

RAJASTHAN UNIVERSITY OF
HEALTH SCIENCES JAIPUR



SYLLABUS
SCHEME OF EXAMINATION AND
COURSES OF STUDY

FACULTY OF HEALTH SCIENCE

M. Pharm.

First Semester Examination
Second Semester Examination
Third Semester Examination
Fourth Semester Examination

SHIV BOOK DEPOT

Opp. Tadkeshwar Temple, 167, Chaura Rasta, Jaipur

MASTERS DEGREE IN PHARMACY (M.Pharm)
ACADEMIC REGULATIONS

1. Duration of the course

The duration of the M.Pharm course shall be of two academic years (four semesters). The course of study for M.Pharm shall include first semester, second semester, third semester and final semester, each of 15 weeks duration (excluding days spent in examination).

2. Eligibility for admission

- 2.1 A candidate who has passed B.Pharm with at least 55% marks (Aggregate of 4 years / 3 years for lateral entry admission) (for SC/ST candidates, the pass percentage at the qualifying examination) from an institution approved by PCI and AICTE.
- 2.2 Preference will be given to GATE qualified candidates.
- 2.3 For sponsored candidates

A Pharmacy Graduate, fulfilling conditions mentioned in section 2.1 and having 2 years of full time professional experience in a registered pharmaceutical company/ educational and/ or research institution/ any government organization shall be eligible for admission under sponsored category.

Sponsored candidates shall have to submit a sponsorship letter from their employer along with the application form for admission. The letter must also mention the length of candidate's employment with the sponsor and the undertaking that the sponsorship shall not be withdrawn before the completion of the course.

Sponsored candidates shall not be eligible to receive scholarship, even if they are admitted on the basis of GATE score.

- 2.4 There will be no age restriction. However, candidates below 45 years of age shall be preferred.
- 2.5 Admissions will be made in order of merit. For preparing merit, equal weightage shall be given to aggregate percentage of marks obtained in B.Pharm and GATE.

Reservations will be made as per State Govt. / University rules. In case of non availability of reserved category candidate(s), the reserved seat(s) shall be filled up by general category candidate(s).

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3. Scheme of Study & Examination

- 3.1 The medium of instruction and examination shall be English.
3.2 Candidates for the M.Pharm course shall be instructed and examined as per the Teaching and Examination Scheme and Course Content of respective specializations.

4. Eligibility for appearing in the examination

- 4.1 Attendance Requirement: In order to be eligible for University examination, a student must be present in not less than 75 % of theory and practical classes of each subject.
4.2 A candidate who has attended a regular course of study for the first semester in an academic institution shall be eligible to appear at the M.Pharm first semester examination of the University.
4.3 A candidate who has been promoted to second semester as per the provisions for conditions of passing and has attended a regular course of study in an academic institution for the second semester shall be eligible to appear at second semester examination for M.Pharm.

- 4.4 A candidate who has been promoted to third semester in an academic institution as per the provisions for conditions of passing and has completed the dissertation research work up to the satisfaction of the supervisor as prescribed under the relevant regulations for third semester shall be eligible to appear at the third semester examination for M.Pharm.

4.5 At the beginning of M.Pharm. third semester, for each candidate, a dissertation supervisor shall be appointed by the head of the institution. The candidate shall choose a topic for dissertation in consultation with the supervisor, carry out literature survey on the proposed dissertation topic and submit a dissertation synopsis including plan of work duly signed by the supervisor to the Head of the institution for approval. The candidate shall then carry out the dissertation research work on the approved dissertation topic at the institute running the course under the guidance of respective supervisor. A candidate may also perform his/ her dissertation work at any other institute/ laboratory/ industry in per the requirement of the subject on

approval of the supervisor and the head of the institution. If the appointed supervisor leaves the college/ is likely to be absent for a long period, the head of the institution shall appoint another supervisor. The candidate shall continue the dissertation work on the topic approved earlier.

- 4.6 A candidate who has been promoted to final semester as per the provisions for conditions of passing and has completed the dissertation research work up to the satisfaction of the supervisor as prescribed under the relevant regulations for the final semester shall be eligible to appear at the final semester examination for M.Pharm. During M.Pharm. final semester, candidate shall continue the dissertation research work of the third semester.

5. Sessional (Internal assessment)

5.1 Theory sessional (25 marks):

Written test	: 15 marks
Seminar and/or assignment	: 10 marks
Total	: 25 marks

(i) Written test (15 marks):

At least two written tests of 15 marks each in every theory subject shall be conducted by the institute at regular interval during each semester. The average of best two performances shall be taken into consideration for the purpose of computation of corithen test marks. Duration of each written test shall be of one hour.

(ii) Seminar and/ or assignment (10 marks):

Every student shall present a subject seminar and/or submit assignment on the topic assigned by the subject teacher.

5.2 Practical sessional (25 marks):

Practical test	: 15 marks
Day-to-day practical work	: 10 marks
Total	: 25 marks

(i) Practical test (15 marks):

At least two practical tests of 15 marks each in every

practical subject shall be conducted by the institute at regular interval during each semester. The average of best two performances shall be taken into consideration for the purpose of computation of practical sessional marks. The duration of each practical test shall be of 6 hours. Each practical test may be conducted in different parts viz. synopsis/ spotting, exercise/ experiment and viva-voce etc.

(ii) Day-to-day practical work/ experiments performed (10 marks):

The concerned teacher shall evaluate the day-to-day practical work/ experiments performed in the laboratory on the basis of the performance of the student, viva-voce and maintenance of practical record.

5.3 Professional practice:

The students shall carry out professional work as allotted by the head of the institution in M.Pharm. first and second semesters. The professional work shall include performance of lab. duties, analysis of samples etc.

5.4 Dissertation sessional (50 marks):

For M.Pharm. third and final semester dissertation sessional, the candidate shall submit a copy of dissertation progress report printed or type written, containing the results of his/her dissertation research work duly signed by the supervisor and forwarded to the head of the institution, on or before the prescribed date. The evaluation shall be on the basis of seminar and dissertation progress report, presentation and viva-voce and shall be done by a board consisting of dissertation supervisor and one teacher of the subject of specialization (to be appointed by the head of the institution). The average of the marks awarded by the board members shall be considered for the purpose of computation of dissertation sessional marks.

5.5

The record of marks of sessional examination for each student shall be maintained by the academic institution and must be submitted to the University before the commencement of University examination.

5.6 A candidate failing in any of the subjects shall have a chance to improve his /her sessional marks in theory, practical and dissertation by appearing in one additional sessional examination. The aggregate of best two performances from all the sessionals shall form the basis of calculating the average for computation of improved sessional marks. Marks for day-to-day assessment in the practicals cannot be improved unless a candidate attends a regular course of study again.

6. University examination

6.1 University examinations for all the four semesters are to be held twice in a year, as per the Teaching and Examination Scheme and Course Content, in the months of Dec./Jan. and June/July or on such dates as may be fixed by the University.

6.2 University examination in each theory subject shall be of three hours duration. There shall be 7 questions carrying equal marks, out of which 5 questions shall have to be attempted.

6.3 University examination in each practical subject shall be of 6 hours duration and shall comprise of synopsis / spotting, exercise / experiment and viva-voce etc. The head of the institution shall send the awards to the University, on or before the prescribed date.

7. Dissertation

7.1 For M.Pharm. third semester University examination, the candidate shall submit four copies of dissertation report, printed or type written, in spirally bound form, containing the results of his/ her dissertation work duly signed by the supervisor and countersigned by the head of the institution.

The evaluation shall be on the basis of dissertation report, presentation and viva voce and shall be done by a Board consisting of dissertation supervisor, external examiner appointed by the University and the Head of the institution who shall be the chairman of the board.

The chairman shall then send the awards to the University, on or before the prescribed date.

7.2

For M.Pharm final semester University examination, the candidate shall submit four copies of dissertation thesis printed or type

written, in bound form, containing the results of his/her research work. The dissertation thesis shall bear a certificate from the supervisor countersigned and duly forwarded by the Head of the institution, on or before the prescribed date, certifying that:

- (i) *the work has been undertaken and completed and the dissertation has been written under his/ her supervision and guidance and meets the requirements of the course;*
- (ii) *the dissertation is a bonafide record of the original work carried out by the candidate and the dissertation work has not formed the basis of award of any other degree or diploma etc. of this or any other University;*

The evaluation shall be done on the basis of dissertation thesis, presentation and viva voce and shall be done by a Board consisting of dissertation supervisor, external examiner appointed by the University and the Head of the institution who shall be the chairman of the board.

The chairman shall then send the awards to the University, on or before the prescribed date.

8. Conditions of passing

8.1 A candidate shall be declared to have passed in a subject when he/she has secured 50% of the maximum marks in the sessional and University examination marks put together separately in each theory and practical subjects and dissertation sessional and dissertation university examination.

8.2 A candidate who fails to obtain 50% marks in any subject(s) (Theory and practical counted as separate subject) in first or second semester examination, shall be eligible for promotion to second/ third semester. Such candidate shall have to appear again in failing subject(s) in the subsequent examination.

8.3 No candidate will be eligible for submitting the dissertation thesis unless he/ she has passed in all subjects of first/ second semester.

8.4 A candidate, who has failed in M.Pharm third semester examination, shall be furnished by the Board with a clear statement of reasons for failure and suggestions for improvement. He/ she shall not be allowed to pursue course for M.Pharm final

semester. He/ she shall revise and resubmit the dissertation report after pursuing research work as suggested by the board on the same dissertation topic. Such a candidate will have to reappear as an ex-student in the next M.Pharm third semester University examination.

8.5 A candidate, who has failed in M.Pharm final semester examination, shall be furnished by the Board [Point 6(d)] with a clear statement of reasons for failure and suggestions for improvement. He/ she shall revise and resubmit the dissertation thesis after incorporating suggestions made by the board on the same dissertation topic. Such a candidate will have to reappear as an ex-student in next M.Pharm final semester University examination.

8.6 In no case shall a candidate, who has not passed finally after six academic years from the date of enrolment, be allowed to continue the course.

The Vice-chancellor in consultation with the Head of the institution may waive this limit of six academic years. The reasons for waiving the limit shall be recorded in writing. Such extension shall not exceed one year.

8.7 A candidate who is unable to appear at any examination in any subject(s) due to any reason whatsoever shall be considered as having failed in that subject(s).

9. Award of Degree, Division and Rank

9.1 On satisfactory completion of the course and after passing all the semester examinations, a candidate shall be awarded degree of M.Pharm in the respective branch.

9.2 No division shall be awarded at the end of M.Pharm first, M.Pharm second and M.Pharm third semester examinations. The division to a successful candidate shall be awarded on the basis of aggregate of marks obtained by him/ her in M.Pharm first semester, M.Pharm second semester, M.Pharm third semester and M.Pharm final semester examinations regardless of the number of attempts, as shown below:

Percentage of marks

Division

75% or above

Honours

(c)	Clinical Immittance Audiometer (Desk model) with accessories	2 instruments essential preferably one with screening type for field work	1 more
(d)	Portable/Screening impedance, audiometer	1	1 more
(e)	Clinical BSEAR	1	1 more
(f)	Otoacoustic emission	1	1 more
(g)	Calibration equipment for AC, BC and free field (by possession or access)		
(h)	Different types of Hearing Aids of mild moderate and strong categories body level and ear level, canal and spectacle hearing aid (1 each), FM, Digital, Programmable aids, ILS Assistive listening devices.	A representative sample of hearing aids and assistive devices.	
(i)	IGO and Hat for hearing aid trial and making electroacoustic measurements.	1	1
(j)	Stop watch	2	2 more
(k)	Oto scope	2	2 more
(l)	Proforma	2	2 more
(m)	Auditory training and Screening material		2 more
(n)	Ear Mould Lab- fully equipped		
Speech Pathology			
(a)	Speech and Language Tests (Tests for differential diagnosis) (English and local language)		
(b)	Proforma		
(c)	Speech Therapy material (Indian, Language and English)		
(d)	Toys and Books		
(e)	Mirrors - size 2' X 3'	4	6
(f)	Speech Trainer	1	2

(k)	Portable and Digital tape recorders	4	6
(h)	Hi-Fi Ampli Deck with speakers and good microphone	1	2
(i)	Esxiptograph/Aerophone	1	1
(j)	Computer PC-AT with VGA Color Monitor	1	3
(k)	Software for diagnostic/therapeutic use	1	1
(l)	ECG	1	1
(m)	Stop Watch	2	4
(n)	Audio cassettes for training/CDS		
(o)	Pitch pipe		
(p)	Tongue depressors	3	5

Third semester

Paper No.	Subject	Teaching hrs. per Week	Marks	
			Sessional	Univ. Exam Total
M.PH211D	Dissertation Synopsis Dissertation (Report, Presentation & Viva-voce)	36	50	To be submitted 150 200
Final semester				
Paper No.	Subject	Teaching hrs. per Week	Sessional	Univ. Exam Total
M.PH221D	Dissertation (Thesis, Presentation & Viva-voce)	36	50	150 200
M.Pharm (Pharmaceutical Chemistry) First semester				
Paper No.	Subject	Teaching hrs. per week	Univ. Sessi onal	Marks Univ. Exam Total
M.111T	Methods in Pharmaceutical Research, Theory	4	3	25 75 100
M.112P	Research in Pharmaceutical Research, Practical	6	6	25 75 100
M.PC113T	Advanced Medicinal Chemistry-I (Chemistry of Synthetic Drugs with Biochemical Approach), Theory	4	3	25 75 100
M.PC114P	Advanced Medicinal Chemistry-I (Chemistry of Synthetic Drugs with Biochemical Approach), Practical	6	6	25 75 100
M.PC115T	Drug Discovery and Development (CADD, QSAR & Receptor Based Drug Design), Theory	4	3	25 75 100
	Professional Practice	12*	-	-
Total		36	125	375 500

* These hours will not be counted as workload of Teacher.

Second semester

Paper No.	Subject	Teaching hrs. per week	Marks	
			Univ. Sessi onal	Univ. Exam Total
M.121T	Advances in Pharmaceutical Sciences including Biostatistics, Theory	4	3	25 75 100
M.122P	Advances in Pharmaceutical Sciences including Biostatistics, Practical	6	6	25 75 100
M.123T	Advanced pharmaceutical Chemistry (Organic Name Reactions, Reaction Mechanism & Stereochemistry), Theory	4	3	25 75 100
M.124P	Advanced Pharmaceutical Chemistry (Organic Name Reactions, Reaction Mechanism & Stereochemistry), Practical	6	6	25 75 100
M.PC125T	Advanced Medicinal Chemistry-II (Chemistry of Natural Products), Theory	4	3	25 75 100
	Professional-Practice	12*	-	-
Total		36	125	375 500

* These hours will not be counted as workload of Teacher.

Third semester

Paper No.	Subject	Teaching hrs. per Week	Marks	
			Sessional	Univ. Exam Total
M.PC211D	Dissertation Synopsis Dissertation (Report, Presentation & Viva-voce)	36	50	To be submitted 150 200

B.1.1.1 INTRODUCTION TO SPEECH AND LANGUAGE PATHOLOGY

(75 hr)

Part A : Normal aspects of Speech, language and communication

1. History and development of the profession-of Speech-Language Pathology (2 hr)

- Major work activities of SLP
- Various settings of service delivery
- Other professions concerned with communication disorders

2. Human Communication (5 hrs)

- Definitions and components
- Distinctions and similarities between communication, speech and language.
- Speech chain
- Functions of communication, speech and language
- Modes of communication
- Characteristics of good speech

3. The physical mechanism of speech and language production (2 hrs)

- Anatomy and physiology of respiratory system
- Respiration for life and speech
- Anatomy and physiology of laryngeal system
- Bases of pitch and loudness change mechanism
- Anatomy and physiology of articulatory system
- Anatomy of the nervous system related to speech and language

4. Acoustic aspects of speech (3 hrs)

- Speech as an overlaid function
- Source filter theory of speech production
- Harmonics, formants, transients and aperiodic energy
- Acoustic characteristics of normal voice and prosody

Interactive bases of human communication (4 hrs)

- Social bases
- Cognitive bases
- Psychological bases

Normal development of communication (23 hrs)

- Development of communicative intent (2 hrs)
- Development of Voice (1 hrs)
- Development of Phonology (2 hrs)
- Development of Semantics (2 hrs)
- Development of Syntax (3 hrs)
- Development of Pragmatics (2 hrs)

Prerequisites for language and speech development (1 hrs)

Factors affecting language and speech development (2 hrs)

Theories of language acquisition – Innate Vs Acquired – a brief introduction (3 hrs)

Models of Speech production (2 hrs)

Stages of language and speech development (3 hrs)

Speech and language skills of infants, toddlers, pre-schoolers, school-going children and adolescents (1 hrs)

Part B : Speech and language disorders

Definitions, causes and characteristics of (15 hrs)

- (a) developmental language disorders (3 hrs)
- (b) articulation disorders (2 hrs)
- (c) Fluency disorders (2 hrs)
- (d) Voice disorders (2 hrs)
- (e) cerebral palsy (2 hrs)
- (f) cleft lip and palate (2 hrs)
- (g) aphasia (1 hrs)
- (h) learning disability (1 hrs)

2. General Principles of assessment and intervention (9 hrs)

Definitions and goals of assessment and intervention (2 hrs)

M.Pharm (Pharmacology)

First semester

Paper No.	Subject	Teaching hrs. per week		Univ. exam. Sessi onal		Marks Univ. Exam Total	
		hrs.	week	hrs.	Exam	Univ.	Total
M.111T	Methods in Pharmaceutical Research, Theory	4		3	25	75	100
M.112P	Methods in Pharmaceutical Research, Practical	6		6	25	75	100
M.PL113T	Systemic Pharmacology-I, Theory	4		3	25	75	100
M.PL114P	Systemic Pharmacology-I, Practical	6		6	25	75	100
M.PL115T	Advanced Pharmacology, Theory	4		3	25	75	100
	Professional Practice	12*		-	-	-	
Total		36		125	375	500	

* These hours will not be counted as workload of Teacher.

Second semester

Paper No.	Subject	Teaching hrs. per week		Univ. exam. Sessi onal		Marks Univ. Exam Total	
		hrs.	week	hrs.	Exam	Univ.	Total
M.121T	Advances in Pharmaceutical Sciences including Biostatistics, Theory	4		3	25	75	100
M.122P	Advances in Pharmaceutical Sciences including Biostatistics, Practical	6		6	25	75	100
M.PL123T	Methods in Drug Evaluation, Theory	4		3	25	75	100
M.PL124P	Methods in Drug Evaluation, Practical	6		6	25	75	100
M.PL125T	Systemic Pharmacology-II, Theory	4		3	25	75	100
	Professional Practice	12*		-	-	-	
Total		36		125	375	500	

* These hours will not be counted as workload of Teacher.

M.Pharm (Pharmacology)

Third semester

Paper No.	Subject	Teaching hrs. per week		Marks Sessi onal Univ. Exam Total	
		Week	Exam	Univ.	Total
M.PI.2111D	Dissertation Synopsis			To be submitted	
M.PI.2111D	Dissertation (Report, Presentation & Viva-voce)	36		50	150
					200
M.Pharm (Pharmacology)					
Paper No.	Subject	Teaching Hours/ Week		Marks Sessi onal Univ. Exam Total	
M.PI.2211D	Dissertation/ Thesis, Presentation & Viva-voce)	36		50	150
					200
M.Pharm (Pharmaceutical Management and Regulatory Affairs)					

First semester

Paper No.	Subject	Teaching hrs. per week		Univ. exam. Sessi onal		Marks Univ. Exam Total	
		hrs.	week	hrs.	Exam	Univ.	Total
M.111T	Methods in Pharmaceutical Research, Theory	4		3	25	75	100
M.112P	Methods in Pharmaceutical Research, Practical	6		6	25	75	100
MJM/R/113T	Pharmaceutical Management-I (General, & Personnel), Theory	4		3	25	75	100
MJM/R/114T	Total Quality Management, Theory	4		3	25	75	100
MJM/R/115T	Drug Regulatory Affairs-I (National Regulatory Aspects), Theory	4		3	25	75	100
	Case Studies	2		-	-	-	
	Professional Practice	12*		-	-	-	
Total		36		125	375	500	

* These hours will not be counted as workload of Teacher.

Parts of an audiometer/ASA, ISO and ANSI, ISI norms – methods of obtaining puretone thresholds through air and bone conduction. Noise levels permissible in audiometric rooms – factors that affect a/c and b/c thresholds.

10. Masking – Definition, types of masking, ipsi-lateral, contralateral, transcranial, remote and central, Masking of pure tones by pure tone. White noise and narrow band noise. Critical band concept. Effective masking level and sound spectrum level. Application of masking in clinical audiometry; Clinical masking of the non-test ear need for; Criteria for masking during AC and BC testing. Cross hearing and I.A. How much to mask, Concepts of minimum necessary masking, factors determining the amount of masking noise. Occlusion effect, air bone gap in the masked ear. Masking dilemma in bilateral symmetrical conductive hearing loss cases. Other applications, Langenback's masking audiometry implications for theories of hearing aid use.

11. Orientation to:

- Speech Audiometry
- Calibration of Audiometers: Demonstration

LIST OF BOOKS

Essential

1. Beagly, H.A. (Ed.) (1981). *Audiology and Audiological Medicine*. Vol. 1, Oxford University Press.
2. Bess and Humes (1990) *Audiology- Fundamental* Williams & Wilkins, London.
3. Davis and Silverman, (Latest Edition). *Hearing and deafness*. H.K. Rinehats & Winston, London.
4. Hodgson, H.R. (1980) *Basic Audiologic Evaluation*, London Williams and Wilkins.
5. Martin, F.N. (1991), *Introduction to Audiology*, IV Edition, New Jersey: Prentice Hall.

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 1. *Basics of Audiology and Speech Language Pathology* 19
 2. *Basics of Audiology and Speech Language Pathology* 19
 3. *Basics of Audiology and Speech Language Pathology* 19
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47. *Basics of Audiology and Speech Language Pathology* 19

and frequency domain signals, nuclear overhauser enhancement, ¹³C-NMR spectra; their presentation, characteristics, interpretation, examples and applications.

Brief indication of application of magnetic resonance spectral data of other nuclei by modern NMR instruments, introduction to 2-D NMR techniques.

Mass Spectrometry: Basic principles and brief outline of instrumentation, ion formation and types; molecular ions, meta stable ions, fragmentation processes, fragmentation patterns and fragment characteristics in relation to parent structure and functional groups, relative abundances of isotopes and their contribution to characteristic peaks, mass spectrum; its characteristics, presentation and interpretation, chemical ionization mass spectrometry, GC-MS including recent advances in MS, Fast atom bombardment mass spectroscopy; analysis of drugs in biological samples by combined GC-MS.

Chromatography: Basic principles, instrumentation, methodological techniques and quantitative analysis of drugs and their metabolites using column chromatography, paper chromatography, TLC, ion exchange chromatography, GC, GLC, HPLC and HPTLC.

Electrophoresis: Moving boundary electrophoresis, zone electrophoresis, iso-tachopheresis, iso-electric focusing and continuous electrophoresis.

Fluorimetry and chemiluminescence: Principles, instrumentation and applications; electro-chemiluminescence, resonant ionization and Laser-enhanced ionization.

X-ray crystallography, thermal methods of analysis, DSC, SEM etc.

M.112P Methods in Pharmaceutical Research, 90 Hrs. Practical

Experiments based on calibration and validation of analytical instruments.

Qualitative and quantitative analysis of pharmaceutical preparations and dosages having single component or in combination of following categories: (biological and microbiological methods excluded).

i) Alkaloids ii) Antibiotics iii) Steroidal hormones iv) Vitamins v) Barbiturates vi) Sulfa drugs.

1. V/V Visible spectrum scanning of certain organic compounds, absorption and correlation of structures, comparison e.g., chloramphenicol, methyl, paracetamol, sulphadiazine, Ibuprofen etc., effect of pH and solvent on UV spectrum of certain drugs.

Estimation of single drug (raw material/formulations) by colorimetry involving different reagents.

Determination of UV cut off wavelength for different solvents.

Estimation of single drug (raw material/formulations) by UV spectrophotometry.

Simultaneous estimation of paracetamol and ibuprofen and other combination formulations by UV spectrophotometry using simultaneous equation/ derivative spectroscopy/ multiwavelength spectroscopy etc.

Comparison of three different analytical methods for salbutamol or other drugs.

Calibration of IR spectrophotometer using polystyrene film and checking the performance of the instrument.

Recording IR spectra for known drugs and comparing with that of Pharmacopoeia, estimation of drugs using IR.

IR spectra of simple molecules and interpretation of the same.

Estimation of drugs by fluorimetry.

Estimation of drugs by flame photometry.

Structural elucidation of at least 5 unknown compounds using UV, IR, NMR and Mass spectral data.

Second semester

M.121T Advances in Pharmaceutical Sciences 60 Hrs. including Biostatistics, Theory

Biostatistics: The application of the following in pharmacy shall be covered.

Mean, median and mode, standard deviation and coefficient of variation, student's t-test, one way ANOVA, chi-square test, probability, frequency distribution, regression analysis, bioavailability-cross-over study, Wilcoxon signed rank test, introduction to control charts.

Pharminformatics: Introduction to information resources available on the internet for the various subjects in pharmacy.

10. Zemlin, W.R. (1981). *Speech and Hearing Science: Ana Physiology*, (2nd Ed.) Englewood Cliffs, New Jersey: Ana Hall.
 11. *Foundations of Anatomy and Physiology*. Ross and W Ed.) (1985). Revised by K.J.W. Wilson. Eng. Language Churchill Livingstone.
 12. *Anatomy for Speech and Hearing* (4th Ed.) John M. (1993). Williams and Wilkins.
 13. *Human Anatomy - Regional and Applied*. (Head, Neck and - Vol.3). B.D. Chaurasia. (1980). CBS Publishers and Dis
 14. *Gray's Anatomy*. (37th Ed.) Williams Wanwick and Banniser. (1989). Churchill Living Stone.
 15. *Principles of Anatomy and Physiology*. (6th ED.) (199 Tortora, N.P. Anagnostakos. N.Y. Harper and Row Publ
 16. *Textbooks of Medical Physiology*. Guyton (8th Ed) (1991 Saunders.
 17. *Principles of Physiology* (1990). Berne and Levy. (Eds) Publishing Ltd.
 18. *Review of Medical Physiology*. (15th Ed.) (199) W.F. C
 19. *Neuroscience for the study of Communication Disorders* S.C. Bhattagar and O.J. Andy. Williams and Wilkins.
- B.1.3.2 : BASIC ACOUSTICS AND ELECTRONICS (7 Part A : Basic Acoustics**
- (Non-mathematical and Conceptual Treatment of subject**
- (1) *Vibrating systems- Simple Harmonic Motion - Simple systems- Systems with two or more masses- systems with modes of vibration - Complex vibrations- Vibration Spectra - Waves - What is a wave? Progressive waves - Sound - Wave propagation - Doppler effect - Reflection, Refraction, Diffraction, Interference, Absorption.*
 - (2) *Resonance of a mass-spring vibrator - standing waves - Part harmonics and overtones- Acoustic impedance - Helmholtz resonator - sympathetic vibrations- Couplers*
 - (3) *Sound Pressure, Power And Loudness- Physical and psychological scales - Critical bands - combined sources Pitch and Timbre - Physical and psycho-physical scales- Fourier analysis of complex tones.*

- Acoustics of Rooms - Sound propagation in outdoors and indoors
- Direct, early and reverberant sound - Calculations of reverberation time - Air absorption - Background noise- Loudspeaker placement and directivity- Acoustic Feedback and equalization- Acoustics of small rooms- sound images and multiple sources - sound field in listening rooms - Quadraphonic sound - listening with earphones.
- Part B : Basic Electronics**
- Operational characteristics, types and specifications- No design details - concepts and block diagrams, only)**
- Basics of electricity - Direct and alternating current - electrical energy and power - Power supplies.**
- Filters, Amplifiers and Oscillators**
- Microphones as transducers - Velocity microphones - unidirectional microphones - Microphone impedance and sensitivity**
- Loudspeakers as transducers - Structure of a dynamic loudspeaker- Air suspension - Baffles and enclosures - Horn speakers - Multi-speaker systems - Loudspeaker efficiency**
- Recording and Reproduction of sound - Recording characteristics- Dynamic Range- Stereophonic recording- Magnetic tape recording- Tape speed and frequency response - Bias and equalization - Tape noise - Digital Tape recording - CD ROM recording**
- High fidelity recording and playback - AM/FM tuners - Amplifier power and distortion - Loudspeaker power and distortion - Earphones (Headphones)**
- Development of micro-electronics- types of transistors - Passive circuit elements - Linear and digital Integrated circuits - micro-computers and micro-processors - micro- electronic devices.**
- Measuring Instruments - Multi-meter - Cathode ray oscilloscope - Audio generator - Function Generator - Frequency counter- Sound Level Meter - Spectrum Analyzer - Distortion Analyzer - Level Recorder (Demonstration and handling of the above instruments).**

Suppositories: Selection of suppository bases, characteristics of bases, formulation, preparation, evaluation and packaging of suppositories, stability studies and recent development.

Dermatological Preparations: Anatomy and physiology of skin, mechanism of absorption through skin including mathematical treatment, formulation and evaluation of ointments, creams, paste, gels including herbal cosmetic creams.

Stability Studies: Basic concepts, consideration of physical and chemical stability studies, determination of shelf life, problems encountered during storage of dosage forms.

M.PH.114 P Product Development, Practical 90 Hrs.

Validation of dissolution test apparatus.

Determination of molecular weight of the given polymer.

Enhancement of solubility of the given drug by solid dispersion technique.

Performance of powder glass test on different type of glasses.

Performance of water attack on treated soda lime glass container.

Formulation and evaluation of matrix tablet of given drug.

Formulation and characterization of topical gels of some anti-inflammatory drugs.

Comparison of release rate profile of conventional and sustained release tablets.

Preparation of microcapsules by different techniques and their evaluation.

Determination of shelf life of aspirin by accelerated stability studies.

Evaluation of spherical crystallization as a particle size enlargement technique for aspirin.

Formulation and evaluation, of ophthalmic dosage forms.

Performance of physical stability and dissolution studies of the suspension of given drug.

Formulation and evaluation of suppositories of given drug.

Determination of the effect of process variables on physico-chemical characteristics and in-vitro release profile of microcapsules.

M.PH.115T Advanced Pharmaceutics & 60 Hrs.
Biotechnology, Theory

Formulation (considerations: Preformulation studies in development of solid, oral liquid and parenteral dosage forms; solubility, dissolution rate, Ph_m , partition coefficient, stability etc., In-vivo evaluation techniques.

Production Management and Documentation: ISO 9000 series, intellectual property rights, total quality management, GMP and quality assurance, validation for tablets and parenterals, practice of WHO (IMP).

Pilot Plant Scale up Techniques: Significance of pilot plant scale up phase, laboratory procedure and formulations, routine production procedure, discussion on important parameters such as formulation, equipments etc, pilot study of dosage forms such as tablets, capsules and oral liquid.

Pharmaceutical Packaging Technology: Selection and evaluation of pharmaceutical packaging materials, containers and closures, problems of container-product interactions, pharmacopoeial specifications, test and standards for packaging materials.

Industrial Safety: Industrial hazards and their prevention, fire, accidents, mechanical and electrical equipments, industrial effluent testing and treatment.

Biotechnology: Introduction, importance and application of pharmaceutical biotechnology, enzyme kinetics, enzyme inhibition, pharmaceutical applications of enzymes, immobilization of cells and enzymes, application of immobilization, immobilization in design of novel drug delivery systems and drug targeting.

Tissue Culture: Introduction, types of culture, micropropagation, protoplast microinjection, plant tissue culture, animal cell culture, pharmaceutical applications of plant and animal tissue culture, production of commercially useful compounds by plant cell culture, bio-transformation by higher plant cell culture, growth of cell in bioreactor and production of active principles, bioreactor, tissue culture based pharmaceutical industries.

Recombinant DNA Technology and Genetics: Basic concepts of DNA, protein synthesis and targeting, genetic recombination, gene transfer methods in prokaryotes and eukaryotes, techniques of genetic

Additional:

1. Akmajian. A. et al. (1990). *Linguistics. An Introduction to Language and Communication.* (3rd Ed.) MIT Press.
2. Catford, J.C. (1982). *Fundamental Problems in Phonetics.* Edinburgh University Press.
3. Clark, J. and Yallop, C (1995). *An Introduction to Phonetics and Phonology.* (2nd Ed.) Basil: Blackwell.
4. Fry, D.B. (1979). *The Physics of Speech,* Cambridge University Press.
5. Ladefoged P. (1992). *A course in Phonetics.* (3rd Ed.) New York. Harcourt Brace Jovanovich.
6. Lyons, J. (Ed.) (1970). *New Horizons in Linguistics.* Hammondsworth: Penguin Books.

B.1.3.4: PSYCHOLOGY RELATED TO SPEECH AND HEARING (75 hrs)

1. (a) Definitions of Clinical Psychology- Historical development, modern history of clinical psychology, its current status and scope as a specialty in health sciences, role of clinical psychology in speech and hearing disorders. (5 hrs)
(b) Concept and normality and abnormality, models of mental disorders, biological, psychological, social models. (5 hrs)
2. (a) Methodology in clinical psychology – Case history, clinical interviewing, clinical observation, types of psychological assessments, considerations for speech and hearing disorders. (5 hrs)
(b) Classification of abnormal behavior: History, need, rationale, present systems DSM and ICD. (5 hrs)
3. (a) Motor development – Early motor development – stages in motor development – manipulative behavior, handedness, development of complex motor skills, motor development during later childhood, and adolescence, decline with age. (5 hrs)
(b) Cognitive development – Evolutionary growth of intelligence, growth from early childhood to adolescence, decline with age, Piaget's theory of cognitive development (6 hrs)
(c) Emotional and social development (7 hrs)

4. (d) Assessment of cognitive functions, personality, interpersonal relationships, diagnosis, and tests used and interpretation of test results. (6 hrs)
4. (a) Introduction – Definitions of learning – Scope and methods types of learning- importance of studying psychology of learning in communication disorders. (6 hrs)-
(b) Experimentation in learning- human and animal learning Quantitative assessment of learning, learning curves. (5 hrs)
(c) Theories of conditioning – Classical conditioning by Pavlov and its principles, Operant conditioning by Skinner and its principles (5 hrs)
5. (a) Biological, Neurochemical, Neurophysiological, Neuropsychological correlates of learning. (5 hrs)
(b) Techniques derived based on operant conditioning, shaping chaining, prompting, time-out, token economy, reinforcement and contingency management, aversive therapy. (10 hrs)

LIST OF BOOKS**PSYCHOLOGY RELATED TO SPEECH AND HEARING****Essential:**

1. Psychology Lefton, L. III Ed. Allyn and Bacon, 1985.
2. Child Development Hurlock EB, VI Ed. Mc Graw Hill International Book Co. 1981.
3. Introduction to Psychology. Morgon C.T. King R.A. Robinson N.M. Tata Mc Graw Hill Publishing Co.
4. Psychology 5th Ed. Dvoretzky J.P.
5. Handbook of Treatment of Mental Disorders in Childhood and Adolescence – Wolman Prentice Hall, 1978.
6. Essential Psychotherapies. Theory and Practice. Gurman A.S., and Messer, S.B.
7. The Handbook of Psychological Testing, Kline, P. Routledge, 1993.
8. Psychological Testing from Early Childhood Through Adolescence. Editor Siegal M.G. International Universities Press, 1987.

affecting drug distribution, volume of distribution, protein binding, mechanism of biotransformation and factors affecting it, renal and non-renal excretion, concept of clearance and kinetics.

Bioavailability and Bioequivalence: Introduction, factors influencing bioavailability methods to determine bioavailability, designing the study for assessment of bioavailability and bioequivalence, in-vitro and in-vivo correlation of bioavailability, methods to enhance bioavailability, statistical concepts.

Pharmacokinetics: Basic consideration of one, two and multiple compartment models including IV- bolus, IV infusion and extra vascular administration, kinetics of multiple dosing, dosage regimen (loading and maintenance dosages)

Clinical Pharmacokinetics: Concepts, absorption, distribution and renal excretion, hepatic clearance and elimination, disposition and absorption kinetics, therapeutic regimen, therapeutic response and toxicity, dosage regimen, clinical based studies.

Physiologic Pharmacokinetic Models: Basic concepts, physiologic pharmacokinetic model with binding, blood flow-limited versus diffusion limited model, application and limitations of physiologic pharmacokinetic models, mean residence time (MRT), mean absorption time (MAT) and mean dissolution time (MDT), statistical moment theory (SMT).

Non-Linear Pharmacokinetics: Recognition of non-linearity, one and two compartment open model with Michaelis-Menton Kinetics, determination of k_m , V_{max} . nonlinear tissue binding constants.

Applications of Computer: Introduction, application of computers in pharmacokinetics and biostatistics.

M.Pharm (Pharmaceutical Chemistry)

First semester

M.PC113T Advanced Medicinal Chemistry-I 60 Hrs.
(Chemistry of Synthetic Drugs with Biochemical Approach), Theory

Survey of recent advances in following areas, brief chemistry, and synthetic approach to marketed drugs, mode of action and SAR of following classes of drugs:

Cardiovascular (antihypertensives, antiarrhythmics, antianginals, cardiotonics), CNS (anesthetics, sedative-hypnotics, anticonvulsants,

Syllabus: Master of Pharmacy

antiphycotholens and CNS stimulants), immunosuppressants, antimicrobials, antibacterials, antivirals, antineoplastics, drugs for immunomodulation, tuberculosis, leprosy, amoebiasis, and tropical diseases and malaria, tuberculosi, leprosy, amoebiasis, and leishmaniasis, radio protectives and drugs against ageing, diuretics, antihistaminics, cholinergic and anticholinergics.

Microorganism in Drug Synthesis: Introduction, theoretical and practical aspects of microbial transformation, microbial conversion of antibiotics.

M.PC114P Advanced Medicinal Chemistry-I 90 Hrs.
(Chemistry of Synthetic Drugs with Biochemical Approach), Practical

Synthesis: determination of R_f value and purity by thin layer chromatography; spectral analysis and M.P. determination of following drug# drug intermediates and other drugs related to theory syllabus.

Synthesis of caprolactam from cyclohexanone.

Synthesis of isatin from phthalimide.

Synthesis of antipyrin.

Synthesis of dibenzal acetone from benzaldehyde.

Synthesis of coumarins from resorcinol.

Synthesis of pinacol from acetone.

Synthesis of sulphanilamide from acetanilide.

Synthesis of phenobarbitone.

Synthesis of diketopiperazine.

Synthesis of nifedipine.

Synthesis of propranolol.

Synthesis of xylocaine.

Synthesis of dimethoxy benzaldehyde.

Synthesis of mefanemic acid.

Synthesis of phenytoin.

Synthesis of para amino phenol.

Synthesis of atleast 4 compounds from journal of repute.

(b) Develop therapy material specific to the cases observed and also in general.

- (11) Familiarization with use of scales/tests
- REEL Scale
 - 3-D scale of language development
 - LPT
 - PAT
 - Checklist for assessment of child directed speech
 - Scale for assessment of pre-linguistic skills.
- (12) Compiling relevant material pertaining to developmental milestones of
- Communicative intent
 - Pre-linguistic skills
 - Speech
 - Hearing response
 - Phonology
 - Morphology
 - Syntax
 - Semantics
 - Pragmatics
 - Feeding skills
 - Attention
- (13) Observation of a minimum of
- 5 diagnostic cases
 - 5 therapy sessions for 3 cases with different speech language disorders.
 - Writing of observations reports of above.
- (14) Familiarization with available instruments for voice and speech analysis. Use of these instruments for measurement of own voice parameters (Fo, Ao, Fo range)
- (15) Maintenance of a clinical diary.
- (16) Maintenance of a journal to be submitted at the end of the term.

(17) Introduction of self as an ASLP professional through modeling and role play.

(18) Familiarization with computers.

CLINICAL PRACTICUM IN AUDIOLOGY

1. Orientation to the field of Audiology by exposure to public information material (videos, pamphlets, booklets, etc)
2. Case history: of Adults and Children with normal hearing, with hearing impairment with normal speech and language functions, with speech and hearing disorders. Taking case history information from clients/care-givers. (5 cases under supervision, 20 cases independently).
3. Under going puretone audiometry. Becoming familiar with different types to sound stimuli used for assessment of hearing.
4. Identifying the different types of audiometer and their accessories referring to their respective manuals. Familiarizing with the parts and their functions. Doing listening check. Trouble shooting with the audiometer: Listing the different arphone/earcushion combination, BC vibrator. Studying the same and reporting the status of the same.
5. Preparing O DBHL equivalent chart with different earphone/earcushion combination.
6. Obtaining audiograms using different types of audiometers, of 10 normal subjects.
7. Observation /Participation during audiological evaluation on a variety of cases under supervision. Plotting the audiograms, calculation of Interaural Attenuation, Occlusion effect, etc.
8. Obtaining audiograms independently -20 with AC and 20 with AC & BC. (1/3 of these cases should be children).
9. Obtaining audiograms with masking (5 cases)
10. Classification of given audiograms as per -nature of hearing loss
 - degree of hearing loss
 - contour of audiograms
11. Calibration of audiometers (Demonstration) – AC/BC/Sound Field, instruments used, identifying the instruments, combination of equipment for different types of calibration, preparing correction chart.

Following unit processes as applied to drugs and drug intermediates are to be performed:

Nitration, amination by catalytic and chemical reduction, diazotization, halogenation, sulphonation, oxidation, hydrogenation, esterification, hydrolysis, polymerization and other name reactions.

Synthesis of at least 4 heterocyclic rings containing nitrogen, sulphur and/or oxygen.

M.PC125T Advanced Medicinal Chemistry-II 60 Hrs.

(Chemistry of Natural Products), Theory

Carbohydrates: Disaccharides, determination of structures, sucrose, maltose, lactose, polysaccharides, cellulose, starch, introduction to lignin, pectin, pectic substances.

Fats, oils, waxes, lipoproteins; their general classification and chemistry.

Amino acids: Polypeptides; introduction, classification, synthesis of amino acids, polypeptides. Synthesis of naturally occurring proteins, structure of polypeptides, amino and carboxyl terminal determination. Proteins; classification, composition, structure, chemistry of oxytocin, insulin, angiotensin and peptides of medicinal importance. Purines and nucleic acids.

Alkaloids: General methods of isolation and structure determination, study the structural elucidation of atropine, morphine, ergotamine, reserpine, colchicine, vinca, podophyllum alkaloids.

Glycosides: Cardiac, saponins, anthraquinones, etc.

Steroids: Stereochemistry, conformational studies of steroidal nucleus, chemistry of cholesterol, stereochemistry of side chain at C-17, cholic acid, vitamin D₃, cortisone and aldosterone.

Anthrocyanins: Introduction, general nature, synthesis, structure of anthrocyanins, flavones, isoflavones, depsides

Selected Synthesis: Stereochemical aspects of ascorbic acid, vitamin A, cholesterol, cortisone, progesterone-dihydroabietic acid, coenzyme A, β-carotene, estrone, prostaglandins F₂ and E₂.

M.Pharm (Quality Assurance)

First semester

MQA113T Standardization & Stabilization 60 Hrs.

Methods-Drugs & Formulations including Herbal Products, Food

& Cosmetics, Theory

Biological standardization, general principles, scope and limitation of bioassays, procedures involved in the biological assay of some official drugs and vaccines.

Pyrogens: Production, chemistry and properties of bacterial pyrogens and endo-toxins, pyrogen testing of IP compared to that of IP, USP and LAL test.

Pre-Clinical drug evaluation; acute, sub-acute and chronic toxicity studies, LD50, ED50 determination, evaluation of compound for its biological activity, study of special toxicities like teratogenicity and mutagenicity.

Microbiological assay of antibiotics and vitamins.

Extraction, isolation, purification and therapeutic importance of following markers (Phytopharmaceuticals): Artemisine, Kernerpine, Vinca alkaloids, Podophylotoxin, Ginseng Saponins, Monggenin, Taxol, Guggulipids and Rutin.

Novel technologies used in the development of phytomedicines like polyphloidy, hybridization, mutation, incorporation of plant growth regulators and tissue cultures.

Food products: Concepts of nutritional requirements at different age, sex and in different conditions of disease, pregnancy and lactation etc, different types of additives used, analysis of nutritional and other ingredients in ethical and non ethical foods.

Cosmetics: Ingredients used in various products such as creams, powder, lotions, hair products, nail polishes, lipsticks, depilatories, collyria etc, and their analysis.

Formulation, stabilization and evaluation of tablets, capsules, liquid dosage forms, parenteral preparations, transdermal products, suppositories and controlled release products.

Containers and closures for pharmaceuticals: Types, performance,

SECOND YEAR GRADUATE COURSE

B.2.1.2: CHILDHOOD COMMUNICATION DISORDERS (75 hrs.)

1. Theories and models of language acquisition – Behavioral, Nativistic, Cognitive, Structural, Pragmatic, Biological (in detail) (6 hrs)
2. Genetic and neurological correlates of communicative development. Growth and developmental. Genetics – Autosomal and sex linked disorders – Fetology with special reference to speech and hearing. RH incompatibility- Kernicterus, Perinatal pediatrics including brain damage, APGAR score – Inborn errors of metabolism, congenital cerebral and cranial defects, infection of CNS, Tumors of CNS, Endocrinal disturbance – Developmental Neurological examination and evaluation – Neurology of Behavior. (9 hrs)
3. Definitions, etiology, classification and characteristics of communication disorders in children with
 - (a) Hearing impairment (5 hrs)
 - (b) Mental retardation (2 hrs)
 - (c) Pervasive developmental disorders (6 hrs)
 - (d) ADD and ADHD (2 hrs)
 - (e) SLI and LLD (4 hrs)
 - (f) Learning disability (4 hrs)
 - (g) Acquired childhood aphasia (4 hrs)
 - (h) Visual impairment (1 hrs)
 - (i) Multiple impairments (2 hrs)
4. Assessment of communication skills in children (15 hrs)
 - Informal and formal procedures
 - Specific assessment tools and protocols for above disorders
 - Differential diagnosis between childhood communication disorders.
 - Team management
5. Communication, language and speech intervention. (15 hrs)
 - General intervention approaches and principles.

- Specific intervention techniques.
- AAC
- Role of parents, caregivers and family.
- Team approach.

LIST OF BOOKS

CHILDHOOD COMMUNICATION DISORDERS

Essential:

- (1) Childhood language disorders in context (1993). Nelson, N.W. New York: Macmillan.
- (2) An Introduction to children with language disorders. (1994) Reed, V (2nd Ed.) New York: Macmillan.
- (3) An integrative approach to language disorders in children (1982). Woolfolk, E. and Lynch J. New York: Grune and Stratton.
- (4) Treatment of Autistic Children (1987). Howlin, P. and Rutter, M. London: John Wiley and sons. ISBN – 1-870332-61-X.
- (5) Craft (ed.) Tredgold's Mental Retardation. (1979). USA: Cavell Ltd.
- (6) Introduction to Child Language Disorders. Hegde, M.N.

Additional:

- (1) Acquired Speech and Language Disorders (1994). Murdoch, B.E. London U.K: Chapman Hall.
- (2) Acquired Childhood Aphasia. (1993) Lees J. London: Whurr Publishers.
- (3) Mental Retardation (1990). Drew C., Logan D., and Hardman, M. Merrill Publishing.
- (4) The Mentally Retarded Child- Development Training and Education. (1979). Huti and Givy. Boutsos: Allyn & Bacon Inc.

B.2.1.3 ARTICULATION AND PHONOLOGICAL

DISORDERS (75 hrs.)

Part A: Articulation and Phonological Disorders (40 hrs.)

- Normal development of articulation and phonology. Models of phonological development. (3 hrs).
- Fundamentals of articulatory phonetics. Co-articulation, Acoustic

Complaints and recalls, evaluation of complaints, recall procedures, related records and documents.

Waste disposal, scrap disposal procedures and records.

M.Pharm (Quality Assurance)

Second semester

M.QA123T Advanced Pharmaceutical Analysis- 60 Hrs.

Method Development, Theory

Chromatographic Techniques: HPTLC detection methods, quantitative methods in TLC; programmed multiple development techniques.

Gas Chromatography: Instrumentation, packed and open tubular column, column efficiency parameters, the Van Deemter equation, resolution, liquid stationary phases, derivatisation methods of GC including acylation, perfluoroacylation, alkylation and esterification. Detectors: FID, ECD, TCD, NPD. A critical comparison of sensitivity, selectivity and field of applications of these detectors. Examples of applications of GC in pharmaceutical analysis.

Liquid Chromatography: Comparison of GC and HPLC, instrumentation in HPLC, analytical, preparative and micro-bore columns, normal and reversed-phase packing materials, reverse-phase HPLC, HPLC-tryptic mapping, size exclusion, ion-exchange amino acid analysis, amino acid sequence analysis, hydrophobic interaction chromatography, column selection, mobile phase selection, efficiency parameters, resolution. Detectors in HPLC: refractive index, photometric and electrochemical; comparison of sensitivity, selectivity and field of applications of these detectors. HPTLC-instrumentation and applications.

Supercritical Fluid Chromatography (SFC).

X-ray Diffraction Methods: Introduction, generation of X-ray, elementary crystallography, Miller indices, X-ray diffraction, Bragg's law of X-ray powder diffraction, X-ray powder diffractometer, obtaining and interpretation of X-ray powder diffraction data.

Radiochemical Assays: Sodium iodide, cyanocobalamin and quality control of radiopharmaceuticals.

Radioimmune assays of drugs and hormones.

Myllabhai Master of Pharmacy

Immunological Assays: ELISA, immunoblotting, immunofluorescence, immunoaffinity.

Enzyme Analysis: Pepsin, papain, hyaluronidase.

Principles and procedures involved in using the following reagents in pharmaceutical analysis: 2,6-dichloroquinone chlorimide, 1,2-naphthoquinone-4-sulfate, 2,3,5-triphenyltetrazolium salt, 3-Methyl-1,2-benzothiazoline hydrate, benzothiazolone hydrochloride (MBTH), Folinm ciocalteu reagent, p-dimethylamino benzaldehyde/ cinnamaldehyde (PDAB), (PDMAC), Ninhydrin reagent.

Polarography: AC pulse polarography and square wave polarography.

Thermal Methods of Analysis: Introduction, TGA, DTA and DSC theory, instrumentation of thermographs and application.

Analysis of drugs obtained from genetic engineering: Vaccines, sera and toxoids.

Electron Spin Resonance: Principle, instrumentation, interpretation of spectra and applications.

Laser: Basic principles, classification, instrumentation and application of Laser.

Reference standards: Source, preparation, characterization, usage, storage and records.

M.QA124P Advanced Pharmaceutical Analysis- 90 Hrs.

Method Development, Practical

Gradient elution techniques in column chromatography.

Two dimensional paper chromatography and TLC.

Separation by electrophoresis.

Experiments using HPLC, GC, HPTLC: Determination of chromatographic parameters—capacity factor, selectivity, resolution, efficiency of column, HETP, asymmetric factor. Effect of polarity of mobile phase on retention of samples in normal/ reversed phase mode in HPLC, estimation of single component or multicomponent drugs in formulations—using different methods of quantitative analysis (Direct comparison method, calibration curve method, internal standard method).

Experiments based on application of the following reagents in pharmaceutical analysis: 2,6-dichloroquinone chlorimide, 1, 2-

Colton, R.H. and Casper, J.E. (1993). San Diego: Singular Publishing Group Inc.

Additional:

- (1) Nature and Treatment of Articulation Disorders (1980). Johnson, J.P. Springfield: Charles C. Thomas.
- (2) Assessment and remediation of articulatory and phonological disorders. (1989) (2nd Ed) Creaghead, N.A. Newman, A.W. and Secord, W.A. New York: Macmillan
- (3) Working with Oral Cancer(1995). Appleton, J. and Machin, J. UK: Winslow. ISBN: 0-86388-129-7.

B 2.1.4 VOICE AND LARYNGECTOMY (75 hrs)

1. (A) Voice -
 - Definition, Review of Anatomy of the respiratory, phonatory and resonant systems.
 - Development of voice and factors influencing.
 - Theories of phonation
 - Characteristics of normal voice. Physiological, acoustical, and Aerodynamic correlates of voice.
 - Evaluation of voice and implication to abnormal voice.
2. (a) Definition of normal and abnormal voice
 - Causes and classification of abnormal voice
 - Incidence and prevalence of abnormal voice
 (b) Causes, diagnosis, differential diagnosis, and therapy for
 - Hysterical Aphonia
 - Spasmodic dysphonia
 - Plica - Ventricularis
 - Mutational voice disorders
 - Diplophonia
3. (a) Vocal hyperfunctional disorders
 - Vocal abuse
 - Vocal Nodule, vocal polyp, contact ulcer
 (b) Voice problems in geriatrics

4. (a) Neurological problems resulting in voice disorders
- (b) Paralysis of the vocal cords - causes, types, characteristics, differential diagnosis and management.
- (c) Voice problems in hearing impaired
- (d) Congenital voice disorders
- (e) Resonatory disorders- hypernasality, hyponasality, causes, characteristics and management.
- (b) Management of the problems of professional voice users
- 1.(B) Laryngectomy
 - Definition, incidence and prevalence
 - Causes and symptoms of laryngeal cancer
 - Types and characteristics of laryngectomy surgery
 - Total laryngectomy - definition, characteristics associated problems
 - Assessment of laryngectomy
2. Management of laryngectomy
 - Esophagael speech - anatomy, candidacy, different types of air intake procedures, speech characteristics in esophageal speech.
 - Tracheo esophageal speech - anatomy, candidacy, different types of TEP, fitting of prosthesis, speech characteristics, complications in TEP
 - Artificial larynx - different types, selection of artificial larynx, speech characteristics
 - Pharyngeal speech, buccal speech, ASAI speech, gastric speech
 - Pre and postoperative counseling.

LIST OF BOOKS**VOICE AND LARYNGECTOMY**

1. Aronson, A.E., (1990): Clinical Voice Disorders, New York: Thieme, Inc.
2. Aronson, A.E. (1980): Clinical Voice Disorders: An interdisciplinary approach. New York: Thieme Stratton.
3. Boone, D. (1977). Voice and voice therapy (2nd Ed.) New Jersey: Prentice Hall Inc.

important therapeutic aspects and recent advances of drugs belonging to the following categories:

Drugs Acting on ANS: Cholinergic drugs, anti-cholinesterases, anti-cholinergic drugs, adrenergic drugs, adrenergic receptors and neuron blockers.

Drugs Acting on PNS: Neuro-muscular blockers, local anesthetics, Drugs Acting on CNS: Ethanol, general anesthetics, sedatives and hypnotics, anti-epileptics, narcotic analgesics, centrally acting muscle relaxants, psychopharmacological agents.

Autacoids: Histamine, serotonin and their antagonists; eicosanoids, anti-inflammatory drugs, anti-gout drugs, drugs used in treatment of asthma.

Drugs Acting on Blood and Blood-forming Organs: Hematinics, anti-coagulants, haemostatic, fibrinolytics, anti-hypercholesterolemics, Gastro-intestinal Drugs: Anti-ulcer drugs, laxatives and purgatives, emetics, anti-emetics.

Diuretics and anti-diuretics.

M.PL114P Systemic Pharmacology-I, Practical 90 Hrs.

Experiments involving action of drugs on autonomic effectors using preparations like frog/ mammalian heart, cat/ dog/ rat blood-pressure (major experiments), rat/ guinea pig/ rabbit intestine, rat uterus. The exercises should include investigations into mechanism of action of given autonomic drug.

Experiments to demonstrate/ detect the presence of the following actions in drugs: Sedation/hypnosis, muscle relaxation, anti-convulsant action, anti-anxiety action, analgesic action, anti-inflammatory action, effect on learning/ memory, neuroleptic effect, anti-ulcer effect etc.

M.PL115T Advanced Pharmacology, Theory 60 Hrs.

Mechanisms of free-radical and oxidative injury in biological systems. Involvement of such injury in pathological processes and states.

Nitric Oxide: Generation and role in physiology and pharmacology.

Immuno-modulation: Immune response, cell-mediated and humoral immunity. Immune-deficiency states. Pharmacology of immunomodulatory agents and their applications.

Ion-Channels: Various types of ion channels. Characteristics of sodium, potassium, calcium and chloride channels. Role of various ion channels in physiology and pathological states. Regulation of ion channels and drugs modifying ion-channel function.

Role of various central neuro-transmitters in physiology and pathological states. Agents modulating neurotransmitter function in brain (with special reference to acetylcholine, dopamine, nor-adrenaline, glutamic acid, aspartic acid, GABA and glycine)

Bio-active Peptides: Source, characteristics and pathological and physiological roles of VIP, gastrin, cholecystokinin, opioid peptides, melatonin, neurokinins, plasmin, angiotensin, interleukins, platelet activating factor, TNF- α and interferons.

Receptor signal transduction mechanisms, role of second messengers (cAMP, IP₃ etc).

Introduction to stem cell, gene therapy and molecular oncology.

M.Pharm (Pharmacology)

Second semester

M.PL123T Methods in Drug Evaluation, Theory 60 Hrs.

Introduction to various stages in the process of drug development. Scope and aims of pre-clinical and clinical evaluation.

Fundamental techniques in estimation of enzymes and other endogenous substances in different tissues and body fluids.

Blind neuro-pharmacological screening and methods of determination of LD₅₀. Importance of LD₅₀.

Methods of biological evaluation of drugs of the following classes:
Autonomic drugs, local anesthetics, anticoagulants, antihypertensives, drugs acting on heart, vasodilators, bronchodilators, diuretics, skeletal muscle relaxants, drugs effecting learning and memory, psychopharmacological agents, analgesics, anti-inflammatory agents, hypnotics, anticonvulsants, anti-diabetic drugs, anti-fertility agents, anti-ulcer drugs, immunomodulators.

Bioassays: Definition, principle, advantages over other assays, graded and quantal bioassays, matching, bracketing, interpolation, three point and four point assays. Methods of bioassay of adrenaline, nor-adrenaline, acetylcholine, histamine, angiotensin, d-tubocurarine, insulin, digoxin, oxytocin, estrogen, thyroxine, corticotrophin and somatotrophin

38. Prater, R.J. and Swift, R.W. (1984): *Manual of Voice Therapy*. Little, Brown and Co, Boston.
 39. Stemple, J.C. (1993): *Voice therapy Mosby year book*. St Louis
 40. Wilson, D.K. (1979). *Voice problems of children* (2nd Ed.) Baltimore: Williams and Wilkins.
 41. Brown, O.L. (1996) *Discover your voice*. Singular publishing group inc.
 42. Brown, W.M.S. and others (1996) (ed): *Organic voice disorders*. Singular publishing group, Sandiego.
 43. Prater, R.J. and Swift, R.W. (1984): *Manual of Voice Therapy*. Little, Brown and Co, Boston.
 44. Sataloff, R.T. (1991): *Professional voice*. Raven Press, New York.
 45. Stemple, J.C. (1993): *Voice therapy*. Mosby year book. St Louis
- Laryngectomy**
1. Diederich, W.M. & Youngstrom, K.A. (1966). *A laryngeal speech*. Springfield: Charles C Thomas.
 2. Doyle, P.C. (1994) *Foundation of voice and speech rehabilitation following laryngeal cancer*. Singular publishing group Sandiego.
 3. Green, M.C.L. (1980). *Voice and its disorders* (4th Ed.) Kent Pitman Medical Limited.
 4. Keith, R.L. & Darley (III Edition) *Laryngectomy rehabilitation* Pro Ed Austin.
 5. Luchisinger, R. & Arnold, G.E. (1965) *Voice – Speech language clinical communication: Its physiology and pathology*. California: Wodsworths.
 6. Prater, R.J. & Swift, R.W. (1984) *Manual of voice therapy*. Little Brown & Co. Boston
 7. Salmon, S.J. and Mount, K.H. (Eds) (1991). *Alaryngeal Speech Rehabilitation*. Prof.- Ed. Austin.
 8. Snidecor, J.C. (1968). *Speech rehabilitation of the laryngectomised*. (2nd Ed.) Springfield: Charles C Thomas.
 9. Travis, L.E. Ed (1971). *Handbook of speech pathology and audiology*, New Jersey: Prentice Hall Inc.

10. Van Riper, C. & Irwin, J.V. (1958) *Voice and Articulation*. New Jersey: Prentice Hall Inc.
 11. Yvonne, E(Ed) (1983). *Laryngectomy: Diagnosis to Rehabilitation*. London: Croom Helm Ltd.
- D 2.2.2 DIAGNOSTIC AUDIOLOGY (75 hrs)**
1. **Speech Audiometry:** Historical perspectives Tests: Speech Awareness Threshold (SAT). Speech Recognition Threshold (SRT), Word Recognition Score (WRS). Materials for each of these tests. Development of test materials available material in Indian and Western language instrumentation, and calibration, administration of tests, recording and interpretation of tests results factors affecting the test results, role of speech Audiometry in differential diagnosis, merits and demerits of Speech Audiometry. (8 hrs)
 2. **Audiological Tests to Differentiate Site of Lesion (9 hrs)**

(A) Test which use pure tone stimuli:

Historical perspectives – Difference Limen Tests, Bekesy Audiometry, Brief Tone Audiometry Short Increment Sensitivity Index (SISI) Modifications of SISI. Loudness Balance Tests – ABLB, MLB. Tone Decay Test: Introduction, Terminology, Different procedures. STAI, continuous Tone Masking. Advantages and Disadvantages of different procedures.

(B) Tests which use Speech Stimulus PIPB Function Imittance Audiometry (15 hrs)

 - Principle of Imittance Audiometry
 - Instrumentation
 - Tympanometry
 - Static Imittance
 - Reflexometry
 - Use of Imittance Audiometry in Clinical Population

(a) to detect middle ear pathology
 (b) to differentiate between cochlear and retrocochlear pathology.
 (c) to identify brain stem lesion
 (d) to identify 7th nerve lesion

yllabus / Master of Pharmacy

Regulatory (considerations for Pre-clinical and Clinical Evaluation: Pre-clinical requirements currently in use. Regulatory requirements of single dose and repeat dose toxicity studies. Study of specific toxicities such as mutagenicity, carcinogenicity and teratogenicity. Animal pharmacokinetics and toxicokinetics. Regulatory requirements of clinical evaluation, pharmacokinetics in man genetic polymorphism. Design and interpretation of clinical trials.

Quality assurance standards as per ISO. Globalization of drug industry, present status and scope of pharmaceutical industry in India.

WHO and NABL certification, ICH guidelines for manufacturing and quality assurance of drug formulation.
M.PMRA115T Drug Regulatory Affairs-I 60 Hrs.
(National Regulatory Aspects), Theory

Origin, development, scope, objectives and nature of Pharmaceutical legislation in India. History and ethics of profession of Pharmacy.
A study of regulatory aspects that affect drug product design, manufacture and distribution in India with special emphasis on the detailed study of the following Acts (with latest amendments)

The Narcotics Drugs and Psychotropic Substances Act.
Medicinal and Toilet Preparations (Excise Duties) Act, 1955.
The Pharmacy Act, 1948.

The Drugs and Cosmetics Act, 1940 and Rules there under.
The Drugs (Price Control) Order in force.
Drugs (Price Control) Order in force.
Introduction to Intellectual Property Rights; Copy Right Act, Trade Mark Act, Patent Act and Biodiversity Act, WTO, TRIPS and TRIMS.

The Drugs and Mingle Remedies (Objectionable Advertisements) Act, 1955.
Prevention of Cruelty to Animals Act.

Schedule U requirements- Product development stage documentation, factory procedures - Standard operating procedures and standard test procedures.

Rajasthan University of Health Sciences

communication, its processes, measures for effective communication, conflict management. Stress management.

M.PMRA114T Total Quality Management 60 Hrs.
(Theory)

Concepts and Philosophy of TQM, GLP, GMP (orange guide). Drug regulatory and accrediting agencies of the world (USFDA, TGA, ICH, WHO, ISO etc.).

Good manufacturing practices: Organisation and personnel, responsibilities, training, hygiene. Premises: Location, design, plant layout, construction, maintenance and sanitation, environmental control, utilities and services like gas, water, maintenance of sterile areas, control of contamination.

Equipments: Selection, purchase specifications, maintenance, clean-in-place, sterilize-in-place, methods (TP and STP).
Raw materials: Purchase specifications, maintenance of stores, selection of vendors, controls on raw materials and finished dosage forms.

Manufacture of and controls on dosage forms: Manufacturing documents, master formula, batch formula records, standard operating procedures, quality audits of manufacturing processes and facilities.

In process quality controls on various dosage forms; sterile and non-sterile, standard operating procedures for various operations like cleaning, filling, drying, compression, coating, disinfections, sterilization, membrane filtration etc.,

Packaging and labeling control, line clearance, reconciliation of labels, cartons and other packaging materials.

Quality Control Laboratory: Responsibilities, good laboratory practices, routine controls instruments, reagents, sampling plans, standard test procedures, protocols, non-clinical testing, controls on animal house.

Data generation and storage, quality control documents, retention samples, records and audits of quality control facilities.

Finished products release, quality review, quality audits, batch release document.

5. Silman S. and Silman C.A. (1991). Auditory Diagnosis Principles and Application New York: Academic Press, Inc.
 6. Rupp, Stockdell (1980). Speech Protocols in Audiology, New York: Grune & Stratton.
 7. Keith, R.M. (Ed.) (1981). Central Auditory Dysfunction New York: Grune & Stratton.
 8. Musiek, and Baran, J.A. (1987). Central Auditory Assessment. Thirty years of challenge and change. Ear and Hearing 3, 225-355.
 9. Pinheiro, H.L. Katsuek, F.E. (Eds) (1985). Assessment of Central Auditory Dysfunction Foundations and Correlates. Baltimore: Williams and Wilkins.
 10. Willisford J.A. (1987), Handbook of Central Auditory Processing Disorders in Children, Drando, Gruene & Stratton.
 11. Feldman, A.S. & Willber, L.A. (Eds), (1976), Acoustic Impedance, Immittance: Measurement of Middle Ear Function, Baltimore: Williams & Wilkins.
 12. Popelka, B.R. (Ed) (1981). Hearing Assessment with acoustic reflex. New York: Grune and Stratton.
 13. Jacobson, J.T. (Ed) (1985). Auditory Brain Stem Response. Taylor and Francis, London.
 14. Musiek, F.E. and Rintlemani, W.F. (1999). Contemporary Perspective in Hearing Assessment. USA: Allyn & Bacon
- B 2.2.3 AMPLIFICATION AND ASSISTIVE DEVICES FOR THE HEARING IMPAIRED (75 hrs)**
- (A) HEARING AIDS:**
- (i) Historical development of hearing aids. (2 hrs)
 - Non- electrical hearing aids.
 - Electrical hearing aid.
 - (ii) Types of hearing aids (15 hrs)
 - Body level AC, BC, body baffle effect
 - Ear level: BTE, Spectacle (AC/BC), AITE, Canal aid
 - Binaural, Pseudobinaural, Monaural
 - Directional hearing aids, modular hearing aids.

- Routine of signals, head shadow/baffle/diffraction effects.
 - Output limiting: Peak clipping, compression.
 - Extended low frequency amplification, frequency transposition.
 - Programmable hearing aids, bone anchored hearing aid.
 - Signal processing- Digital hearing aids.
 - Master hearing aids.
 - Group amplification – hard wire, induction loop. FM, infra red. Merits and demerits of each.
- (III) Mechano – acoustic couplers: (2 hrs)
- Types
 - Procedures
 - Effect of acoustic couplers on the characteristics of hearing aid output.
- (IV) Electro-acoustic characteristics measurements for hearing aid: (8 hrs)
- (a) Instrumentation Analysis of all styles of hearing aids:
 - According to ISI procedure
 - According to IEC and ANSI procedure.
 - (b) Interpretation of the analysis.
- (V) Hearing Aid Selection: (20 hrs)
- (a) Pre-selection factors: which ear to fit? Monaural or binaural? Which type of receiver? Which style?
 - (b) Prescriptive and comparative procedure.
 - (c) Functional gain and insertion gain methods: Instrumentation, prescription formulae, Articulation Index, Speech – banana. Merit and demerits of each of these.
 - (d) Hearing aids for conductive hearing loss: congenital malformation, chronic middle ear disorders.
 - (e) Hearing aids for infants/children/multiply handicapped.
 - (f) Hearing aids for elderly: Recruiting cars, poor Word Recognition Scores (WRS).
 - (g) Hearing aids for the sightless.

Evaluation of investment decisions by pay back period, accounting rate of return, net present value methods, break even analysis.

Project definition, preparation of feasibility assessment and selection, project reporting, conventional project appraisal; limitations, towards a new framework. Projections, profitability, cost and benefit analysis, appraisal criteria – financial, economic and social. Risk analysis.

Institutional Finance and Project Appraisal: Framework for domestic/international finance evaluation, project identification, feasibility, appraisal, financial and capital structures, capital market instruments, managing new issues, negotiations with FIs, FII's, and other market players, issue pricing, SEBI guidelines, syndication of loans including term loans, lease financing.

M.PMRA125T Drug Regulatory Affairs-II 60 Hrs.
(Including International Regulatory Aspects), Theory

A detailed study of regulatory aspects that affect drug product design, manufacture and distribution in a developed country such as USA and in a developing country such as Brazil, Hatch Waxmann Act; Bolar Provisions and other FDA Regulations.

Regulatory aspects of pharmaceutical and bulk drug manufacture, regulatory drug analysis.

Loan license (contract manufacture).

Recent amendments to Drugs and Cosmetic Act and other relevant rules.

Certification and licensing procedure.

Documentation related to manufacturing, cleaning methods, retention samples and records, quality control, batch release documents, distribution records, complaints and recalls.

Quality, safety and legislation for cosmetic products and herbal products.

Approval of New Drug: Investigational new drug (IND) submission, format and content of IND, content of investigator brochure, clinical research protocols, objective and protocol design, FDA guidelines for clinical trials, reviews and approval of a clinical study, general consideration of the new drug approval (NDA), specific requirements,

International business and inland & foreign trade, procedure of export and importing goods. General international environment; political, legal, socio-cultural and economic factors, tax aspects, entering factors, labour factors and economic integration. BOP analysis, foreign exchange control, governmental policies, international trade, economic community, IMF, managing multinationals/globalization operations.

Emerging Trends in Biotechnology Patenting.
Patent Cooperation Treaty
Strategies for effective Patent Drafting. IP Issues in contract Manufacturing. Exporting to the US and Pre-litigation Consideration

REFERENCE BOOKS (LATEST EDITION)

1. M.Pharm (Pharmaceutics, Pharmaceutical Chemistry, Quality Assurance, Pharmacology, Pharmaceutical Management and Regulatory Affairs)
2. Methods in Pharmaceutical Research (M.111T & M.112P)
3. Instrumental Methods of Analysis by Scoog and West.
4. Spectrometric Identification of Organic Compounds by Silverstein et al.
5. Instrumental Method of Analysis by Willard Dean & Merritt.
6. Text Book of Inorganic Chemistry by A.I. Vogel.
7. Pharmaceutical Chemistry, Vol. I & Vol. II by Becker and Stanlake.
8. Pharmaceutical Chemistry, Vol. I & Vol. II by L.G.Chatterji.
9. Text Book of Pharmaceutical Analysis by K.A. Connor.
10. Pharmaceutical Analysis by Higuchi, Bechman, Hasson, et al.
11. Methods of Drug Analysis by Gearien, Graboski.
12. Text Book of Biopharmaceutic Analysis by Robert Smith and James Stewart.
13. Pharmaceutical Analysis – Modern Methods, Part A and B by Munson James. W.

- Integration
- Partial integration
- Segregation : day school Vs residential school
- (b) Criteria for recommending the various educational placements.
- (c) Factors affecting their outcome
- (a) Educational problems of hard of hearing in India.
- (b) Counseling the parents and teachers regarding the education of the hearing handicapped.
- (c) Setting up class rooms for the hearing handicapped.
- (d) Home training – need, preparation of lessons, correspondence programs, follow up.
- (a) Classroom acoustics, preferential seating and adequate illumination.
- (b) Classroom amplification devices.

LIST OF BOOKS

EDUCATIONAL AUDIOLOGY

1. Sanders, D.A. (1993) *Management of Hearing Handicap: Infants to Elderly*, 3rd Ed. New Jersey, Prentice Hall.
 2. Davis, J.M. and Hardick, E.J. (1981) *Rehabilitative Audiology for children and Adults* New York: John Wiley and Sons.
 3. Ross, M. Brackett, D. and Maxon, A.B. (1991). *Assessme. i and management of mainstreamed hearing-impairment childrens Principles and practice*. Austin: Pro. Ed.
 4. Lynas, W. (2000) *Communication options*. In J. Stokes (Ed) *Hearing impaired infants – Support in the first eighteen months*, London : Whurr Publishers Ltd.
 5. Sims, L.G. Walter, G.G. and Whitehead, R.L. (1981) *Deafness and Communication: Assessment and Training*. Baltimore Williams and Wilkins.
 6. Tucker, I. & Nolan, M (1984) *Educational Audiology*. London Croom Helm, Chap. 10.
 7. Alpiner, J.G. (1982). *Handbook of Adult Rehabilitativ Audiology*. Baltimore: Williams and Wilkins.
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8. Chermak, G.D. (1981) *Handbook of Audiological Rehabilitation*. C.C. Thomsas.
 9. Ebbin, J.B. (1974) *Critical Age in Hearing*. In C. Griffiths (Ed). *Proceeding of the International Conference on Auditory Techniques*. Illinois: Charles C. Thomas.
 10. Griffiths, C. (1974) *Early Identification- Plus the Auditory Approach*. In C. Griffiths (Ed). *Proceeding of the International Conference on Auditory Techniques*. Illinois: Charles C. Thomas.
 11. Bornstein, H. (1977). *Systems of Sign*. In L.J. Bradford & W.G. Hardy (Eds), *Hearing and Hearing-Impairment*. New York: Grune and Stratton Inc.
 12. Hull, R.H. (Ed) (1982) *Rehabilitative Audiology*. New York: Grune and Stratton. Inc.
 13. Fitzgerald, E. (1929). *Straight Language for the Deaf*. McClure.
 14. Jackson, A (1981) *Ways and Means-3. Hearing-Impairment a Resource Book of Information. Technical Aids. Teaching Material, and Methods used in the Education of Hearing-Impaired Children*. Hong Kong: Somerset Education Authority.
 15. Tobbs, T. (1978) *Ways and Means: A Resource Book of Aids, Methods, Materials, Materials and Systems for use with the Language Retarded Child*. Hong Kong: Somersed Education Authority.
 16. *Correspondence Program for Parents of the Deaf*, John Tracy Clinic.
 17. Nix, G.W. (1976) *Mainstream Education for Hearing – Impaired Children and Youth*. New York: Grune and Stratton Inc.
 18. Ross, M. Brackett, D. and Maxon, A.B. (1991) *Assessment and management of mainstreamed hearing-impairment children: Principles and practice*. Austin: Pro. Ed.
 19. Webster, A. & Ellwood, J. (1985). *The Hearing – Impaired Child In the Ordinary School*. London: Croom Helm.

11. Pharmaceutical Experimental Design and Interpretation by N.A. Armstrong, L.K.C. James; Taylor & Francis.
 12. Current Patent Acts of various countries.
 13. Web Resources in Pharmacy by Mueen Ahmed K.K.
- Novel Drug Delivery System (M.PH.123T & M.PH.124P)**
1. Encyclopedia of Controlled Drug Delivery, Vol. I & II Edited by Edith Mathiowitz.
 2. Novel Drug Delivery Systems by Y.W. Chien.
 3. Targeted Therapeutic Systems by P. Tyle, B.P. Ram.
 4. Controlled Drug Delivery Fundamental & Applications by J.R. Robinson.
 5. Drug Delivery Systems: Fundamental & Techniques by P. Johnson and J.G. Lloyd.
 6. Biopolymeric Controlled Released System by Donald L. Wise.
 7. New Drug Delivery System by Joliano.
 8. Controlled Drug Delivery, Vol. I & II by Stephen D. Bruck.
 9. Microencapsulation and Related Drug Processes by Patrice B. Deasy.
 10. Controlled and Novel Drug Delivery by N.K. Jain.
 11. Remington's Pharmaceutical Sciences.
 12. Liposomal Therapeutics by S.P. Vyas and V.K. Dixit
 13. Interfacial Phenomena in Drug Delivery and Targeting by Graham Buckton.
 14. Liposomes—A Practical Approach by H.H.C. New.
- Biopharmaceutics and Pharmacokinetics (M.PH.125T)**
1. Biopharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi.
 2. Biopharmaceutics and Pharmacokinetics by Robert E. Notari.
 3. Biopharmaceutics by Swarbrick.
 4. Textbook of Applied Biopharmaceutics and Pharmacokinetics by Shargel.
 5. Biopharmaceutics and Clinical Pharmacokinetics by John and Wagner.

- Pharmaceutical Master of Pharmacy**
6. Textbook of Biopharmaceutical Analysis by Smith R.V and Brown J.T
 7. Dissolution, Bioavailability and Bioequivalence by Abdou, H.M.
 8. Clinical Pharmacokinetics: Concepts and Applications by Rewland M. and Toyzer T.N
 9. Pharmaceutical Bioequivalence by Welling P.G
 10. Remington's Pharmaceuticals Sciences.
 11. Advanced Pharmaceutics by Bankers and Bhods.
- Advanced Medicinal Chemistry-I (MPC113T & MPC114P)**
1. Medicinal Chemistry by Burger.
 2. Principles of Medicinal Chemistry by Foye.
 3. Organic Drug Synthesis, Vol. 1, 2 & 3 by Lednicer.
 4. Annual Reports in Medicinal Chemistry by Hans, Jurgen Hess.
 5. Medicinal Chemistry Series by Ariens.
 6. Progress in Medicinal Chemistry Series by Ellis and West.
- Drug Discovery and Development (MPC115T)**
1. Introduction to the Principles of Drug Design by Smith & Williams.
 2. Drug Design, Vol. VII by Ariens.
 3. Progress in Pharmaceutical Research by Woodridge.
 4. Annual Reports in Medicinal Chemistry, Academic Press Inc.
 5. Comprehensive Medicinal Chemistry, Vol. 4.
 6. Burger's Medicinal Chemistry, Vol. 1
- Advances in Pharmaceutical Sciences including Biostatistics (M121T & M.122P)**
1. Pharmaceutical Statistics by Sanford Bolton; Marcel Dekker.
 2. Pharmaceutical Statistics of Industrial Pharmacy by Lachman.
 3. Text Book of Biopharmaceutic Analysis by Smithe, Stewart.
 4. Methods in Biostatistics by Mahajan.
 5. Fundamental of Applied Statistics by S. C. Gupta and Kapoor.
 6. Mathematical Statistics by Kapoor and Saxena.
 7. Statistics by Gofeti Radhakrishna.

- Professional ethics for SLPs. Interacting with allied professionals and community health workers
4. Planning services for the communication disabled: (4 hrs)
Philosophy, planning, establishment of services for communication disorders – infrastructure, budget, staffing, equipment, furniture, policy-making, record keeping, proposal-writing, etc. Making services user-friendly.
5. Legislative support for rehabilitation. (5 hrs)
- RCI Act (1992)
 - PWD Act (1995)
 - National trust Act for autism, CP and MR (1999)
 - Environmental Act
 - MRTTP Act.
 - FCRA
 - Consumer Protection Act.
 - Schemes and concessions under state and central government.
 - Vocational rehabilitation.
6. Strategies for awareness, public education and information (Camps, Print and audiovisual media, surveys, Radio broadcast, Street plays, etc) (3 hrs)
7. Empowering parents, persons with disabilities and community. Skill transfer to parents, grass-root level workers, teachers, health workers. (2 hrs)
8. Levels of prevention: (2 hrs)
- (a) Health promotion
 - (b) Specific protection
 - (c) Early diagnosis and Treatment – high risk infants
 - (d) Disability limitation
 - (e) Rehabilitation
9. The professional as a witness. Documentation. Handling legal issues. (1 hrs)

LIST OF BOOKS

**COMMUNITY ORIENTED PROFESSIONAL PRACTICES
IN SPEECH LANGUAGE PATHOLOGY AND
AUDIOLOGY**

1. Administration and Management of Programs for Young Children. (1995) Shoemaker, C.J. New Jersey: Prentice Hall Inc. ISBN: 0-02-410041-2.
 2. Management of Child Development Centre (1993) Hildebrand, V. (3rd Ed) MacMillan Publishing Company. ISBN: 0-02-354524-0
 3. Status of Disability in India (2000), Editor: Kundu C.L., RCI.
 4. Professional Issues in Speech- Languages Pathology and Audiology- A Text book. (1994). Lubinski R. and Fratalli C. California: Singular Publishing Group ISBN: 1-56593-171-8
 5. Private Practice in Communication Disorders (1991) Wood, M.L. (2nd Ed). California: Singular Publishing Group.
 6. Enabling the Disabled Thakur Hariprasad Institute.
- B.2.3.6. BASIC STATISTICS AND RESEARCH METHODS
IN AUDIOLOGY AND SPEECH LANGUAGE
PATHOLOGY (75 hrs)**
- A. Basic Statistics:**
1. What is Statistics – Important of statistics in behavioural sciences – descriptive statistics and inferential statistics – usefulness of quantification in behavioural sciences – application to speech and hearing.
 2. Measurement – scales of measurements – nominal, ordinal, interval and ratio scales.
 3. Data collection- Classification of data - class intervals – continuous and discrete measurements - drawing frequency curve- drawing inference from graph.
 4. Measures of Central tendency – need-types: mean, median, mode- working out these measures with illustrations.
 5. Measures of variability – need-types of: Range, deviation average deviation, standard deviation, variance – interpretation.
 6. Normal distribution – general properties of normal distribution – theory of probability – illustration of normal distribution – area

7. Isolation and Identification of Drugs by Clark, E.C.G., The Pharmaceutics Press, London.
 8. The Practical Evaluation of Phytopharmaceutics by Brain, K.R. and Turner, R.D., Wright-Scientechics Bristol.
 9. Modern Methods of Plant Analysis by Peach K. & Tracey, M.V., Narosa Publisher House, N.D.
 10. Biological Standardization by Burr. Finney and Godwin.
 11. Modern Pharmaceutics by Rhodes & Banker.
 12. Microbial Assays by Barton J. Wright.
 13. The International Pharmacopoeia, Vol. I, II, III, IV, 3rd Edition.
 14. Basic Tests for Pharmaceutical Substances – WHO (1988)
 15. Basic Tests for Pharmaceutical Dosage Forms – WHO (1991)
 16. Evaluation of Drug Activities: Pharmacometrics (Vol. I & II) by D.R.Laurence.
 17. Screening Methods in Pharmacology by R.A.Turner.
 18. Animal and Clinical Pharmacologic Techniques in Drug Evaluation by Nodine and Siegler.
- Total Quality Management-I (M.QA115T)**
1. Quality Assurance Standards as per ISO.
 2. WHO And NABL Certification, Globalization of Drug Industry, Introduction to Export of Drugs and Import Policy.
 3. ICH Guidelines for Manufacturing and Quality Assurance of Drug Formulation.
 4. Present Status and Scope of Pharmaceutical Industry in India.
 5. Guidelines for Developing National Drug Policies, WHO Publications, 1998.
 6. Quality Assurance of Pharmaceuticals – A Compendium of Guidelines and Related Materials, Vol.-1; WHO Publications.
 7. A Guide to Total Quality Management by Kaushik Maitra and Sedhan K. Ghosh.
 8. GMP by Mehra.
 9. How to Practice GMP by P.P. Sharma.

10. ISO 9000 and Total Quality Management by Sadhan K. Ghosh.
 11. Good Manufacturing Practices for Pharmaceuticals - A Plan for Total Quality Control by Sidney H. Willing & James R Stoker. (Drugs & Pharm. Sciences) Vol. 78, Marcel Dekker Inc.
 12. OPI-Quality Assurance.
 13. USP.
- Advanced in Pharmaceutical Sciences including Biostatistics (M.121T & M.122P)**
1. Pharmaceutical Statistics by Sanford Bolton; Marcel Dekker.
 2. Pharmaceutical Statistics of Industrial Pharmacy by Lachman.
 3. Text Book of Biopharmaceutical Analysis by Smith, Stewart.
 4. Methods in Biostatistics by Mahajan.
 5. Fundamental of Applied Statistics by S. C. Gupta and C. K. Kapoor.
 6. Mathematical Statistics by Kapoor and Saxena.
 7. Statistics by Gofeti Radhakrishna.
 8. Web Resources in Pharmacy, In Pharma Publication, Bangalore.
 9. Basic Statistics and Pharmaceutical Statistics Application by James E.De Muth; Marcel Dekker Inc.
 10. Pharmaceutical Experimental Design by G.A. Lewis, D. Matheia, Roger Phan-Tan-Luu; Marcel Dekker Inc.
 11. Pharmaceutical Experimental Design and Interpretation by N.A. Armstrong, L.K.C. James; Taylor & Francis.
 12. Current Patent Acts of various countries.
 13. Web Resources in Pharmacy by Mueen Ahmed K.K.
- Advanced Pharm. Analysis Methods Development (M.QA123T& M.QA123T)**
1. Advanced Pharmaceutical Analysis-Method Development.
 2. Trace and Ultra Trace Analysis by HPLC by Ahuja.
 3. HPLC in Pharmaceutical Analysis [2 Volumes] by Szepesi
 4. HPLC Analysis of Biological Compounds, Lab. Guide Chromatography Series, Vol. 26 by Hancock and Sparrow.
 5. Chromatography of Pharmaceuticals: Natural Synthetic &

- Pragmatics
 - Non-verbal communication
 - Velopharyngeal competency
 - Phonological processes
 - Intelligibility
 - Reading, Writing and Spelling
 - Phonological analysis of disordered speech
- (2) Analyze and interpret information obtained during assessment to arrive at a provisional diagnosis.
 - (3) Differentially diagnose
 - (a) Childhood communication disorders.
 - (b) Articulation and phonological disorders.
 - (4) Plan and execute intervention programs for
 - (a) Delayed speech and language development.
 - (b) Deviant speech and languages development.
 - (c) Deficient speech and language skills.
 - (d) Misarticulations.
 - (e) Cleft lip and palate.
 - (f) Phonological disorders.
 - (5) Compile a comprehensive report for appropriate referral of clients.
 - (6) Communicate relevant test findings to clients and significant others in a professional manner.
 - (7) Obtain information about different types of set-ups dealing with communication disorders.
- Clinical Practicum Work:**
- (1) Complete informal and formal assessment of all aspects of speech and language in a minimum of 15 cases including children and adults (emphasis on childhood communication disorders and articulation and phonological disorders), under supervision.
 - (2) Familiarization with checklists, tests, scales such as:
 - Clinical evaluation of language function (CELF)
 - Program for Acquisition of language for the severely impaired

(PALS)

- Test of language development (TOLD)
 - Bankson's language screening test (BLST)
 - Screening Speech Articulation Test (SSAT)
 - North western Syntax Screening Test (NSSST)
 - Checklist for Autism Assessment
 - Pragmatic Assessment Protocols.
 - Boder Test of Reading – Spelling Patterns
- (3) Using available instruments for:
 - Fo and Intensity information for sentences produced with different suprasegmentals.
 - Measuring AMR and SMR using any two methods of measurement.
 - Measuring s/z ratio, MPD using any two methods of measurement.
 - Comparing the performance of hearing impaired subjects on a task of auditory discrimination using a hearing aid and a tactile aid.
 - Analyzing different types of spectrograms.
 - Obtaining Nasalance measures for standard stimuli for normal subjects.
 - (4) Planning and executing intervention programs for a minimum of 5 cases (including children and adult) for at least 5 sessions each. The student clinician should
 - carry out and report baseline evaluation.
 - Develop proficiency in using various therapy techniques appropriately
 - Develop proficiency in adopting various reinforcement strategies.
 - Provide guidelines for home-based intervention.
 - Report progress in therapy appropriately.
 - Participate in case discussion with supervisor.
 - Participate in parent counseling meeting.
 - Make appropriate referrals, where necessary.

8. Web Resources in Pharmacy, In Pharma Publication, Bangalore.
 9. Basic Statistics and Pharmaceutical Statistics Application by James E.De Muti; Marcel Dekker Inc.
 10. Pharmaceutical Experimental Design by G.A. Lewis, D. Mathesia, Roger Phan-Tan-Luu; Marcel Dekker Inc.
 11. Pharmaceutical Experimental Design and Interpretation by N.A. Armstrong, L.K.C. James; Taylor & Francis.
 12. Current Patent Acts of various countries.
 13. Web Resources in Pharmacy by Mueen Ahmed K.K.
- Methods in Drug Evaluation (M.PL123T & M.PL124P)**
1. Drug Discovery and Drug Evaluation by Vogel
 2. Hand Book of Experimental Pharmacology by Zaimis E & Others
 3. Handbook of Drug Screening by Rankrishna Seethala and Prabhavathi B. Fernandes
 4. Methods of Drug Screening by Turner
 5. Clinical Research in Pharmaceutical Development by Barry Bleidt and Michael Montagne
 6. Screening Methods in Pharmacology. Turner R.A.
 7. Evaluation of Drug Activities: Pharmacometrics by Laurance D.R.
 8. Methods in Enzymology.
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3. Laws of Drugs in India by Hussain.
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2. Pharmaceutical Statistics of Industrial Pharmacy by Lachman.
3. Text Book of Biopharmaceutic Analysis by Smith, Stewart.
4. Methods in Biostatistics by Mahajan.
5. Fundamental of Applied Statistics by S. C. Gupta and C. K. Kapoor.
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 10. Pharmaceutical Experimental Design by G.A. Lewis, D. Matheia, Roger Phan-Tan-Luu; Marcel Dekker Inc.
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 13. Web Resources in Pharmacy by Mueen Ahmed K.K.
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1. Management by Tripathi P. C. and Reddy P. N.; Tata Mc Graw Hill.
 2. Business Organization and Management by Shukla M. C.; S. Chand and Company.
 3. Business Organization and Management by Sherlakar S. A.; Himalaya.
 4. Personnel Management by Filippo E. B.; McGraw Hill.
 5. Marketing Management by Kotler Philip; Prentice Hall of India.
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 10. Marketing Hand Book Vol. II, Marketing Management by Edwin - E Bobrow, Mark - D. Bobrow.
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