

॥ अंतरी पेटयु ज्ञानज्योत ॥



**NORTH MAHARASHTRA UNIVERSITY,
JALGAON**

Syllabus for
B . PHARMACY
(FIRST YEAR)

(w.e.f. July, 2001)

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B. PHARMACY COURSE

STRUCTURE AND SYLLABUS

General :

The ordinance which are relevant to the students perusing their education in Pharmacy, shall be applicable. The various ordinances such as for admission, enrolments, examinations, condonations, etc. are specially important for Pharmacy students.

1. Minimum qualifications required for admission:

a. First Year B. Pharm. Course:

The candidate must have passed 10+2 examination in science stream of any Statutory/ Recognised Board or its equivalent examination with atleast 50 % marks in Physics, Chemistry and Biology (45 % for backward class candidates) taken together at one and the same seating and also should have offered mathematics as one of the subjects. He should have also passed in English. In case the candidate has not offered mathematics, he will have to attend the remedial course of mathematics and passed in the same after the admission to the course.

(Admission to the first year B. Pharm. shall be as per rule prescribed by State Govt. viz. Directorate of Technical Education, North Maharashtra University as applicable at the time of admission.)

b. Second Year of B. Pharm. Course:

A candidate who has passed Diploma in Pharmacy with atleast 60 % marks from an institution approved by the Pharmacy Council of India or possessing any other qualification approved by the Pharmacy Council of India as a equivalent to Diploma in Pharmacy will be considered eligible for admission directly to the second year of B. Pharm. course.

Such a candidates will have to appear and pass in the subject Industrial Psychology of First Year B. Pharm. Course, failing which they will not be considered eligible for admission to the Final Year of B. Pharm. Course

(Admission to the second year B. Pharm. shall be as per rule prescribed by State Govt. viz. Directorate of Technical Education, North Maharashtra University as applicable at the time of admission.)

2. Duration of the Course:

The duration of the course is of four academic years.

For the students who are admitted to the Second Year B. Pharm. Course directly, the duration of the course is of three academic years.

3. Fee:

The fee shall be charged as per the notification released by State Govt. or any such authority from time to time.

4. Practical Training:

The student is required to undergo practical training of one month duration after the completion of the Second Year B. Pharm. examination in :

- a. Hospital/Community/ Clinical pharmacy or
- b. Pharmaceutical Industry or
- c. Analytical Laboratory or
- d. Pharmaceutical Research and Development Organisation

He will be considered eligible for getting B. Pharm. degree provided he completes this training before the end of Fourth Year B. Pharm. course and provide he fulfils other requirement

5. Grant of Terms:

A student will have to attend atleast 75% of the theory classes as well as practicals separately for each subject to become eligible for the grant of term.

6. Scheme of Examination:

- a. There will be an annual university examination at the end of the academic year.
- b. 80% of the total mark of each Theory paper and Practical are allotted to them at the Annual University Examination. The remaining 20 % of the mark are allotted to each theory paper and Practical at the sessional examinations.
- c. The allotment of the mark and duration for each Theory and Practical Examination will be as per the tables given in the syllabus.
- d. There will be three Sessional Examinations during an academic year. The higher performances of student in any two of these sessional examinations in each Theory paper: / Practical will be taken into consideration. The average of marks obtained by student in each theory paper and practical at these two examinations will be communicated to the university for inclusion in his / her final result of the examination.
- e. The improvement sessional exam. shall be conducted by College only for the failures students at University exam. in the respective subject heads subsequent to their appearing at said University exam. However, the improvement sessional exam. shall be held on entire syllabus of respective subjects. Further the improvement sessional exam. can be conducted for the candidate who are otherwise passed in the subjects but for want of prescribed aggregate of 50%, they wish to attend those subjects again. The marks should be submitted to the University.

7. Standard of Passing:

A student will have declared to have passed the examination if he/she has obtained atleast 40% marks in Theory (i.e . minimum 32 marks in annual theory examination and minimum 8 marks in sessional examination.)

AND

Has obtained atleast 45% marks in practicals (i.e . minimum 36 marks in annual practical examination and minimum 9 marks in sessional examination.)

AND

Has obtained atleast 50% of the aggregate marks assigned to the whole examination.

A student who passes in all the heads of passing an examination, but fails to get the minimum required 50% of the aggregate marks for passing that examination, will be allowed to reappear for maximum three subjects of his choice (theory paper and practicals together of that examination.

8. Award of Class:

Aggregate marks secured by he candidate at the Third Year and Final Year B. Pharm. examinations will be taken into consideration for an award of the class .

Mode of award of class:

<u>Class</u>	<u>Marks required</u>
First Class with distinction	70% and Above
First Class	60% and Above but less than 70 %
Second Class	50% and Above but less than 60 %

9. A.T.K.T.:

A candidate failing in a subject will be allowed to carry a backlog of a maximum of two subjects in the next year, meaning thereby that a candidate must clear those two subjects independently or simultaneously at the next examination. If he fails to clear subjects of the previous year he will not be permitted to attend next higher class. The term subject for this purpose will mean both theory and practical together.

NORTH MAHARASHTRA UNIVERSITY JALGAON
FIRST YEAR B.PHARMACY SYLLABUS
SUBJECT:-Introductory Biology Syllabus (Theory)
(W.e.f.2002-03)

**SYLLABUS FOR INTRODUCTORY BIOLOGY PAPER FOR
THE CANDIDATES ADMITTED TO B.PHARM. SCIENCE
COURSE WITHOUT HAVING OFFERED
BIOLOGY AT XII SCIENCE.**

TOTAL MARKS-50

PART-A: Botany

1. General organization of the plant and its inclusions.
2. The plant tissues (Meristematic and permanent).
3. The broad classification of the plant kingdom.
4. Morphology of the plant parts like roots, stems, leaf and their modifications.
5. Inflorescence and flower, its pollinations.
6. Morphology of fruits and seeds.
7. **Plant Taxonomy**: Families-Leguminosae, Umbelliferae, Solanaceae, Lilliaceae, Zinziberaceae, Rubiace with special reference to medicinal plants.
8. **Plant physiology**:transpiration,photosynthesis, respiration,growth and plant nutrition,vitamins,enzymes.
9. The study of the root and fungi,yeast,penicillin, bacteria.

PART-B: Zoology

1. The study of Animal cell, Animal tissues, difference between plant cell and animal cell.
2. The detailed study of frog.
3. The study of representatives of the Pisces, Reptiles, Aves with special reference to their medicinal values.
4. General organization of a mammal.
5. The study of Poisonous animals.

REFERENCE BOOKS

- | | | |
|--------------------------------------|---|--|
| 1. A class book of Botany | - | A.C.Dutta |
| 2. Outlines of Zoology | - | Ekambarnath Iyer & T.N.Anantha Krishna |
| 3. Functional Anatomy of a Mammal | - | Taylor & Weber |
| 4. Comparative Anatomy | - | Atwood |
| 5. Baileys Text book of Histology | - | W.M.Copenhaver |
| 6. A Text book of Vertebrate Zoology | - | S.N.Prasad |
| 7. Vertebrate Zoology Vol.II | - | Ekambarnath Iyer |

NORTH MAHARASHTRA UNIVERSITY, JALGAON

SCHEME OF EXAMINATION OF B. PHARMACY.

FIRST YEAR B. PHARMACY.

(With effect from July, 2001)

Sr. No.	Subjects	Theory				Practicals			
		University		Sessional	Total	University		Sessional	Total
		Hrs.	Marks	Marks	Marks	Hrs.	Marks	Marks	Marks
1.1	Pharmaceutics-I	03	80	20	100	04	80	20	100
1.2	Dispensing of Medication & Hospital Pharmacy	03	80	20	100	04	80	20	100
1.3	Pharmaceutical Inorganic Chemistry	03	80	20	100	06	80	20	100
1.4	Anatomy, Physiology & Health Education	03	80	20	100	04	80	20	100
1.5	Biochemistry	03	80	20	100	04	80	20	100
1.6	Industrial Psychology	03	80	20	100	--	--	--	--
1.7	Drug Store & Business Management	03	80	20	100	--	--	--	--

Total: 700

500

Grand Total: 1200

NORTH MAHARASHTRA UNIVERSITY, JALGAON

STRUCTURE OF B. PHARMACY COURSE & SCHEME OF TEACHING

FIRST YEAR B. PHARMACY

(With effect from July, 2001)

Sr. No.	Subject	Theory	Practical
1.1	Pharmaceutics-I	03	03
1.2	Dispensing of Medication & Hospital Pharmacy	03	03
1.3	Pharmaceutical Inorganic Chemistry	03	03
1.4	Anatomy, Physiology & Health Education	03	03
1.5	Biochemistry	03	03
1.6	Industrial Psychology	02	--
1.7	Drug Store & Business Management	02	--
	Total :-	19	15

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS

1.1-Pharmaceutics-I (Theory)
 (3Hrs/week)

(With effect from July, 2001)

Section- I

TOPICS	Hrs.
1) Introduction to pharmaceutics and its scope:	01
2) History of pharmacy: Historical background and development of profession of pharmacy and pharmaceutical industry in India. Introduction to pharmacopoeias	03
3) Definition of drug and development of new drug :	01
4) Introduction to dosage forms and their classification: Reasons to develop dosage forms, preformulation and formulation development: Physicochemical properties of drugs substances, accelerated stability evaluation, drug-excipients compatibility studies. Formulation development based on different aspects including physicochemical studies, therapeutic, biopharmaceutical and technical aspect, patient acceptance. Pharmaceutical additives.	07
5) Drug delivery systems: <u>Non sterile monophasic liquids:</u> a) Aromatic waters and con. aromatic waters, infusions and decoction. b) Glycerites. Solutions: Factors affecting rate of solution, preformulation and formulation development, vehicles and excipients, manufacturing process and equipment, packaging and quality control standards (including controls on raw material, in process control and finished product control) of pharmaceuticals like syrups, elixirs, linctuses, ENT preparations and paints, mouth washes, cosmetics. After-shave lotions, Hair care solutions. Unit processes and equipment used for manufacturing of non-sterile monophasic liquids: Liquid mixing, mechanism of mixing, impellers, and propeller type mixers. Tanks, baffles. Prevention of aeration and foam.	20

Section-II

1) Filtration and clarification: Factors affecting rate of filtration, filter media, filter aid : Nutsch filter, plate and frame filter, sparkle, leaf filter, rotary vacuums filter. Equipment used for manufacturing and packaging of liquids: bottle washing and machine filling equipment, belt conveyer cartooning and batch numbering, hydroextractors (basket centrifuge)	07
2) Powders and granules: Formulation, preparation and evaluation of various powders and granules. Products like dusting powder, oral rehydration power, dry syrup formulation, talcum powder, tooth powder. Equipment used in the production of powders:- a) <u>Size reduction:</u> Importance in pharmacy, factors influencing size reduction grinding mills of various types like hammer mill, multimill, conico cylindrical, ball mill, edge and end runner mill, fluid energy mill. b) <u>Size separation :</u> Sieves, sifting, size gradation, size distribution- methods	24

- of determining size distribution.
- 3) **Powder mixing**: Various types of mixers, various types of trough mixers, sigma and ribbon blenders, paddle mixers, machine like tube and double cone Planetary mixer.
 - 4) **Granule manufacturing**: Environmental control, pouch filling machine.
 - 3) **Biological products**: Sutures and ligatures. Classification into absorbable and non absorbable material, processing and manufacturing, sterilization, packing and quality control test of material like catgut and nylon. 05
 - 4) **Packaging science**: Primary and secondary packaging material- component of packages and material used in primary packaging material selection their evaluation, closure, filter proof and tamper proof packaging, child resistant packaging, blister and strip packing. 05

Total hours :

BOOKS:

Text book:

1. F. Schmidt- Libermann & König- Industrial pharmacy (Lea & Febiger)

Reference Books:

1. Pharmaceutical dosage and drug delivery systems- Ansel- Popovich & Allen- (Williams and Wilkins)
2. American pharmacy- Ditter (J.B. Lippincott)
3. Remington- The science and practice of pharmacy- Alfonso R. Gomez (Vint Publishers Co.)
4. Bentley's Text Book of Pharmaceutics- (Kawthra/FI BS)
5. Harker and Rhodes- Modern pharmaceutics-(Dekkar)
6. Groves- Parental products-(William Heinemann Medical Books Ltd)
7. Stanton- Hand Book of Package Design (McGraw Hill)
8. David Caderton- Unit processes in pharmacy (William Heinemann)
9. Industrial Pharmacy- 5th edition - Cooper and Gunn.
10. Leon Shargel- Pharmacy review (Wiley and sons)
11. Swarbrick and Boyton- Encyclopaedia of pharmaceutical technology (Dekker)
12. James J. Wells- Pharmaceutical preformulation (Ellis Horwood Ltd.)

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS

1.1-Pharmaceutics-I (Practicals)
(3hrs/week)

(With effect from July, 2001)

- A) Solutions:**
1. Aqueous iodine solution (Lugol I.P.)
 2. Tincture of iodine I.P.
 3. Magnesium citrate solution N.F.
 4. Cresol with soap I.P.
 5. Surgical chlorinated soda solution B.P.C
 6. Paracetamol pediatrics solubilized drops
- B) Aromatic waters:**
1. Conc. Dill water B.P.
 2. Dill water
 3. Conc. Anise water B.P.C
 4. Chloroform water
 5. Gripe water
- C) Glycerites:**
1. Glycerine of Boric acid I.P.
 2. Tannic acid Glycerine I.P.
 3. Glycerine of starch I.P.
- D) Syrups:**
1. Simple syrups I.P.
 2. Artificial syrup
 3. Cough syrup
 4. Flavoured syrup
- E) Elixir:**
1. Piperazine citrate elixir B.P.C
- F) Linctus:**
1. Simple linctus B.P.C
- G) Ear and nose preparation**
1. Chloramphenicol ear drop OR Gentamycin ear drop
 2. Nasal drop
 4. **Paint**
 1. Mandles paint B.P.C
- H) Liquid cosmetics**
1. After shave lotion
 2. Hair care lotion
 3. Liquid shampoo
 4. Nail Lacquer
- I) Powders:**
1. Oral rehydration powder
 2. Dry syrup
 3. Talcum powder
 4. Tooth powder
 5. Effervescent granules

BOOKS:

1. Ansel, Introduction to pharmaceutical dosage forms (Lea and Febiger)
2. Dittert, Sprouls American Pharmacy (J.B.Lipincott)
3. Martin, Remington's Pharmaceutical Sciences. (Mack)
4. Harkishan Singh, Pharmacopeias and Formularies, Vallabh Prakashan Delhi)
5. M.J. Shroff General Pharmacy Series
6. Mittal, Pharmaceutical Formulations
7. Lachman, Industrial Pharmacy (Lea & Febiger)
8. I.P., B.P., B.P.C., U.S.P.
9. Pharmaceutics-Aulton

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS.
1.2 - Dispensing of Medication & Hospital Pharmacy. (Theory)
 (3 hrs/ week)

(With effect from July, 2001)

Section - I

TOPICS	Hrs.
1) Dispensing of medication : Definition of dispensing & compounding. Good dispensing & compounding practices, fundamental operations in compounding. Containers & closures for dispensed products, labelling & storage of compounded products. Dispensing of prefabricated dosage forms, patient counselling, documentation of compounding & dispensing records	03
2) Prescription & its parts , types of prescription, responding to prescription, prescription pricing, endorsement & documentation.	05
3) Pharmaceutical Calculations :- % Calculations, Allegation method, isotonicity, proof spirit. Posology factors affecting & Calculations of doses. Weight & measures.	07
4) Compounding & Dispensing Aspects of -	22
i) Formulation & procedure for compounding & dispensing oral & external use liquids. Mouthwashes, gargles, nasal drops, syrups, sprays, enemas.	
ii) Suspensions :- Thickening agents. Diffusible & indiffusible type, oral suspensions & lotions.	
iii) Emulsions :- Emulgents, choice of emulgents, HLB values, two phase emulsion, methods of preparation (Dry & wet gum & soap emulsions.), determination of type, physical stability & factors affecting it.	
iv) Semisolids :- Ointments, Creams, Pastes, jellies, Poultrices & Plasters	
v) Suppositories :- Formulation, displacement value, compounding & evaluation.	
vi) Solid Dosage Forms :- Divided & bulk (oral & external) powders, effervescent granules Filling of Hard gelatine Capsules, dispensing of prefabricated Tablets. Capsules, Pastilles, Lozenges. Pills & tablet triturates.	
vii) Incompatibilities :- Definition, types, physical, chemical. Effect of pH, solvent, complexation, redox reactions, therapeutic incompatibility.	

Section - II

TOPICS	Hrs.
HOSPITAL PHARMACY.	
1. Hospitals - Classification, functions, organisation administration	01
2. Hospital Pharmacy - History and development	01
3. Duties and responsibilities of Hospital Pharmacist	04
4. Pharmacy and therapeutic committee.	04

5.	Hospital formulary	02
6.	Organisation, Personnel	03
7.	Purchasing procedure and inventory control	02
8.	Dispensing of controlled substances	03
9.	Central sterile service, advantages, management, plan location activities.	02
10.	Sterilisation with disposal of surgical materials Sterilisation of rubber gloves, syringes and needles, catheters, surgical instruments, powders and other materials	04
11.	Medical gases : different gases and their use in therapeutics, colour coding of cylinders, care of cylinders, accessories	04
12.	Health accessories : wheel chairs, canes, crutches, bed pans, vaporisers, syringes and needles, hot water bottles, clinical thermometers, crutches, first aid supplies, family medicine cabinet.	04
13.	Techniques in radiopharmacy and clinical applications of radiopharmaceuticals. Introduction to particulate radiation, half life, therapeutic and diagnostic radiopharmaceuticals, facilities required, protection of operators, preparation of radiopharmaceuticals kits.	03
14.	Use of computers	

TOTAL Hrs. :- 74

BOOKS

Dispensing Pharmacy

- | | | |
|----|--|--------------------------------------|
| 1. | Remington's Pharmaceutical Science- | AH. Gennaro (Mack Publishing) |
| 2. | Pharmaceutical Practice | Collett & Aulton (ELBS) |
| 3. | Dispensing of Medications | Hoover (Mack Publishing) |
| 4. | Prescription Pharmacy | Sprowls (Lippincott) |
| 5. | Pharmaceutical Calculations | Stocklosa |
| 6. | USP DI Vols. I & II | Official |
| 7. | IP, BP, USP-NF, NF_x and the
Pharmaceutical Codex | Official |
| 8. | Martindale Extra Pharmacopoeia | Official |

Hospital Pharmacy

Text Book

Text book of Hospital Pharmacy - Merchant & Qadry (B.S. Shah Prakashan)

Reference Book

Hospital Pharmacy - Hassan (Lea and Febiger)

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS.
1.2 - Dispensing of Medication & Hospital Pharmacy. (Practicals)
(3 hrs' week)

(With effect from July, 2001)

Notes :

- (i) All the prescriptions shall be in metric system except a few for practice which shall be in the imperial system
- (ii) Latest editions of books wherever applicable shall be used
- (iii) Special attention to be paid to the cleanliness and precise working (including documentation) of the candidate in the laboratory.

1 Dispensing Vs Compounding

- 2 Weighing technique for the dispensing-balance sensitivity - Weight box calibration and - accuracy. Precision of weighing and error evaluation.**

Measuring techniques - Precision and accuracy of measuring and error evaluation

Devices for accurate dosage measurement

Handling of prescription - Reading, checking, labelling and dispensing with detailing.

General Dispensing procedure - Different containers for dispensing, labelling of dispensed medicines - Documentation.

- 3. Posology and calculations**
Weights and measures
Reducing and Enlarging formulae
Percentage calculations
Dilutions and concentration (Stock solutions)
H.L.B. System
Isotonic solutions

- 4. Compounding and Dispensing with precision of the following preparations:**

(I) Powders and Granules

Compound Magnesium Trisilicate oral powder
Siedlitz powder
Isapgol granules
Effervescent granules of sodium sulphate

Zinc, starch and Talc Dusting powder
Eutectic powder containing Menthol with camphor

(ii) Solutions

Salicylic acid colloid
Paediatric ferrous sulphate oral solution
Zinc Sulphate and Zinc chloride mouth wash

(iii) Suspensions

Paediatric kaolin mixture
Magnesium Trisilicate mixture
Paediatric chalk mixture
Inhalation containing menthol and eucalyptus

(iv) Emulsions

Emulsion for internal use containing acacia
White liniment
Oily calamine lotion
Benzyl Benzoate application

(v) Ointment

Sulphur ointment
Whitfields ointment
Methyl salicylate ointment
Lubricating jelly

(vi) Suppositories

Use of displacement value
Suppository with fatty base
Suppository with PEG base

(vii) Compounding of proprietaries for the following preparations

- a) Topicals containing ointment/cream with powders, liquids and finely powdered tablets of antimycotic, antibacterial, anti-inflammatory and corticosteroids
- b) Anti diarrhoeal powder for paediatric use containing anti bacterial, antispasmodic, antiamoebic with kaolin and Pectin

- c) Mouth wash containing Thymol, Menthol, Peppermint oil and an suitable antiseptic.
- d) Scalp lotion containing Mercuric chloride panthenol and a hair conditioning agent etc.
- e) Mixture of salts excluding Sodium Chloride for use as a substitute in hypertension
- viii) Preparation of Lozenges (2), pastilles (2), pills (including Ayurvedic Pills) (3), tablet triturates (2), capsules (1).
- 6. Pre-packaging and bulk compounding of Paracetamol/Trimethoprim sulpha tablets
- 7. Drug information - Source - An exercise on drug information.

BOOKS

- 1. Prescription Pharmacy - Sprowls
- 2. Dispensing for Pharmacy students - Cooper & Gunn - 12th edition
- 3. Pharmaceutical Practice - Collett & Aulton
- 4. Dispensing of Medication - Hoover
- 5. The Extra Pharmacopoeia - Martindale
- 6. Merck Index
- 7. Remingtons Pharmaceutical Sciences
- 8. Pharmaceutical calculations - Bradley
- 9. Pharmaceutical calculations - Joel I. Zatz

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS.

1.3 - Pharmaceutical Inorganic Chemistry. (Theory)

(3 hrs/ week)

(*With effect from July, 2001*)

Section - I

TOPICS	Hrs.
1. Atomic structure - Bohr's model, wave nature of electron, Shrodinger wave equation, Quantum numbers and geometry of orbitals.	06
2. Theoretical Principles of qualitative analysis separation of cations and anions.	04
3. Mole concept, standard solutions and solubility - stoichiometry	02
4. Sources of contamination in pharmaceuticals and methods to control them. various limit tests including chloride, sulphate, arsenic, lead, iron, heavy metals. Limits of insoluble matter, soluble matter, non-volatile matter, residue on ignition and ash values. Qualitative tests for alkali and alkaline earth metals.	12
5. Introduction to the study of monographs of official compounds in I.P.	02
6. Water : Detailed study from the view point of water as Universal Pharmaceutical Vehicle.	02
7. Major extra and intracellular electrolytes and ions: chloride, phosphate, bicarbonate, sodium, potassium, calcium, magnesium, their physiological properties and uses, infusion fluids. Electrolytes used for replacement therapy sodium chloride, potassium chloride, calcium chloride, compounds to maintain acid base balance- sodium acetate, sodium lactate and ammonium chloride. Regulatory mechanisms in body.	04
8. Essential and trace elements : Iron, Copper, Zinc, Manganese, Selenium sulphur and iodine, their official compounds and uses and their role in biochemical functions and deficiency symptoms. Compounds - ferrous fumarate, ferrous gluconate, ferrous sulphate, ferric ammonium citrate, potassium iodide.	05

SECTION-II

TOPICS	Hrs
9. Gastro intestinal agents : Antacids- Sodium bicarbonate, aluminium hydroxide, magnesium carbonate, magnesium hydroxide. Protectives and adsorbents- Bismuth subcarbonate, kaolin. Cathartics - Magnesium sulphate.	08
10. Tropical agents protectives - Talc, Zinc oxide, silicon polymers, Antimicrobials and Astringents - Hydrogen Peroxide, Potassium Permanganate, Iodine solutions, sulphur, boric acid, alum.	10
11. a. Dental Products : Sodium fluoride, Sodium phosphate, CaCO ₃ , Ca ₂ HPO ₄ , Dentifrices. b. Official Gases	04

12	Expectorants, Emetics and their official compounds – Ammonium Chloride, KI, Sodium Chloride, Copper Sulphate and Antitussives	02
13	Antidotes - Sodium Nitrite, Sodium Thiosulphate.	02
14	Radio-opaque contrast media - Barium sulphate.	02
15	Buffers - Acids and Bases, buffer capacity, buffer action and buffer index and buffer used in Pharmaceuticals.	04
16	Radiopharmaceuticals - Uses of radio isotopes in health sciences, general discussion of possible applications. Radiation Dosimetry, Radioisotopes as therapeutic and diagnostic aids, method of placement, Radioisotopes used in medicinal and related applications. Iodine - 131, Phosphorous - 32, Chromium - 51, Cobalt - 60, Iron - 59. Quality Control of Radiopharmaceuticals	06
Total Hrs. :-		75

Books

- 1 Inorganic Medicinal and Pharmaceutical Chemistry - J.H. Block, E B.Roche & I.O. Soine, C.O. Wilson(Varghese Pub.)
- 2 Modern Inorganic Pharmaceutical Chemistry - C.A. Discher
- 3 Bentley and Driver's Textbook of Pharmaceutical Chemistry
- 4 Remington : The Science and Practice of Pharmacy - Alfonso R. Gennaro (Mack)
- 5 Indian Pharmacopoeia, Latest edition
- 6 Practical Pharmaceutical Chemistry Parts I & II
A.H. Beckett & J.B. Stenlake(CBS).
- 7 Vogel's Textbook of Quantitative Chemical Analysis (ELBS)
- 8 A textbook of micro & semimicro qualitative inorganic analysis by Vogel.
- 9 Human Physiology - Chatterjee

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS.

1.3 - Pharmaceutical Inorganic Chemistry. (Practicals)

(3 hrs/ week)

(With effect from July, 2001)

1. Care in Chemistry lab. Knowing grades & properties of chemicals. Care in handling hazardous chemicals.- Care and handling of balance. Calibration of weights. Precision in weighing. Use of a rider. Cleaning & drying of apparatus. Care in cleaning of volumetric apparatus. Calibration of volumetric apparatus.
2. Analysis of single basic & single acidic radicals. (2expts.)
3. Qualitative analysis of 2 cations and 2 anions - at least 05 mixtures of water soluble or dilute acid soluble ions only. No insoluble residue nor aqua-regia soluble ions to be given (Sulphide, Sulphite, Chlorate, Nitrite, Oxide ions not to be given).
4. Quantitative analysis.
 - a) Preparation & standardisation of N/10 HCl, N/10 BaSO₄, N/10 NaOH, N/10 I₂, N/10 KMnO₄ & N/10 AgNO₃. (4expts.)
 - b) Determination of the total alkali, quantity of NaOH and Na₂CO₃ in a mixture. (1expt.)
 - c) Preparation of buffer solutions and determination of buffer capacity. (1expt.)
 - d) Assays of the following compounds : (6expts.)
 - i. ZnO/CaCO₃ - by acid-base titration
 - ii. Iodine solution
 - iii. CuSO₄ by iodometry
 - iv. FeSO₄, H₂O₂, Oxalic acid by permanganometry
 - v. MgSO₄ and lead acetate by complexometry
 - vi. Sodium chloride by Volhard's and Mohr's methods.
 - vii. Lead, sulphate and nickel by gravimetry.
 - e) Limit tests for chloride, sulphate, iron, lead, heavy metals as per Pharmacopoeia. (5expts.)
 - f) Preparation of simple inorganic compounds - FeSO₄·7 H₂O, CuSO₄, MgO (By calcination of MgCO₃). (3expts.)

Books

1. Vogel's Textbook of Quantitative Chemical Analysis
2. A textbook of micro & semimicro qualitative inorganic analysis by Vogel
3. Pharmacopoeias
4. Practical Pharmaceutical Chemistry Parts I & II (A.H. Beckett and J.B. Stenlake)

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS.
1.4 - Anatomy, Physiology & Health Education. (Theory)
(3 hrs/ week)

(With effect from July, 2001)

Section - I

TOPICS	Hrs.
1) Introduction to Anatomy & Physiology	02
2) Anatomy & Physiology of following systems-----	
a) Lymphatic system - Functions, composition, formation & circulation of lymph, structure & functions of lymph glands & spleen.	03
b) Blood :- Composition & functions of blood & blood elements, coagulation & grouping of blood.	05
c) Cardiovascular system - Structure of heart, circulation of blood in body, conducting system of heart, cardiac output & peripheral resistance, cardiac cycle, blood pressure & factors affecting B.P., normal E.C.G.	08
d) Respiratory system - Parts of respiratory system & their functions, mechanism of breathing, exchange of gases, vital capacity.	04
e) Digestive system :- Anatomy of G I T. & functions of its parts, digestion of Carbohydrate, Proteins & Fats.	08
f) Urinary system - Structure & functions of organs of urinary system, formation of urine, Renin angiotensin system - Juxtaglomerular apparatus - Acid Base balance.	06

SECTION - II

TOPICS	Hrs.
1) Anatomy & Physiology of following systems-----	
a) Nervous system - Definition & classification, Structure & functions of various parts of Central nervous system & peripheral nervous system, transmission of impulses Reflex action.	08
b) Skeletal muscle :- Structure of skeletal muscle, mechanism of contraction, neuromuscular junction	02
c) Sense organs - Structure & functions of organs of Taste, Smell, Vision, Touch & Hearing.	05
d) Endocrine system - Locations, hormones & functions of various endocrine glands, negative feed back mechanism.	06
e) Reproductive system - Structure & functions of male & female reproductive system, spermatogenesis & menstrual cycle	05
2) HEALTH EDUCATION :-	
a) Definition of health & health education. Objectives, contents & principals of health education.	01
b) Family Planning :- Principles & methods of various family planning methods.	02
c) Communicable diseases :- Causative agents, mode of transmission.	04

symptoms, treatment & prevention of ---- small pox, Chicken pox, Influenza, Diphtheria, Tuberculosis, Tetanus, Hepatitis, Cholera, Typhoid, Malaria & sexually transmitted diseases.	
d) Non-communicable diseases :- Diabetes, Hypertension, Cancer.	02
e) Nutrition :- Definition of nutrition & nutrient, classification of nutrient.	01
Total Hrs. :- 69	

Text Books :

1. Ross and Wilson- Foundations of Anatomy and Physiology (ELBS Churchill Livingston)
2. Park and Park - Text book of Preventive and social medicine. (M/s Banarsidas Bharat Pub)

Reference Books :

1. Seers W., Gordon and others - Anatomy and Physiology for Nurses (Pub. Edward Arnold)
2. Jackson, S.M. - Anatomy Physiology for Nurses. (E & S Livingstones Ltd.)
3. Rowe, J. W. and others - Concise text book of Anatomy and Physiology (William and Wilkins)
4. Bocoock and Heimes - Applied Anatomy for Nurses (E & S Livingstones Ltd.)
5. Thompson T. S. - Core Text book of Anatomy (J. B. Lippincott)
6. Topic C. - Basic Human Anatomy (McGraw Hill Book Co.)
7. Chatterjee C.C. - Human Physiology Vol. 1 and 2 (Med Allied Agency)
8. Guyton - Text book of Medical Physiology (W. B. Samudus)
9. Sander A. J. and Others - Human Physiology (McGraw Hill Book Co.)
10. Health education and Community Pharmacy - P. C. Dandia, Z. Y. Zafer, Afifa Zafer

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS.
1.4 - Anatomy, Physiology & Health Education. (Practicals)
(3 hrs/ week)
(With effect from July, 2001)

1. Study of Human Skeleton - Identification of bones
2. Haematology
 - i) Determination of RBC count of blood.
 - ii) Determination of total WBC count of blood.
 - iii) Determination differential WBC count of blood.
 - iv) Determination of clotting time & bleeding time.
 - v) Determination of haemoglobin content of blood.
 - vi) Determination of blood group
 - vii) Determination of blood pressure.
3. Microscopic study of permanent slides of:
 - i) Epithelial tissue, connective, nervous & muscular tissue.
 - ii) Tongue, thyroid, testes, ovary, blood vessels, pancreas, liver, spleen, stomach, intestine, spinal cord, cerebrum, cerebellum, lungs.
4. Study with help of chart & models of following systems & organs
 - i. Digestive system
 - ii. Respiratory system
 - iii. Cardiovascular system
 - iv. Urinary system
 - v. Reproductive system
 - vi. Nervous system
 - vii. Eye
 - viii. Ear
5. Study of different family planning devices.
6. Demonstration - (Through video or through experimentation)
 1. Effect of Acetylcholine/Adrenaline/Excess Ca^{++} and Excess K^+ on isolated heart of frog.
 2. Effect of temperature & successive stimuli on simple muscle twitch recorded on frog gastrocnemius muscle- sciatic nerve preparation.

Books :

1. Ranade V.G. - Text Book of Practical Physiology

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS

1.5-Biochemistry (Theory)
(3Hrs/week)

(With effect from July, 2001)

Section-I

TOPICS	Hrs.
1. Animal Cell: Structure and functions of different organelles, nucleus, mitochondria plasma membrane, ribosome, endoplasmic reticulum, lysosome, Golgi apparatus, Biochemistry of specialized tissue, nerve, kidney, liver and muscle	04
2. Bio-Membrane: Structure of membrane, transportation, membrane receptors, membrane potential, membrane bound Adenyl cyclase, protein kinase and phosphodiesterases., Na ⁺ -K ⁺ pump, Ca ⁺⁺ ATPase, and diffusion.	06
3. Proteins and amino acids :Functions of proteins and their classification, physiochemical properties of proteins, study of amino acid, classification, acid-base property. Isoelectric point, . Essential and non-essential amino acids, peptides. Different methods for separation and purification of proteins and amino acids, ion-exchange chromatography, paper chromatography, TLC, Gel filtration, Electrophoresis, ultra centrifugation and affinity chromatography(Explain elementary idea and outline the method of separation) Protein structure at various level primary, secondary, tertiary and quaternary. Application of protein structure database in drug design.	08
4. Enzymes : Classification, mechanism of enzyme action factors affecting rate of enzymatic reaction. Activators and inhibitors of enzymes Competitive and non- competitive type of enzymes inhibition with respect to drug action. Enzyme induction and Isozymes. Pharmaceutical application of enzymes.(allosteric enzymes, coenzymes)	08
5. Vitamins and coenzymes: Structure and functions of coenzyme from water soluble vitamins folic acid, thiamin, pyridoxine, cynocobalamine, riboflavin, niacin, biotin efficacy of vitamin formulation, Role of fat soluble vitamin. A, D, E, K.	06
6. Lipids : Defination and classification , structure and significance of phospolipids, essential and non-essential fatty acids(Biological value of lipids), analysis of fat , rancidity of fat, acid value, saponification value	06

and iodine value.		
Section -II		
TOPICS		Hrs
1. Metabolism:		
A) Bioenergetics, energy flow in a biological system, common energy exchange phenomenon, energy rich substances in a biological system and their role. ATP cycle, Glycolysis (aerobic and anaerobic), TCA cycle, oxidative phosphorylation, ETC, entry of different carbohydrate in glycolysis, gluconeogenesis, pentose phosphate pathways, storage of energy in the form of glycogen.		08
B) Protein metabolism: Integration of protein metabolism with glycolysis and TCA cycle, transamination, oxidative deamination, urea biosynthesis, glucogenic amino acids, ketogenic amino acid, catabolism of individual amino acid. Synthesis of physiologically important substances from amino acid (neurotransmitters, hormones).		12
C) Lipid Metabolism: β - oxidation, oxidation of fatty acid, biosynthesis of fatty acid, study of lipoproteins and their role in lipid metabolism. Different types of lipoproteins, changes in lipoproteins profile in various disease condition.		05
2. Genetics:		13
Structure of DNA and its role as a genetic material, experimental Evidences indicating DNA as a genetic material, Whatson and crick model for DNA structure, physiochemical properties of DNA, melting of DNA. Renaturation kinetics of DNA, classification of DNA on the basis of renaturation kinetics. Different physical methods for DNA handling (centrifugation and electrophoresis) Flow of genetic information –replication, transcription, reverse transcription, translation. Drugs acting at various level Mutation and DNA repair.		
Total Hours		76

Books

Textbook

1. Outlines of biochemistry by E.E. Cohn and P.K. Stumpf
2. Fundamental of Biochemistry by A. C. Deb
3. Principles of Biochemistry by Albert Lehninger.

Reference Books

1. Biochemistry by Lubert stryer
2. Gene by Lewin
3. Molecular biology by watson.
4. Biochemistry by Devid Rawn.
5. Harpers Biochemistry by Murray, Granmer, Mayes and Rodwell

NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS

(With effect from July, 2001)

1.5-Biochemistry (Practicals)
(3Hrs/week)

	No. of Practical
1. Qualitative test for carbohydrate	(05)
2. Qualitative test for proteins	(04)
a) Precipitation.	
b) Color reaction	
3. Quantitative estimation of protein by Biuret method, Lowry method.	(02)
4. Quantitative estimation of carbohydrate by Anthrone method	
5. Calibration of volumetric ware, glassware, study of biological variation, sources of errors and expression of concentration such as normality, molarity, molality, percent etc.	(01) (01)
6. Care and use of PH-Meter and construct titration curve for amino acid alanine. Plot graph of PH verses ml. Of alkali calculate isoelectric PH of alanine	(01)
7. Determination of ascorbic acid by using 2,6-dichlorophenol indophenol	(01)
8. Determine the acid value, saponification value and iodine value of the given fat sample	(04)
9. To study the activity of salivary amylase	(01)
10. Isolation of DNA(from goat/sheep liver) and determine purity by uv-method	(02)
11. Electrophoresis: Paper electrophoresis of serum protein (demonstration)	(01)
12. Separation of amino acid by paper/ thin layer chromatography	(01)

BOOKS:

1. Practical biochemistry By David T. Plummer
2. Comprehensive viva and practical biochemistry by A.C. Deb
3. Clinical Biochemistry by Harold and Varly.

**NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS.**

1.6 - Industrial Psychology. (Theory)

(2 hrs/ week)

(With effect from July, 2001)

Section-I

TOPICS	Hrs.
1. Introduction to Industrial Psychology Definition of Psychology : subfields of Psychology; Industrial Psychology; its definition, nature and scope. History of Industrial Psychology, Premises of Industrial Psychology. Modus operandi of Industrial Psychology. Development of Industrial Psychology. Hurdles in the way of Industrial Psychology.	05
2. Personnel Selection Occupational information, individual differences. Personnel specification, its types and objectives. Methods of Job analysis. Uses of Job analysis. Types of personnel actions. Selection techniques : Application blanks, references, interview and Psychological Tests. Intelligence (otis, standord-Binet, Weehster adult Intelligence test, Multifactor test); Aptitude (DAT); Personality (Rorschaeh, TAT and MMPI).	08
3. Personnel Development Motivation : Theories of Motivation (Maslow, Vroom) Motivation & Organisation. Incentives, financial and non-financial job satisfaction. Herzberg's two factor theory. Factors affecting satisfaction. Morale and Monotony. Definition and nature of leadership. Functions of leaders. Trait theory of leadership: Managerial grid. Fieldless contingency Model.	07
4. Accident Prevention and Safety measures.	02

Section - II

TOPICS	Hrs.
5. Introduction to Sociology What is Sociology ? The relevance of sociology to industry. Personality and social behaviour, Social adjustment of workers, Definition and levels of communication, Process of communication, Types of communication, Improving communication in organisation.	05
6. Industrial Democracy	05

	What is Industrial Democracy ? Worker participation in Management.	
7.	Trade Unions Problem of trade unions in India Collective bargaining. Industrial disputes, its causes and methods to resolve.	06
8.	Science, Technology, Industry and Society Science & Technology, Impact of Science & Technology on industry and society. The role of industry in national development. Cottage, small and large scale industries. Problems of industrialisation with special reference to the Pharmaceutical industry.	06

Total Hrs. :- 44

Books

Text book

1. Bhagwatwar P.A., Psychology of Industrial and Organisational behaviour.

Reference books

1. Ghosh, P.K. & Ghorpode, M.B. Industrial Psychology.
2. Ghosh, P.K. & Ghorpode, M.B., Industrial and Organisational Psychology
3. Rao, P.K. & Thakurdesai, V.U. Industrial Psychology and Organisational behaviour.
4. Giri, V.V. Labour problems in Indian industries.
5. Trade Unionism by Varria and Dixit.
6. Industrial Psychology by V Schneider.
7. A Sociology of work in Industry by A.Fox.
8. Social Psychology by Barrew and Byrne.
9. Industrial Conflicts by A.Kornhauser, R.Dubiw and A.M.Ross.

**NORTH MAHARASHTRA UNIVERSITY, JALGAON
FIRST YEAR B. PHARMACY SYLLABUS.**

1.7 - Drug Store & Business Management. (Theory)

(2 hrs/ week)

(With effect from July, 2001)

Section-I

TOPICS	Hrs.
<p>1. Community Pharmacy a. Pharmaceutical care - Different aspects, ABCS of Pharmaceutical care, From product focus to patient focus. b. Definition of community pharmacy and community pharmacist, Code of Ethics. c. Process in Community pharmacy - Activity of pharmacist, Assimilation of pharmaceutical care in the community pharmacy, Aspiratiion of community pharmacy. d. Registered pharmacists and avenues for them. Drug store in rural and urban area, Ideal Indian community pharmacy.</p>	32
<p>2. Pharmacy as a Trade or a profession Difference between Trade and Profession - Pharmacy ethics and role of Pharmacist in Society. Business management applied to retail operations.</p>	01
<p>3. Channels of Distribution Vendors, and Doctors / Hospital suppliers - Retail Single units, Multiple units (chain stores)- Departmental stores - Wholesale Distributors, and stockists - Super stockists and other channels</p>	04
<p>4. Retail Pharmacy Planning of Retail Pharmacy Enterpreneurship, establishing a New Pharmacy, buying of an established Pharmacy. Location Analysis Classification of Location, Criteria for development of a Location, Selection of a Location. Layout Design Interior layout of a drug store, Location of a cash counter, packaging and delivery counter, Exterior layout, furniture, fixtures, lighting and colours, Traffic flow analysis, rearrangement & renovation.</p>	06
<p>5. Purchasing Policies, Methods of purchase, types of Purchases (Wholesale), Record keeping. Handling of drugs OTC, generics and ethicals, physician samples and expired goods.</p>	04
<p>6. Sales</p>	03

General Sales, Speciality products (Sale by wholesale), Supply to physicians, clinics & Hospitals, ESIS supplies, Sales promotion - Services rendered (mail order, credit system, home delivery, parking) - Marketing, Advertising & Display, Sales Analysis, Maintenance of records.	
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Section-II

TOPICS		Hrs.
1.	<p>Risks & Insurance Different types of liabilities. (e.g. Product, elevator, accidents etc.). Types of risks (e.g. fire, theft, floods, etc.). Methods of risk management, Risk dilutions, safe business practices, Insurance policies for retail and wholesale including life Insurance and Medicare. Frauds by employees, by customers, by others and their prevention</p>	04
2.	<p>Business Management. Forms of Business Organisations Hindu Undivided Family, Sole proprietorship, Partnership, Joint Stock companies and co-operative Societies.</p>	03
3.	<p>Introduction to Licences required for starting and running Drug Store - PCI approved drug store for training.</p>	03
4.	<p>Finance Management Capital Layout, requirement, methods of raising finance and deployment of funds, Control over flow of finance, areas of control - Financial accounting and record keeping. Projections of financial requirements (Budgets). Various methods of raising finance, internal and external resources, long term planning, short term loans, banking operations, types of banks and their functions and bank accounts. Financial Institutions in India and their role. Cash control, Investment expansion diversification and renovation. Use of computers: for inventory control, drug-drug interaction/ drug-food interaction, accounting and financial statement analysis, label preparations, purchasing for chain operations, for patient counselling, for a drug information centre and others.</p>	10
5.	<p>Personnel Management Pharmacist-patient relationship, Pharmacist-physician relationship, Pharmacist-wholesale distributor relationship, Pharmacist-manufacturer relationship and pharmacist-employee relationship. Human Resources Planning and Management</p>	10

Books**Text books**

1. Smith - Principles and methods of Pharmacy Management.
2. Principles of Management by Kooniz and O'Donnell.
(McGraw Hill)

Reference books

1. Tomski - Text Book of Pharmacy management (Kugan Page).
2. Drug Store Management - Nolen and Maynard
(McGraw Hill)
3. J K. Lassers "How to run a small business" - Prerau
(McGraw Hill)
4. Drug Store Operating Costs and Profile - Burley, Fisher Cox.
(McGraw Hill)
5. Effective Management by Objectives by W. J. Redin
(Tata McGraw Hill)
6. Managerial Effectiveness by W. J. Reddin
(McGraw Hill)
7. The Practice of Management by Peter Drucker
(Allied Publishers, New Delhi)
8. Dholakia, Khurana & others - Marketing Management - Cases and Ceoncepts
(McMillan)
9. Maylard - Management Handbook
(McGraw Hill)
10. R. M. Mehta - Drug Store and Management
(Vallabh Prakashan, Pune)
11. Dr. Mahesh D. Burande - Principles and Practice of Drug Store Administration.
(Nirali Prakashan, Pune)
12. Case problems in community pharmacy management by Arnold Goldstein

NORTH MAHARASHTRA UNIVERSITY, JALGAON

FIRST YEAR B. PHARMACY SYLLABUS

Sub:- Remedial Mathematics Syllabus(Theory)

(With effect from July, 2001)

**SYLLABUS FOR ADDITIONAL MATHEMATICS PAPER FOR THE
CANDIDATES ADMITTED TO B. PHARM. SCIENCE COURSE WITHOUT
HAVING OFFERED MATHEMATICS AT XII SCIENCE.**

Algebra: Laws in indices, surds definition and properties, rationalization, square root and fourth root. Logarithms, quadratic equation. Progressions, permutations and combinations, determinants and binomial theorem.

Coordinate Geometry: Distance formula, equations of a line, circle.

Trigonometry: Measurements of angles, Trigonometric ratios and simple relations conducting the complimentary and supplementary angles. Negative angles, sum and difference of two angles, sine and cosine formulae for multiple angles and half angles.

Identities: Relations between side and angles of a triangle, area of triangle, solution of triangles, general solution of trigonometric equation, ratio of circumscribed, inscribed circles of triangles, graphs.

Calculus: Functions, limits, continuity and differentiability, rules for differentiation of sum, difference, products, and quotients of function, differentiation of implicit trigonometric, composite and inverse function.

Integration as anti-derivatives, simple integration formulae e.g. x , $\sin ax$, $\cos ax$, $\tan ax$ etc, by x , e^x and a^x - method of substitution.

