. Mayur Gaikar
	Structure and functions of sympathetic and parasympathetic nervous system	1	
	Origin and functions of spinal	1	
	Origin and functions of cranial nerves	1	
	Structure and functions of eye and their disorders	1	
	Structure and functions of ear and their disorders	1	
	Structure and functions of nose and their disorders	1	
	Structure and functions of tongue and their disorders	1	
Unit V	**Endocrine system** Classification of hormones	1	Mr. Mayur Gaikar
	mechanism of hormone action	1	
	structure and functions of pituitary gland	1	
	structure and functions thyroid gland, parathyroid gland	1	
	structure and functions adrenal gland, pancreas and their disorders	1	
	structure and functions pineal gland and their disorders	1	
	structure and functions thymus and their disorders	1	
TOTAL NUMBER OF HOURS		**45**	

QUESTION BANK

1) Explain the scope of anatomy & physiology?
2) What are the levels of structural organization & body system?
3) Describe in detail structure & functions of cell membrane?
4) Explain the transport mechanism across the cell membrane?
5) Explain the process of cell division?
6) What are the general principles of cell communications?
7) Describe in detail intracellular signaling pathway activation by extracellular signal molecule?
8) Enlist various forms of intracellular signalling?
9) Explain a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine forms of intracellular signalling?
10) Write down the classification of tissues?
11) Explain the structure, location and functions of epithelial & muscular cell?
12) Explain the structure, location and functions of nervous and connective tissues?
13) Describe in detail Structure & functions of skin?
14) Write a note on divisions of skeletal system?
15) Enlist the types of bone?
16) Explain the salient features and functions of bones of axial skeletal system?
17) Describe in detail salient features and functions of bones of appendicular skeletal system?
18) Explain the organization of skeletal muscle?
19) Describe the physiology of muscle contraction & neuromuscular junction?
20) Explain Organization of neuron & Neuroglia?
21) What are the properties of nerve fibre?
22) Explain the terms electrophysiology, action potential & nerve impulse?
23) Explain the structure & functions of brain?
24) Explain functions of afferent and efferent nerve tracts &reflex activity?
25) Write down the Classification of peripheral nervous system?
26) Explain Structure and functions of sympathetic and parasympathetic nervous?
27) What are Origin and functions of cranial nerves?
28) Explain Structure and functions of eye and their disorders?
29) Classify of hormones & explain mechanism of hormone action?

Subject II

PHARMACEUTICAL ANALYSIS-I

(PA-I)

Scheme

Course of study

Course Code	Course Name	Lectures Assigned			
		Theory	Practical	Tutorial	Total
BP102T	PA-I	03	-	01	04
BP108P	PA-I	-	04	-	02

Schemes for internal assessments and end semester examinations

Course Code	Course Name	Internal Assessment				End Semester Exams		Total Marks
			Sessional Exams					
		Continuous Mode	Marks	Duration	Total	Marks	Duration	
BP102T	PA-I	10	15	1 Hrs	25	75	3 Hrs	100
BP108P	PA-I	5	10	4 Hrs	15	35	4 Hrs	50

BP102T. PHARMACEUTICAL ANALYSIS-I

(Theory)

45 Hours

Scope:

This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

Course Delivery:

The course will be delivered through lectures, class room interaction, and presentations.

Course Objectives:

Upon completion of the course student shall be able to

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations
- develop analytical skills

COURSE CONTENT	
UNIT-I	**10 Hours**
(a) Pharmaceutical analysis- Definition and scope i) Different techniques of analysis ii) Methods of expressing concentration iii) Primary and secondary standards. iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate **(b)Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures	
UNIT-II	**10 Hours**
Acid base titration: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves **Non aqueous titration**: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl	
UNIT-III	**10 Hours**
Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride. **Complexometric titration**: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate. **Gravimetry**: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate	
UNIT-IV	**08 Hours**
Redox titrations (a) Concepts of oxidation and reduction (b) Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate	
UNIT-V	**07 Hours**
Electrochemical methods of analysis **Conductometry**- Introduction, Conductivity cell, Conductometric titrations, applications. **Potentiometry -** Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications. **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications	
Recommended Books: (Latest Editions) 1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London 2. A.I. Vogel, Text Book of Quantitative Inorganic analysis 3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry 4. Bentley and Driver's Textbook of Pharmaceutical Chemistry 5. John H. Kennedy, Analytical chemistry principles 6. Indian Pharmacopoeia.	

LESSON PLAN			
S. No	**Topic**	**No. of hours**	**Name of the faculty**
1	**PHARMACEUTICAL ANALYSIS**: Definition and scope	**1**	**Miss.K.T. Vaditake**
	Different techniques of analysis	**1**	
	Methods of expressing concentration,	**1**	
	Expression of concentration and strength of solution	**1**	
	Primary and secondary standards	**1**	
	Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid	**1**	
	hydrochloric acid, sodium thiosulphate, sulphuric acid,	**1**	
	potassium permanganate and ceric ammonium sulphate	**1**	
2.	Errors: Sources of errors,	**1**	**Miss.K.T. Vaditake**
	Types of errors,	**1**	
	Methods of minimizing errors, accuracy, precision and significant figures	**1**	
3.	Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves	**1**	**Miss.K.T. Vaditake**
	Classification of acid base titrations and theory involved in titrations of strong.	**1**	
	Classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases.	**1**	
	Classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases	**1**	
	Classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases	**1**	
	Neutralization curves.	**1**	
4.	**Non Aqueous Acid Base Titration** : Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl	**1**	**Miss.K.T. Vaditake**
	acidimetry and alkalimetry titration	**1**	
	estimation of Sodium benzoate and Ephedrine HCl	**1**	
	estimation of Sodium benzoate and Ephedrine HCl	**1**	
5.	**Precipitation Reaction And Titration:** Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride	**1**	**Miss.K.T. Vaditake**
	Modified Volhard's,.	**1**	
6.	**Complex metric Reaction And Titration:**	**1**	**Miss.K.T.**

	Classification,		**Vaditake**
	Metal indicators, Types of complexometric titration.	**1**	
	estimation of Magnesium sulphate, and calcium gluconate	**1**	
	masking and demasking reagents,.	**1**	
7.	**Oxidation –Reduction Reaction And Titration:**		**Miss.K.T. Vaditake**
	Reactions, Nernst equation,	**1**	
	Redox equivalent weights, redox indicators.	**1**	
	Redox indicators Reactions, Nernst equation.	**1**	
	Titration with potassium permanganate ceriometry, potassium dichromate.	**1**	
	Titration with potassium permanganate ceriometry, potassium dichromate.	**1**	
	Iodine, periodic acid.	**1**	
	Potassium bromated Titration.	**1**	
8.	**Gravimetric Method** : Principles, formation and properties of precipitates.	**1**	**Miss.K.T. Vaditake**
	Unit operations in gravimetry.	**1**	
	Organic precipitants	**1**	
9	**Electrochemical methods of analysis** **Conductometry**- Introduction, Conductivity cell,	**1**	**Miss.K.T. Vaditake**
	Conductometric titrations, applications.	**1**	
	Potentiometry - Electrochemical cell, construction and working of reference indicator electrodes (metal electrodes and glass electrode),	**1**	
	(Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode),	**1**	
	methods to determine end point of potentiometric titration and applications	**1**	
	Polarography - Principle, Ilkovic equation,	**1**	
	construction and working of dropping mercury electrode and rotating platinum electrode,	**1**	
	Applications	**1**	
	Total	**45**	

QUESTION BANK

Chapter1. Introduction to Analytical Chemistry

1. Difference between qualitative a define equivalent analysis and quantitative analysis.
2. Write brief about molecular weight and equivalent weight.
3. Define equivalent weight, normality, molarity, molality.
4. Define the term primary standard and give examples of primary standards used in acid base titration.
5. Explain in brief about primary standards.
6. Differentiate between primary standard and secondary standard.
7. Explain various method of qualitative and quantitative analysis.
8. Write about fraction of mole and how to determine it?

Chapter 2. Introduction to Statistical Treatment of Analytical Data

1. Explain analytical errors and give methods of minimization of errors.
2. What is accuracy and precision in analytical method.
3. Explain student T test.
4. What are statistical test of significance? Explain the terms mean, mode, median, standard deviation.
5. What do you mean by descriptive statstices? Explain with suitable example.

Chapter 3. Acid Base Titration

1. What is buffer index? Explain buffer in detail. Write equation to calculate P. Discuss Veriouse types of solvent used in non –Aqueous titration.

2. Derive an equation to calculate buffer solution.
3. Give neutralization curve of weak acid and weak base with example.
4. Explain what polyproticacid. Explain in brief polyfunctional titration is.
5. Classify chemical indicators with suitable examples.
6. Discuss in brief ostwal theory.
7. Explain theories of acid base titration.
8. Explain titration of amino acids.
9. Describe distribution of acid and bases with PH.
10. Write a note on acid base indicator.

Chapter 4. Non Aqueous Acid Base Titration

1. What are amphiprotic solvents?
2. Discuss about different solvent used in non aqueous titration.
3. Explain leveling and differentiating effect.
4. Application of non-aqueous titration.
5. Write in detail about preparation and standardization 0.1 N perchloric acid.
6. Give limitation advantages indicators used in non-Aqueous titration.
7. Give effect of temperature on non-aqueous titration.

Chapter 5. Precipitation Titration

1. Write a note about factors affecting the solubilty.
2. Write a note about factor affecting the chemical reaction in solution.
3. Explain common ion effect. How it is utilized for controlling concentration of weak acid electrolytes.
4. Explain preparation and standardization of 0.1 n AgNO3 solution.
5. Explain principle Volhard method; K. Fajans method; Mohors Method.
8. Explain principle involved in precipitation titration.
9. Write a note on indicators used in precipitation titration.

Chapter 6. Complexometric Titration

1. Explain ligand and sequestering agent.
2. What are the complexes and chelates.Expalin stability of complex and factor influencing it.
3. Explain different types complexometric titration with examples.
4. Write preparation and standardization of 0.05 M Dosodium EDTA.
5. What are the masking and demasking agents write its examples.
6. Explain in detail metalochromicindicators. Write its characteristics and properties.
7. Write pharmaceutical application of complexometric titration.
8. Write end point detection in complexometric titration.

Chapter 7. Oxidation Reduction Titration

1. How redox indicator change its color near the end point.
2. Write down the assay of titanus chloride.

3. Give the method of preperation and standardization of 0.02M and 0.1 M KMnO4 solution.

4. Write a note on redox titration.

5. Explain redox curve in detail.

6. Discuss ceriometric titration.

7. Explain iodometric and iodimetric titration. Write difference between it.

8. Enlist different conditions used in iodometric titration.

9. Explain principle of redox titration.

10. Explain principle, preperation and standardization of 0.05 M Iodine solution.

11. Write pharmaceutical Application of redox titration.

12. Write the preperation of 0.1 M ceric ammonium sulphate.

13. Explain in brief periodic acid.

14. Write the different types of permanganate titration.

15. What is half reaction and how it is balanced.

Chapter 8. Gravimetric Analysis

1. What is co-precipitation? How it is reduced**?**

2. Steps involved in gravimetric titration.

3. Write the principle of gravimetric analysis.

4. What is co-precipitation and post-precipitation?

5. Explain in brief method of minimization of post precipitate.

6. Write a note application of gravimetric titration.

Electrochemical methods of analysis

1. Write a note on conduct metric titration.

2. Write a note on

- Standard hydrogen,
- silver chloride electrode
- calomel electrode indicator electrodes (Metal electrodes and glass electrode)

3. Write a note on methods to determine end point of potentiometric titration.

4. Write the applications of conduct metrico titration.

5. Write a note on Principle and application of polarography.

Subject III

PHARMACEUTICS-I

Scheme

Course of study

Course Code	Course Name	Lectures Assigned			
		Theory	Practical	Tutorial	Total
BP103T	Pharmaceutics-I	03	-	01	04
BP109P	Pharmaceutics-I	-	04	-	02

Schemes for internal assessments and end semester examinations

Course Code	Course Name	Internal Assessment				End Semester Exams		Total Marks
			Sessional Exams					
		Continuous Mode	Marks	Duration	Total	Marks	Duration	
BP103T	Pharmaceutics-I	10	15	1 Hrs	25	75	3 Hrs	100
BP109P	Pharmaceutics-I	5	10	4 Hrs	15	35	4 Hrs	50

BP103T. PHARMACEUTICS-I

(Theory)

45 Hours

Scope:

This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Course Delivery:

The course will be delivered through lectures, class room interaction, and presentations.

Course Objectives:

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

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms.

COURSE CONTENT	
UNIT-I	**10 Hours**
Historical background and development of profession of pharmacy: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia. **Dosage forms:** Introduction to dosage forms, classification and definitions **Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription. **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.	
UNIT-II	**10 Hours**
Pharmaceutical calculations: Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight. **Powders:** Definition, classification, advantages and disadvantages,Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions. **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques	
UNIT-III	**08 Hours**
Monophasic liquids: Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions. **Biphasic liquids:** **Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome. **Emulsions:** Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.	
UNIT-IV	**08 Hours**
Suppositories: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories. **Pharmaceutical incompatibilities**: Definition, classification, physical, chemical and therapeutic incompatibilities with examples.	
UNIT-V	**07 Hours**
Semisolid dosage forms: Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages form.	

Recommended Books: (Latest Editions)

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy,Lea& Febiger Publisher, The University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

LESSON PLAN			
Sr. No	**Topic**	**No. of hours**	**Name of the faculty**
1	**UNIT I**		Mr.V.A. Kashid
	Historical background and development of profession of pharmacy	1	
	History of profession of Pharmacy in India in relation to pharmacy education	1	
	Industry and organization Pharmacy as a career	1	
	Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.	1	
	Dosage forms: Introduction to dosage forms	1	
	Classification and definitions	1	
	Prescription: Definition, Parts of prescription	1	
	Handling of Prescription and Errors in prescription.	1	
	Posology: Definition, Factors affecting posology	1	
	Pediatric dose calculations based on age, body weight and body surface area**.**	1	
2	**UNIT-II**		Mr.V.A. Kashid
	Pharmaceutical calculations: Weights and measures – Imperial & Metric system	1	
	Calculations involving percentage solutions, allegation	1	
	proof spirit and isotonic solutions based on freezing point and molecular weight.	1	
	Powders: Definition, classification, advantages and disadvantages	1	
	Simple & compound powders – official preparations, dusting powders	1	
	Effervescent, efflorescent and hygroscopic powders, eutectic mixtures.	1	
	Geometric dilutions	1	
	Liquid dosage forms: Advantages and disadvantages of liquid dosage forms.	1	
	Excipients used in formulation of liquid dosage forms.	1	
	Solubility enhancement techniques	1	
3	**UNIT III**		Mr.V.A. Kashid
	Monophasic liquids: Definitions and preparations of Gargles	1	
	Mouthwashes, Throat Paint, Eardrops, Nasal drops	1	
	Enemas, Syrups, Elixirs, Liniments and Lotions. Biphasic liquids	1	
	Suspensions: Definition, advantages and disadvantages	1	
	classifications, Preparation of suspensions; Flocculated and Deflocculated suspension	1	
	stability problems and methods to overcome.	1	

	Emulsions: Definition, classification, emulsifying agent ,Test for the identification of type of Emulsion	1	
	Methods of preparation & stability problems and methods to overcome.	1	
4	**UNIT IV**		Mr.V.A. Kashid
	Suppositories: Definition, types, advantages and disadvantages	2	
	Types of bases, methods of preparations	1	
	Displacement value & its calculations	1	
	Evaluation of suppositories.	1	
	Pharmaceutical incompatibilities: Definition, classification,	1	
	Physical, chemical and therapeutic incompatibilities with examples.	2	
5	**UNIT V**		
	Semisolid dosage forms: Definitions, classification	2	
	mechanisms and factors influencing dermal penetration of drugs	1	
	Preparation of ointments, pastes	1	
	creams and gels	1	
	Excipients used in semi solid dosage forms.	1	
	Evaluation of semi solid dosages forms	1	
TOTAL NUMBER OF HOURS		**45**	

QUESTION BANK

1. Write the history of Pharmacy Profession and Industry in India.
2. Write about career opportunities after Pharmacy graduation.
3. What are pharmacopoeias? Describe different editions of Indian Pharmacopoeia.
4. Write short note on: BP, USP, Extra Pharmacopoeia.
5. What is need of dosage forms?
6. Define prescription. Describe different parts of prescription.
7. Write a note on pricing of the prescription.
8. Write a note on errors in prescription.
9. What is Posology? Describe different factors affecting posology.
10. How paediatric dose calculations are made?
11. In what proportion may a manufacturing pharmacist mix 20%, 15%, 5% and 3% zinc oxide ointment to produce 10% ointment ?
12. What is proof strength of 80% and 45% v/v ethanol ?
13. Various methods for isotonicity adjustments.
14. Write notes on: Dusting powders, Effervescent, Efflorescent and Hygroscopic powders, Eutectic mixtures.
15. What is geometric dilution?
16. What are liquid dosage forms? Give its advantages and disadvantages.
17. Describe excipients used in formulation of liquid dosage forms in detail.
18. Describe different solubility enhancement techniques?
19. Differentiate between a) Syrups and Elixirs b) Lotions and liniments c) Flocculated and Deflocculated suspensions
20. Write formulation requirements of following dosage forms:
    a. Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments, Lotions.
    b. Suspensions
    c. Emulsions d. ointments, pastes, creams, gels
21. Stability of suspensions and Emulsions.
22. Notes on: a) Suspending agents b) Emulsifying agents
23. Identification of type of Emulsions.
24. Different types of suppository bases.
25. Displacement value of suppositories.
26. What are pharmaceutical incompatibilities?
27. Describe physical, chemical and therapeutic incompatibilities with examples.
28. Mechanism and factors affecting penetration of drugs through skin.
29. Describe different ointment bases.
30. Describe different Excipients used in semi solid dosage forms.
31. Define and classify all types of dosage forms.
32. Evaluation of all types of dosage form in the syllabus.

Subject IV

PHARMACEUTICAL INORGANIC CHEMISTRY

(PIC)

Scheme

Course of study

Course Code	Course Name	Lectures Assigned			
		Theory	Practical	Tutorial	Total
BP104T	PIC	03	-	01	04
BP110P	PIC	-	04	-	02

Schemes for internal assessments and end semester examinations

Course Code	Course Name	Internal Assessment				End Semester Exams		Total Marks
			Sessional Exams					
		Continuous Mode	Marks	Duration	Total	Marks	Duration	
BP104T	PIC	10	15	1 Hrs	25	75	3 Hrs	100
BP110P	PIC	5	10	4 Hrs	15	35	4 Hrs	50

BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY

(Theory)

45 Hours

Scope:

This subject deals with the monographs of inorganic drugs and pharmaceuticals.

Course Delivery:

The course will be delivered through lectures, class room interaction, and presentations.

Course Objectives:

Upon completion of course student shall be able to

- know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
- understand the medicinal and pharmaceutical importance of inorganic compounds

COURSE CONTENT	
UNIT I	**10 Hours**
Impurities in pharmaceutical substances: History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate	
General methods of preparation, assay for the compounds superscripted with **asterisk (*),** properties and medicinal uses of inorganic compounds	
UNIT II	**10 Hours**
Acids, Bases and Buffers: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity. **Major extra and intracellular electrolytes**: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt, Physiological acid base balance. **Dental products**: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.	
UNIT III	**10 Hours**
Gastrointestinal agents **Acidifiers:** Ammonium chloride* and Dil. HCl **Antacid:** Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture	
Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations	
UNIT IV	**08 Hours**
Miscellaneous compounds **Expectorants:** Potassium iodide, Ammonium chloride*. **Emetics**: Copper sulphate*, Sodium potassium tartarate **Haematinics:** Ferrous sulphate*, Ferrous gluconate **Poison and Antidote:** Sodium thiosulphate*, Activated charcoal, Sodium nitrite333 **Astringents**: Zinc Sulphate, Potash Alum	
UNIT V	**07 Hours**
Radiopharmaceuticals: Radio activity, Measurement of radioactivity, Properties of α, β, γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I131, Storage, precautions & pharmaceutical application of radioactive substances.	
Recommended Books (Latest Editions) 1. A. H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4th edition. 2. A. I. Vogel, Text Book of Quantitative Inorganic analysis 3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition 4. M. L. Schroff, Inorganic Pharmaceutical Chemistry 5. Bentley and Driver's Textbook of Pharmaceutical Chemistry 6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry	

LESSON PLAN			
S. No	**Topic**	**No. of hours**	**Name of the faculty**
Unit 1	**Monograph**: Definition and its importance, Acidity, Alkalinity, Tests for purity, Assay etc.	1	Mr. Rohit J. Bhor
	various test included in monographs as per I.P.	1	
	Loss on drying, Ash values, Extractive values, Moisture content, Identification tests	1	
	Acidity, Alkalinity, Tests for purity, Assay etc.	1	
	Introduction to the study of monographs of following official compounds:,	1	
	Sodium chloride, Sodium citrate, Silver nitrate,	1	
	Copper sulphate, Ammonium chloride	1	
	Ferrous gluconate, calcium carbonate and ferrous sulphate.	1	
	Impurities: Impurities in pharmaceutical substances sources of impurities, types and effects of impurities.	1	
	Limit tests of Chlorides, Sulphates, Heavy metals, Lead, Iron, Arsenic Mercury, as per I.P	1	
Unit 2	**Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation	1	Mr. Rohit J. Bhor
	Acids, Bases and Buffers: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity	1	
	Calculations and methods of adjusting isotonicity.	1	
	Calculations and methods of adjusting isotonicity.	1	
	Major extra and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy	1	
	Major extra and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy	1	
	Major extra and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy	1	
	Major extra and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy	1	
	Dental products: Dentifrices, role of fluoride in	1	

	the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.		
	Dental products: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.	1	
Unit 3	**Acidifiers:** Ammonium chloride* and Dil. HCl	1	Mr. Rohit J. Bhor
	Acidifiers: Ammonium chloride* and Dil. HCl	1	
	Antacid: Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture	1	
	Antacid: Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture	1	
	Antacid: Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture	1	
	Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite	1	
	Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite	1	
	Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite	1	
	Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations	1	
	Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations	1	
Module 4	**Expectorants:** Potassium iodide, Ammonium chloride*.	1	Mr. Rohit J. Bhor
	Expectorants: Potassium iodide, Ammonium chloride*.	1	
	Haematinics: Ferrous sulphate*, Ferrous gluconate	1	
	Haematinics: Ferrous sulphate*, Ferrous gluconate	1	

	Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite	1	
	Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite	1	
	Astringents: Zinc Sulphate, Potash Alum	1	
	Emetics: Copper sulphate*, Sodium potassium tartarate	1	
Unit 5	**Radiopharmaceuticals**: Radio activity, Measurement of radioactivity	1	Mr. Rohit J. Bhor
	Radiopharmaceuticals: Radio activity, Measurement of radioactivity	1	
	Properties of α, β, γ radiations	1	
	Properties of α, β, γ radiations	1	
	Study of radio isotopes - Sodium iodide I131, Storage conditions, precautions & pharmaceutical application of radioactive substances.	1	
	Study of radio isotopes - Sodium iodide I131, Storage conditions, precautions & pharmaceutical application of radioactive substances.	1	
	Half life, radio isotopes	1	
	TOTAL NUMBER OF HOURS	**45**	

QUESTION BANK

Introduction

1. Write history of pharmacopeias.
2. Define monograph and write a note on complete monograph.
3. Write the different storage conditions as per monograph.
4. Write a note on ash value.

Sources of contamination in pharmaceuticals and method to control

1. Define impurity and explain different sources of impurities with examples.
2. Explain types of impurities.
3. Write a note on limit test of
    - Chloride
    - Sulphate
    - Heavy metal
    - Arsenic
    - Lead
    - Iron
4. Write a note on various test of purity.

Gastrointestinal agents

1. Write a properties and mode of action of antacid.
2. Define antacid .write a properties of aluminum hydroxide.
3. Write a note on adsorbent and protective.
4. Discuss the method of preparation, uses and properties of magnesium carbonate and calcium phosphate.
5. Classify gastrointestinal agents.
6. List of calcium and magnesium antacid agents.
7. Write a note on saline and cathartics.
8. Write note assay iodine.
9. Write a note on kaolin.
10. Write a note on properties of antacid.

Electrolytes

1. What is metabolic acidosis and metabolic alkalosis?
2. Write a note on electrolyte combination therapy.
3. Write a note major and minor electrolyte.
4. Write the assay procedure for the sodium chloride and sodium bicarbonate.
5. Write a note on physiology of acid base balance.
6. Write a note on oral rehydration therapy.
7. Write a physiological role of sodium ion and potassium ion as an electrolytes.
8. Write a note on pharmaceutical application of electrolytes.
9. How the acid base balance is maintained.
10. Write a note reverse osmosis.
11. Give the composition of ORS formulation.

Dental product

1. Write note dental products.
2. Described the preparation, properties and assay of sodium fluoride.
3. Write a note on fluoride as anticaries.
4. Write a note on desensitizing agents.
5. Write a note on dental products.
6. What are the polishing agents and abrasives?
7. Write a note inorganic phosphate in dental products.

Radiopharmaceuticals

1. Discuss in brief radiopaque substances with examples.
2. Discuss the method of preparation properties and assay of the compounds used in cyanide Poisoning.
3. Write a note on antidotes.
4. Write a note radiopaque contrast media.
5. Write a note on expectorants and emetics.
6. Write the principal reaction involved in assay ammonium chloride.

Subject V

COMMUNICATION SKILLS

Scheme

Course of study

Course Code	Course Name	Lectures Assigned			
		Theory	Practical	Tutorial	Total
BP105T	Communication Skills	02	-	-	02
BP111P	Communication Skills	-	02	-	01

Schemes for internal assessments and end semester examinations

Course Code	Course Name	Internal Assessment				End Semester Exams		Total Marks
			Sessional Exams					
		Continuous Mode	Marks	Duration	Total	Marks	Duration	
BP105T	Communi-cation Skills	5	10	1 Hrs	15	35	1.5 Hrs	50
BP111P	Communi-cation Skills	5	5	2 Hrs	10	15	2 Hrs	25

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.

Course Delivery:

The course will be delivered through lectures, class room interaction, and presentations.

Course 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	
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	

Recommended Books: (Latest Editions)

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011

2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011

3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013

4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011

5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013

6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010

7. Communication skills for professionals, Konar Nira, 2ndEdition, New arrivals – PHI, 2011

8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011

9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning India pvt.ltd, 2011

10. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011

11. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009

12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999

LESSON PLAN			
Sr. No	**Topic**	**No. of hours**	**Name of the faculty**
1	**Communication Skills**: Introduction, Definition, The Importance of Communication.	1	Mr. Dhamak Vikrant
	The Communication Process: Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context.	2	
	Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers.	2	
	Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.	2	
2	**Elements of Communication:** Introduction, Face to Face Communication	2	Mr. Dhamak Vikrant
	Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication	2	
	Communication Styles: Introduction, The Communication Styles Matrix with example for each - Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style	3	
3	**Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations	2	Mr. Dhamak Vikrant
	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	3	
	Writing Effectively: Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message	2	
4	**Interview Skills:** Purpose of an interview, Do's and Don'ts of an interview, Dealing with Fears, planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery	2 3	
5	**Group Discussion**: Introduction, Communication skills in group discussion	2	Mr. Dhamak Vikrant
	Do's and Dont's of group discussion	2	

QUESTION BANK

1. Define and state the importance of communication
2. Enlist and explain the communication process in details.
3. Enlist and elaborate the barriers to communication.
4. Write shot note on:
   - I. Physiological barriers
   - II. Physical barriers
   - III. Cultural barriers
   - IV. Language barriers
   - V. Gender barriers
   - VI. Interpersonal barriers
   - VII. Psychological barriers
   - VIII. Emotional barriers
5. Write note on perspectives in communication.
6. What are the factors affecting our perspective in communication?
7. Enlist and explain the elements of communication.
8. What is non-verbal communication & verbal communication?
9. Write note on physical communication.
10. Enlist and explain communication styles.
11. Write note on direct communication style.
12. Write note on spirited communication style.
13. Write note on systematic communication style.
14. Write note on considerate communication style.
15. What are basic listening skills?
16. Write short note on active listening.
17. Write short note on becoming an active listener.
18. Write short note on listening in difficult situations.
19. What are effective ways for written communication?
20. What is formal communication?
21. What is process of writing effectively?
22. What are do's and dont's of an interview?
23. What are essentials of presentations?
24. What communication skills are required for group discussion?
25. What are do's and dont's of group discussion.

Subject VI

REMEDIAL BIOLOGY

(RB)

Scheme

Course of study

Course Code	Course Name	Lectures Assigned			
		Theory	Practical	Tutorial	Total
BP106RBT	Remedial Biology	02	-	-	02
BP112RBP	Remedial Biology	-	02	-	01

Schemes for internal assessments and end semester examinations

Course Code	Course Name	Internal Assessment				End Semester Exams		Total Marks
			Sessional Exams					
		Continuous Mode	Marks	Duration	Total	Marks	Duration	
BP106 RBT	RB	5	10	1 Hrs	15	35	1.5 Hrs	50
BP112 RBP	RB	5	5	2 Hrs	10	15	2 Hrs	25

BP106RBT. REMEDIAL BIOLOGY

(Theory)

30 Hours

Scope:

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

Course Delivery:

The course will be delivered through lectures, class room interaction, and presentations.

Course 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

COURSE CONTENT	
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.

Recommended Books:
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

LESSON PLAN			
S. No	**Topic**	**No. of hours**	**Name of the faculty**
1	**Living world:**		Mr. Laware S. G.
	Definition and characters of living organisms	1	
	Diversity in the living world	1	
	Binomial nomenclature	1	
	Five kingdoms of life and basis of classification. Salient features of Monera, Potista, Fungi, Animalia and Plantae, Virus,	1	
	Morphology of Flowering plants		
	Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.	1	
	General Anatomy of Root, stem, leaf of monocotyledons & Dicotylidones.	1	
2	**Body fluids and circulation**		Mr. Laware S. G.
	Composition of blood, blood groups, coagulation of blood	1	
	Composition and functions of lymph	1	
	Human circulatory system		
	Structure of human heart and blood vessels	2	
	Cardiac cycle, cardiac output and ECG	1	
	Digestion and Absorption		
	Human alimentary canal and digestive glands	1	
	Role of digestive enzymes	1	
	Digestion, absorption and assimilation of digested food	1	
	Breathing and respiration		
	Human respiratory system	1	
	Mechanism of breathing and its regulation	1	
	Exchange of gases, transport of gases and regulation of respiration	1	
	Respiratory volumes		
3	**Excretory products and their elimination**		Mr. Laware S. G.
	Modes of excretion	1	
	Human excretory system- structure and function	1	
	Urine formation	1	
	Rennin angiotensin system	1	
	Neural control and coordination		
	Definition and classification of nervous system	1	
	Structure of a neuron	1	

	Generation and conduction of nerve impulse	1	
	Structure of brain and spinal cord	1	
	Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata	1	
	Chemical coordination and regulation		
	Endocrine glands and their secretions	1	
	Functions of hormones secreted by endocrine glands	1	
	Human reproduction		
	Parts of female reproductive system	1	
	Parts of male reproductive system	1	
	Spermatogenesis and Oogenesis	1	
	Menstrual cycle	1	
4	**Plants and mineral nutrition:**		Mr. Laware S. G.
	Essential mineral, macro and micronutrients	1	
	Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation	1	
	Photosynthesis		
	Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis	1	
	Plant respiration: Respiration, glycolysis, fermentation (anaerobic).	1	
	Plant growth and development		
	Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators	1	
	Cell - The unit of life		
	Structure and functions of cell and cell organelles. Cell division	1	
	Tissues		
	Definition, types of tissues, location and functions.	1	

QUESTION BANK

REMEDIAL BIOLOGY

CELL AND TISSUE

1. Enlist the basic types of tissue with its characteristic.
2. Describe the structure and location of various types connective of tissue.
3. Explain the structure of nucleus. Describe the sequence of events during protein synthesis.
4. Describe the structure and function of mitochondria.
5. Draw a well labeled diagram of plasma membrane and explain the different functions of Plasma membrane.
6. Discuss the various transport process across the cell membrane.
7. Discuss passive transport across the cell membrane.
8. Explain the various stages of cell division.
9. Explain the epithelial tissue.
10. Draw a well labeled diagram of cell and write its function.
11. Discuss active transport mechanism.
12. Write a note on connective tissue along with its structure function and location.
13. Write a note on muscular tissue along with its structure function and location.
14. Write a note on nervous tissue along with its structure function and location.

BLOOD

1. Give the structure and function of RBC.
2. Write a note on WBC.
3. Write a note on platelates
4. Explain in detail platelet plug formation and blood clotting mechanism.
5. Write a note on blood group. Or Write a note on ABO and RH System.
6. Write the different types of anemia.
7. Describe the blood clotting mechanism.
8. Explain the platelet plug formation.
9. Write a note on hemolytic disorders in new born.
10. Write a note on plasma protein.
11. What are different types of WBC and give its function.
12. Write a role of W.B.C in inflammation.
13. Write a note on Acquire immunity and natural immunity.
14. Define the term
    a) Anemia
    b) Thrombocytopenia
    c) Leukemia
    d) Sickle cell anemia
    e) Aplastic anemia.
    f) Pernicious anemia.
    g) Megaloblastic anemia.
    h) Hemolytic anemia.

LYMPH AND LYMPHATIC SYSTEM

1. Write a note on lymph node.
2. Write a structure and function of Spleen.
3. Give the composition and function of lymph.
4. Write the structure and function of lymph node.
5. Define the following term
    a) Splenomegaly
    b) Lymphangitis.
    c) Lymphoedema
    d) Lymphandenitis.
    e) Lymphoma.

CARDIOVASCULAR SYSTEM

1. Draw a neat labeled diagram of heart.
2. Explain the structure of blood vessels.
3. Explain the structure of heart.
4. Define a blood pressure and explain factor affecting it.
5. Define and describe cardiac cycle.
6. Draw a neat labeled diagram of interior of heart.
7. Explain ECG.
8. Draw a neat labeled diagram of conducting system of heart and explain the conducting system of heart.
9. Write a note on renin angiotensin system.
10. Write a note on blood circulation.
11. Explain how B.P is regulated.
12. Define the terms;
    - Myocardialinfraction.
    - Angina pectoris.
    - Congestive heart failure.
    - Circulatory shock.
    - Cardiac arrhythmia.

DIAGESTIVE SYSTEM

1. Draw a neat labeled diagram of digestive system.
2. Explain the location anatomy histology of and function of small intestine.
3. Write a note on liver.
4. Give the histology and functions of liver.
5. Define the term peptic ulcer, gastratitis, acholrhydria, dysentery.
6. Describe the structure, function of stomach.
7. Explain the mechanical and chemical digestion in stomach.
8. Write a note on neurohumoral control of digestive system.
9. Write a note function of pancreas and liver in digestion.
10. Explain composition and function of saliva.

PLANT GROWTH AND DEVELOPMENT

1. Write the characteristics of living organisms.
2. Write short note on five kingdom classification.
3. Write short note on anatomy of leaf.
4. Write note on Plant Growth Regulators.
5. Write note on Plant respiration.
6. Write short note on Fermentation.
7. Write note on Photosynthesis
8. What are the factors affecting Photosynthesis.
9. Write note on biological nitrogen fixation.

REMEDIAL MATHEMATICS

(RM)

Scheme

Course of study

Course Code	Course Name	Lectures Assigned			
		Theory	Practical	Tutorial	Total
BP106RMT	Remedial Mathematics	02	-	-	02

Schemes for internal assessments and end semester examinations

Course Code	Course Name	Internal Assessment				End Semester Exams		Total Marks
			Sessional Exams					
		Continuous Mode	Marks	Duration	Total	Marks	Duration	
BP106 RMT	RM	5	10	1 Hrs	15	35	1.5 Hrs	50

BP106RMT. REMEDIAL MATHEMATICS

(Theory)

30 Hours

Scope:

This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Course Delivery:

The course will be delivered through lectures, class room interaction, and presentations.

Course Objectives:

Upon completion of the course the student shall be able to

- Know the theory and their application in Pharmacy
- Solve the different types of problems by applying theory
- Appreciate the important application of mathematics in Pharmacy

COURSE CONTENT	
UNIT-I	**07 Hours**

Partial fraction

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

Logarithms

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

Function:

Real Valued function, Classification of real valued functions,

Limits and continuity :

Introduction, Limit of a function, Definition of limit of a function

UNIT-II	07 Hours

Matrices and Determinant:

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem, Application of Matrices in solving Pharmacokinetic equation

UNIT-III	07 Hours

Calculus

Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of *xn w.r.t*x, where *n* is any rational number, Derivative of *ex*,, Derivative of loge *x* , Derivative of *ax*, Derivative of trigonometric functions from first principles **(without Proof)**, Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

UNIT-IV	05 Hours

Analytical Geometry

Introduction: Signs of the Coordinates, Distance formula,

Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration:

Introduction, Definition, Standard formulae, Rules of integration , Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

UNIT-V	04 Hours
Differential Equations : Some basic definitions, Order and degree, Equations in separable form , Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations** **Laplace Transform** : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**	
Recommended Books: 1. Differential Calculus by Shanthinarayan 2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H. 3. Integral Calculus by Shanthinarayan 4. Higher Engineering Mathematics by Dr.B. S. Grewal	

LESSON PLAN			
Sr. No	**Topic**	**No. of hours**	**Name of the faculty**
1	**UNIT I**		Mrs. Patil
	Partial fraction		
	Introduction, Polynomial, Rational fractions, Proper and Improper fractions	1	
	Partial fraction , Resolving into Partial fraction Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics	1	
	Logarithms Introduction, Definition, Theorems/Properties of logarithms,	1	
	Common logarithms, Characteristic and Mantissa, worked examples,	1	
	application of logarithm to solve pharmaceutical problems. Function: Real Valued function, Classification of real valued functions	1	
	Limits and continuity : Introduction , Limit of a function, Definition of limit of a function (□ - □ definition)	1	
2	**UNIT-II**		Mrs. Patil
	Matrices and Determinant: Introduction matrices, Types of matrices	1	
	Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants	1	
	Properties of determinants , Product of determinants, Minors and co-Factors Adjoint or adjugate of a square matrix , ,	1	
	Singular and non-singular matrices,	1	
	Inverse of a matrix, Solution of system of linear of equations using matrix method	1	
	Cramer's rule, Characteristic equation and roots of a square matrix,	1	
	Cayley–Hamilton theorem, Applicationof Matrices in solving Pharmacokinetic equations	1	
3	**UNIT III**		Mrs. Patil
	Calculus Differentiation : Introductions Derivative of a function, Derivative of a constant	1	
	Derivative of a product of a constant and a function	1	
	Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula	1	
	Derivative of the quotient of two functions (Quotient formula) – Without Proof, Derivative of xn w.r.tx,where n is any rational number,	1	
	Derivative of ex,, Derivative of loge x , Derivative	1	

	of ax,Derivative of trigonometric functions from first principles (without Proof),		
	Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application	1	
4	**UNIT IV**		Mrs. Patil
	Analytical Geometry Introduction: : Signs of the Coordinates, Distance formula, Straight Line	1	
	Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines,	1	
	Slope of a line joining two points, Slope – intercept form of a straight line	1	
	Integration: Introduction, Definition, Standard formulae,	1	
	Rules of integration , Method of substitution	1	
	Method of Partial fractions, Integration by parts, definite integrals, application	1	
5	**UNIT V**		Mrs. Patil
	Differential Equations : Some basic definitions, Order and degree	1	
	, Equations in separable form , Homogeneous equations,	1	
	Linear Differential equations, Exact equations, Application in solving Pharmacokinetic equations	1	
	Laplace Transform : Introduction, Definition, Properties of Laplace transform,	1	
	Laplace Transforms of elementary functions, Inverse Laplace transforms,	1	
	Laplace transform of derivatives, Application to solve Linear differential equations,	1	
	Application in solving Chemical kinetics and Pharmacokinetics equations	1	
TOTAL NUMBER OF HOURS		**30**	

CONTACT DETAILS

Teaching staff information

Sr. No	Name	Designation & Department	Experience	Mobile	Email ID
1	Dr. Sunil A. Nirmal	Principal	15.00	9423787429	sunil.nirmal@pravara.in
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3	Mr. V. A. Kashid	Asst. Professor	11.00	9422935932	kashidvivek@rediffmail.com
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