



**Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad.**

**REVISED CURRICULUM  
BACHELOR OF PHARMACY  
(B. PHARM.)**

**(Including amended regulations, structure and scheme of examination)**

0.527 There shall be four Examinations leading to the Degree of Bachelor of Pharmacy namely:-

- ( i ) The First B. Pharm . Examination at the end of the First Year :
- (ii) The Second B. Pharm. Examination at the end of the Second Year :
- (iii) The Third B. Pharm. Examination at the end of the Third Year :
- (iv) The Final B. Pharm. Examination at the end of the Final Year :

0.528 The examination specified above shall be held twice a year at such places and on such dates as may be appointed by the University.

0.529 An applicant for admission to an examination specified in ordinance shall complete a regular course of study in the courses prescribed for Examination concerned for not less than one academic year in the college of Pharmaceutical Sciences recognized by the Marathwada University.

0.530 A candidate shall be admitted to the First B. Pharm. Course if he has: -



- (i) Passed the HSC (Std. XII) examinations of Maharashtra State Board of Secondary and Higher Secondary Education or its equivalent examination with

- English is one of the subjects
- Both subjects mentioned under Group – I and
- Any one of the subjects mentioned under Group – II

**Group-I**      1. Physics                      2. Chemistry

**Group-II**      1. Mathematics              2. Biology      3. Biotechnology  
4. Computer Science

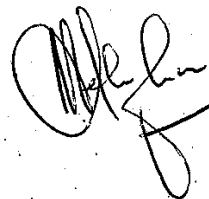
- (ii) Secured minimum 50% marks (45% for backward class candidates from Maharashtra State only) in Physics, Chemistry and the subject of maximum marks amongst the 4 subjects of Group-II, added together.

- (iii) Appeared for Maharashtra Pharmacy Common Entrance Test (MAH-PH-CET) conducted by the competent authority for the academic year and secured non zero MAH-PH-CET score.

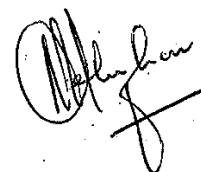
**The above eligibility criteria may be subject to change depending upon the rules and regulations of the Govt. of Maharashtra.**

0.531 A candidate shall be admitted to the Second B. Pharm if he has passed the First B.Pharm. Examination, to the Third B. Pharm, If he has passed the First and Second B. Pharm. Examination and to the Final B. Pharm, If he has passed First to Third B. Pharm examination.

0.532 An applicant for admission to an Examination shall satisfy the head of the Department/Principal in the terminal and other Test conducted during the academic year regarding his suitability to take the Examination.



- 0.533 Every candidate shall be require to undergo at least one months Practical training (continuous or in Parts) at any time after the end of the Second year B. Pharm Examination, in a Recognized Pharmaceutical Manufacturing Concern or in an Analytical Laboratory or in a Chemical Manufacturing Unit or Pharmaceutical Research Organization or Hospital (Clinical Pharmacy) failing which, he/she will not be eligible for conferment of degree by the university.
- 0.534 No person shall be admitted to any of the Examinations if he has already passed the same examination or equivalent examinations of any other statutory university.
- R.646 The structure of B.Pharm Course, scheme of Examination including the maximum marks allotted to the Sessional Examination in each paper, the written part and the practical part for each of the Four examinations, shall be as indicated in appendices A and B.
- R.647 The scope of the subject shall be as indicated in the syllabus.
- R.648 The Head of the Department of Pharmaceutical Sciences/ Principal shall maintain, in his office, a complete record of the marks obtained by the candidates in the sessional Examinations.
- R.649 The head of the Department/Principal shall send final sessional marks sercured by the candidates to the Registrar, in a sealed cover not less than 15 days before the commencement of examination.
- R.650 In order to pass an examination, an examinee must have obtained –
- (i) At least 40% of the marks in Theory (excluding Sessional Marks i.e. 32 out of 80 and 40 out of 100) and 45% of the marks in Practical (excluding



Sessional Marks i.e. 36 out of 80 and 45 out of 100) Separately in each subject and

- (ii) Must have obtained at least 50% of the total marks assigned to that examination.

R.651 ( i ) There shall be no classification of successful examinees at the First, Second and Third B. Pharm.

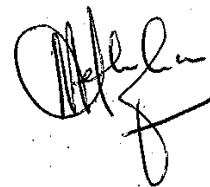
- (ii) The rank in order of merit of first five students shall be declared on the basis of the aggregate marks obtained at the Third and Final B. Pharm Examinations.

R.652 Division of successful examinee at the final B. Pharm Examination shall be declared on the basis of the aggregate marks obtained at the Third and Final B. Pharm Examinations taken together.

R.653 The following shall be the mode of Award of Class at an examination

- (i)Candidate obtaining 75% or more of Grant Total: First Class with Distinction
- (ii)Candidates obtaining 60% or more but less than 75% of Grant Total: First Class
- (iii)Candidate obtaining 50% or more but less than 60% of Grant Total: Second Class

R.654 ( i ) An examinee who is successful at an examination and obtains not less than 75% of the total marks prescribed in a subject shall be declared to have passed the Examination with Distinction in that subject.



Explanation: - Distinction in a subject will be awarded at the Third and Final B.Pharm Examination separately.

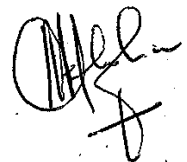
- (ii) Only those candidates who have passed an examination in one attempt will be eligible for any prize or scholarships to be awarded for that examination.

R.655 A candidate at the First, Second or Third B. Pharm examination, who fails to secure the prescribed minimum marks in not more than two theory papers and not more than two practical examinations may at, his/her option, be admitted to a subsequent examination in that paper or practical only on payment of fresh fee. An examinee under this provision shall be allowed to keep terms in the next higher class. He may take both examinations simultaneously, but his result at the higher examination shall not be declared unless he is declared successful at the lower examination.

R.656 An examinee failing in more than two theory papers and more than two practicals may at his/her option, appear as an ex-student at subsequent examination in the subject in which he has failed, on payment of fresh fee.  
If he clears the subjects in which he has failed he shall be declared to have passed the examination. An examinee availing of the exemptions under the provisions of these Regulations shall not be allowed to keep terms at the next higher class.

R.657 (i) At least, three Sessional examinations will be held by the teaching institute every year for the purpose of internal assessment. Sessional marks will be calculated as the average of the best two performances at these examinations.

(ii) A candidate failing in any of the University examinations may, at the discretion of the Head of the Department/Principal be permitted, for such period as the Head of the Department/Principal considers necessary, to



attend the course of instruction on the paper or practical in which he has failed as the case may be, in such a case the Head of the Department shall awarded to him fresh Sessional marks on the basis of his fresh performance.

- (iii) The revised curriculum (including regulations, structure and syllabi) will be in force for academic year 2006-2007 onwards for First Year B. Pharm, for academic year 2007-2008 onward for Second Year B. Pharm for academic year 2008-2009 and onward for the Third Year B. Pharm, and for academic year 2009-2010 and onward for Final Year B. Pharm.

A candidate failing in an examination with old course will have to clear that examination with old course only. He/she will have to take the subsequent higher examinations as per the carry on rule decided by the University.

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## Appendix A

### STRUCTURE OF B. PHARM COURSE.

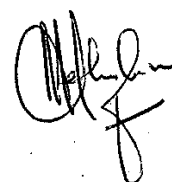
The following will be the course structure of First Year, Second Year, Third Year and Final Year B. Pharm.

#### FIRST YEAR B. PHARM

Sr. No.	Subject	Theory Hours per week	Practical Hours per week
1.1	Pharmaceutics-I	3	3
1.2	Biochemistry	3	3
1.3	Anatomy Physiology and Health Education	3	3
1.4	Pharmaceutical Inorganic Chemistry.	2	--
1.5	Dispensing of Medication and Hospital Pharmacy.	3	3
1.6	Pharmaceutical Mathematics	2	--
1.7	Computer Application	1	1 D
1.8	Pharmaceutical Organic Chemistry-I	3	3
	<b>T O T A L</b>	<b>20</b>	<b>16</b>

#### SECOND YEAR B. PHARM

Sr. No.	Subject	Theory Hours per week	Practical Hours per week
2.1	Pharmaceutics-II (Physical Pharmacy)	3	3
2.2	Pharmaceutical Microbiology	3	3
2.3	Pharmaceutical Organic Chemistry II	3	3
2.4	Pharmacognosy-I	2	--
2.5	Pathophysiology and Clinical Biochemistry.	3	3
2.6	Pharmaceutical Analysis -I	3	3
2.7	Pharmaceutical Engineering	3	--
	<b>T O T A L</b>	<b>20</b>	<b>15</b>



**THIRD YEAR B. PHARM**

Sr. No.	Subject	Theory Hours per week	Practical Hours per week
3.1	Pharmaceutical and Cosmetic Technology	3	3
3.2	Pharmacognosy II	3	3
3.3	Medicinal Chemistry- I	3	3
3.4	Pharmacology and Toxicology	3	3
3.5	Biopharmaceutics and Pharmacokinetics	2	--
3.6	Pharmaceutical Analysis II	3	3
3.7	Biotechnology	3	-
TOTAL		20	15

**FINAL YEAR B. PHARM**

Sr. No.	Subject	Theory Hours per week	Practical Hours per week
4.1	Dosage Form Design	3	3
4.2	Pharmacognosy and Phytochemistry	3	3
4.3	Medicinal Chemistry- II	3	3
4.4	Pharmacology and Bioassay	3	3
4.5	Pharmaceutical Management	3	--
4.6	Quality Assurance Techniques	3	3
4.7	Pharmaceutical Jurisprudence and Intellectual Property Rights	3	--
TOTAL		21	15

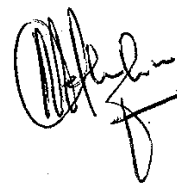


## Appendix B

### SCHEME OF EXAMINATION

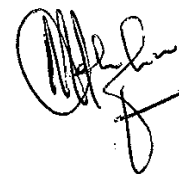
#### First Examination for Degree of Bachelor of Pharmacy Four Year Integrated Course.

Sr. No.	Subject	Theory Examination				Practical Examination			
		University		Sessional	Total Marks	University		Sessional	Total Marks
		Hrs.	Marks	Marks		Duration Hrs.	Marks	Marks	
1.1	Pharmaceutics-I	3	80	20	100	4	80	20	100
1.2	Biochemistry	3	80	20	100	4	80	20	100
1.3	Anatomy Physiology and Health Education	3	80	20	100	4	80	20	100
1.4	Pharmaceutical Inorganic Chemistry.	3	80	20	100	--	--	--	--
1.5	Dispensing of Medication and Hospital Pharmacy.	3	80	20	100	4	80	20	100
1.6	Pharmaceutical Mathematics	3	80	20	100	--	--	--	--
1.7	Computer Application	3	40	10	50	--	--	--	--
1.8	Pharmaceutical Organic Chemistry-I	3	80	20	100	4	80	20	100



**Second Examination for Degree of Bachelor of Pharmacy Four Year  
Integrated Course.**

Sr. No.	Subject	Theory Examination				Practical Examination			
		University		Sessional	Total Marks	University		Sessional	Total Marks
		Duration Hrs.	Marks	Marks		Duration Hrs.	Marks	Marks	
2.1	Pharmaceutics-II (Physical Pharmacy)	3	80	20	100	4	80	20	100
2.2	Pharmaceutical Microbiology	3	80	20	100	4	80	20	100
2.3	Pharmaceutical Organic Chemistry II	3	80	20	100	4	80	20	100
2.4	Pharmacognosy-I	3	80	20	100	-	-	-	-
2.5	Pathophysiology and Clinical Biochemistry.	3	80	20	100	4	80	20	100
2.6	Pharmaceutical Analysis -I	3	80	20	100	4	80	20	100
2.7	Pharmaceutical Engineering	3	80	20	100	--	--	--	--



**Third Examination for Degree of Bachelor of Pharmacy Four Year  
Integrated Course.**

Sr. No.	Subject	Theory Examination				Practical Examination			
		University		Sessional	Total Marks	University		Sessional	Total Marks
		Duration Hrs.	Marks	Marks		Duration Hrs.	Marks	Marks	
3.1	Pharmaceutical and Cosmetic Technology	3	80	20	100	4	80	20	100
3.2	Pharmacognosy II	3	80	20	100	4	80	20	100
3.3	Medicinal Chemistry- I	3	80	20	100	4	80	20	100
3.4	Pharmacology and Toxicology	3	80	20	100	4	80	20	100
3.5	Biopharmaceutics and Pharmacokinetics	3	80	20	100	--	--	--	---
3.6	Pharmaceutical Analysis II	3	80	20	100	4	80	20	100
3.7	Biotechnology	3	80	20	100	--	--	--	--



**Final Examination for Degree of Bachelor of Pharmacy Four Year Integrated Course.**

Sr. No.	Subject	Theory Examination				Practical Examination			Total Marks
		University		Sessional	Total Marks	Unviersity		Sessional	
		Hrs.	Marks	Marks		Duration Hrs.	Marks	Marks	
4.1	Dosage Form Design	3	80	20	100	4	80	20	100
4.2	Pharmacognosy and Phytochemisty	3	80	20	100	4	80	20	100
4.3	Medicinal Chemistry- II	3	80	20	100	4	80	20	100
4.4	Pharmacology and Bioassay	3	80	20	100	4	80	20	100
4.5	Pharmaceutical Management	3	80	20	100	--	--	--	--
4.6	Quality Assurance Techniques	3	80	20	100	4	80	20	100
4.7	Pharmaceutical Jurisprudence and Intellectual Property Rights	3	80	20	100	--	--	--	--

The university Theory Question paper of 80 marks will be set according to the following pattern

**Section – I (40 Marks)**

Compulsory question	
Question No. 1	10 Marks
Optional questions (Solve any two)	
Question No. 2	15 Marks
Question No. 3	15 Marks
Question No.4	15 Marks

**Section – II (40 Marks)**

Compulsory question	
Question No. 5	10 Marks
Optional questions (Solve any two)	
Question No. 6	15 Marks
Question No. 7	15 Marks
Question No. 8	15 Marks

The University Practical Question paper of 80 marks will be set according to following pattern

Question No. 1 Synopsis	10 Marks
Question No. 2 Viva	10 Marks
Question No. 3 Practical (Major and /or Minor)	60 Marks



**Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad.**

**FIRST YEAR BACHELOR OF PHARMACY  
(F.Y.B. PHARM.)  
SYLLABUS**

**Subject index**

Sr. No.	Subject	Theory Hours per week	Practical Hours per week
1.1	Pharmaceutics-I	3	3
1.2	Biochemistry	3	3
1.3	Anatomy Physiology and Health Education	3	3
1.4	Pharmaceutical Inorganic Chemistry.	2	--
1.5	Dispensing of Medication and Hospital Pharmacy.	3	3
1.6	Pharmaceutical Mathematics	2	--
1.7	Computer Application	1	1 D
1.8	Pharmaceutical Organic Chemistry-I	3	3

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.**  
**Syllabus for First year B. Pharm.**

1.1

Subject: Pharmaceutics I (Section A)

Theory		3 hrs./week	
1	Pharmacy profession	Pharmacy as a career, evolution of Pharmacy profession, earlier period, middle to modern ages	1
2	Introduction to Pharmaceutics	Definition, importance of Pharmaceutics, areas concerned, scope of Pharmaceutics, history & development of profession of Pharmacy & Pharmaceutical industry in India. A brief review of present Indian Pharma industry in global perspective	2
3	Introduction to dosage form	Definition of drug, new drug & dosage form. The desirable properties of a dosage form, the need of dosage form, Idea about available types of dosage forms and new drug delivery system.	4
4	Route of administration	Routes of administration with respect to dosage form design, physiological consideration for various routes of administration.	3
5	ADME	Scheme of fate of dosage form after its administration. Definition and Introduction to concept of absorption, distribution, biotransformation & elimination of drug (without mathematical equation/factors affecting absorption). Introduction of Bioavailability & various equivalences referring plasma-time profile of drug.	3
6	Sources of drug information	Introduction to Pharmacopoeia with reference to I.P., B.P., U.S.P. & International Pharmacopoeia: Study of structure/ features (index), general notice & components of monograph of excipient, drug and drug product. Other sources: Textbook, journals, internet (drug information system, online database, patient, consumer information & non-print material. Classification of information: primary, secondary & tertiary. Nomenclature of drugs.	4
7	Unit operation in manufacturing	Filtration and Clarification: Factors affecting rate of filtration and clarification, filter media, filter aids, Leaf filter, Plate and frame filter, Nutsch filter, Rotary drum filter and Membrane filters.	2
8		Introduction to terms like Dessiccation, Exsiccation, Efflorescence, Deliquescence, Hygroscopic, Sublimation & Freeze drying.	1
9		Size reduction: Importance in Pharmacy, factors influencing size reduction, grinding mills of various types like Hammer mill, Ball mill, edge and end runner mill and Fluid energy mill.	3
10		Size separation: Sieves, sifting, size gradation, size distribution and determination of size distribution by sieving, cyclone separator, ellutriators and sedimentation technique..	2
11		Powder mixing: Mechanism of solid-solid, solid-liquid mixing, various types of trough mixers-- Sigma mixer, Ribbon mixer, Planetary mixer and Tumbler mixer like Cube, Double and Slant double cone.	3
12		Equipment used for manufacturing and packaging of liquids: Bottle washing machine, filling equipment, belt conveyors, cartoning and batch numbering.	2
	Allopathic dosage forms	Merit / demerit, importance, formulation development - vehicles / excipients with examples for the following dosage forms (No QC tests):-	
13		Solid dosage form: Powder, Capsules & Tablet.	4
14	<u>Section B</u>	Liquid dosage form: Monophasic liquid D. F.: Aromatic water, Syrup, Elixir, Linctus, Lotion, Liniments, Glycerites, Solutions, Spirits, ENT preparation, Mixtures, Paints, Mouthwash.	14 (SECTION B)
15	Crude extracts	Infusion, decoction, maceration, percolation, tincture & extract. Methods of preparation of dry, soft & liquid extract.	3
16	Allergenic extract	Types of allergens, preparation of extract, testing & standardization of extracts.	2
17	Ayurvedic System of Medicines	Theory, basic concept, diagnosis, various branches of treatment in Ayurveda, types of drugs formulation in Ayurveda and Important Ayurvedic drugs and their uses. Formulation of asavas, arishtas, watika, churma, taila, ghruta, lep	4

S.R. Lokar

P.K. Kulkarni

Maddi  
S.R. Stali

Kishore

K. S. Somani  
2015/06  
[K. S. Somani]

A. K. Somani

18	Homeopathic System of Medicines	Theory, basic concept, diagnosis, treatment, sources of Homeopathic medicines and Important Homeopathic drugs and their uses.	3
19	Siddha System of Medicine	Theory, basic concept, diagnosis, treatment, diet, various Siddha forms of drugs, Important Siddha drugs and their uses.	2
20	Unani System of Medicines	Theory, basic concept, diagnosis, Unani medicines, various Unani forms of drugs and their uses.	2
21	Aromatherapy	Theory, basic concept, diagnosis, treatment and aromatic oils used in various disorders.	1
22	Biological products	Absorbable & non-absorbable materials types, sutures & ligatures, processing, manufacturing, sterilization, packaging, QC tests of materilas like catgut & nylon.	4
23	Packaging	Primary & Secondary packaging , components of packages like container, closures, boxes, ideal package, Packaging material selection & their evaluation. Closures- Types. Pilfer proof & tamper proof packaging & child resistant packaging.	4
24	GMP	Introduction to GMP, QC & QA.	2

**References**

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 Jain NK and Sharma SN, " A Text book of Professional Pharmacy", Vallabh Prakashan, ND.

*S.R. Lohan*      *YD*      *Mouli*      *anup*

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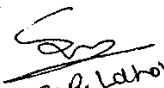
**Subject: Pharmaceutics - I**  
**Expt. No List of Practicals** **3 hrs./week/batch**  
*Note: Wherever possible, perform desirable inprocess & finished product quality control test like pH, density, organoleptic properties, viscosity, flow properties etc.*

1	<b>Introduction</b>	Good Laboratory Practice
2	<b>Solutions</b>	Strong solution of ammonium acetate IP, strong solution of iodine IP, aqueous solution of iodine IP,
3		Solution of ferrous iodide BPC, coal tar solution IP,
4		Cresol with soap solution IP, surgical chlorinated soda solution IP.
5	<b>Aromatic water</b>	Camphor water, cinnamon water IP,
6		Peppermint water BP, conc. Peppermint water BP,
7		Dill water IP, conc. Dill water IP, chloroform water IP.
8	<b>Glycerites</b>	Glycerin of boric acid IP, Glycerin of borax IP,
9		Glycerin of tannic acid IP, Glycerin of starch IP.
10	<b>Syrups</b>	Simple syrups, syrup of lemon IP,
11		Syrup of vasaka IP, syrup of tolu IP, compound syrup of ferrous phosphate IP
12	<b>Infusions</b>	Infusion of quassia IP, conc. Compound infusion of chirata IP, conc.
13		Compound infusion of quassia BP.
14	<b>Spirits</b>	Aromatic spirit of ammonia IP, spirit of pudina IP, spirit of nitrous ether IP.
15	<b>Tinctures</b>	Tincture of orange BP, compound tincture of benzoin IP, compound tincture of cardamom IP.
16	<b>Liniments</b>	White liniment IP
17	<b>Lotion</b>	Calamine lotion IP.
18	<b>Elixir</b>	Piperazine citrate elixir BPC, cascara elixir BPC, Paracetamol elixir pediatric BPC.
19	<b>Linctus</b>	Simple linctus BPC
20	<b>EENT</b>	Gentamicin eye drop, chloramphenicol ear drop, ephedrine sulphate nasal drop.
21	<b>Paints</b>	Mandles paint BPC
22	<b>Powder</b>	Oral rehydration powder, dry syrup formulation for reconstitution.
23	<b>Ayurvedic</b>	Asava, arista,
24		Taila.
25	<b>Homeopathic</b>	Preparation & standardization of one mother tincture, potentization of preparation

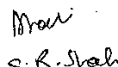
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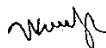
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Remington: The Science & Practise of Pharmacy, Alphonso Gennaro (Mac publishing company)  
Cooper and Gunn "Dispensing for Pharmaceutical students" S. J. Carter

  
S. R. Lakshmi

  
P. R. Lakshmi

  
S. R. Shah





**Dr. Babasaheb Ambedkar Marathwada University,**  
**Aurangabad**  
**Syllabus for B.Pharm First Year**  
**1.2 Biochemistry**

THEORY

3hrs / week

**Section A**

Sr.No.	TOPIC	Hours
1	<b>Biochemistry – Introduction &amp; Scope</b> Animal Cell Structure And Cell Organelles with Functions – Nucleus, mitochondria, plasma membrane, ribosome, endoplasmic reticulum, lysosome, Golgi apparatus, Na <sup>+</sup> K <sup>+</sup> pump, Ca <sup>++</sup> ATPase	3
2	<b>CARBOHYDRATES</b> – Introduction, Definition, Classification Mono, Di, Polysaccharides. General Chemistry of Carbohydrates with their Biochemical functions. Chemical Reactions of monosaccharides regarding their separation from each other. E.g.: - Reaction with phenolic compound and osazone formation.	6
3	<b>Proteins and amino acids :-</b> Definition of proteins with their functions and classification based upon solubility. Protein structure at various level i.e. primary, secondary, tertiary, quaternary. Application of protein structure database in drug design, Selected reactions of proteins and amino acids (colour reactions.) Classification of amino acids based on structure, polarity and nutrition, Isoelectric point, Essential and non-essential amino acids, peptides. Different methods of separation and purification of proteins and amino acids like chromatography, electrophoresis and centrifugation.	7
4	<b>Lipids :-</b> Definition and classification, structure and significance of phospholipids, Essential and nonessential fatty acids, biological value of lipids, analysis of fat, acid value, saponification value, iodine value, types of lipoproteins, changes in LP profile in various disease condition.	5
5	<b>Enzymes :-</b> Definition Nomenclature , properties and classification mechanism of enzymes action. (Km) Lineweaver plot. Factors affecting rate of enzymatic reaction. Activators and inhibitors of enzymes. Competitive and non-competitive inhibition with respect to drug action. Enzyme induction and Isozymes with clinical importance . Pharmaceutical application of enzymes.	7
6	<b>Vitamins and coenzymes :-</b> Structure , functions and biochemical role of coenzymes from water soluble vitamins – Thiamine Riboflavin, Niacin , Pantothenic acid, Pyridoxine, Biotin Folic acid, Cyanocobalamine and vitamin C. Biochemical role and structural role of vitamin A, D, E., K.	8
7	<b>Nucleic acid</b> : Nucleosides, Nucleotides, Phosphodiester bond Structure of DNA and RNA , Nucleic acids with their classification structure, functions , separation and characterization technique, Functions of nucleotides, important nucleotides with their structure.	4

**Section B**

Sr.No.	TOPIC	Hours
1	<b>Carbohydrate Metabolism :-</b> Glycolysis (aerobic, anaerobic), Regulation, Energetics. TCA cycle – function, regulation, significance, inhibitors. Gluconeogenesis regulation, significance, Glycogenolysis, Glycogenesis, HMP pathway with medical importance and energetics, separation and characterization techniques.	7
2	<b>Proteins and amino acid Metabolism:-</b> Biochemical reactions of amino acids, Transamination, Oxidative and Non-oxidative deamination, Deamidation and decarboxylation with example, Urea and their clinical importance, Glucogenic and ketogenic amino acids. Physiological importance of substances from amino (neurotransmitters, hormones)	6
3	<b>Lipid Metabolism :-</b> Biosynthesis of fatty acids, $\beta$ Oxidation of fatty acids, formation ketone bodies, Prostaglandins and their biochemical role. Cholesterol metabolism and biosynthesis.	8
4	<b>Bioenergetics &amp; Biological Oxidation:-</b> Definitions, Energy yielding reaction, Redox potential, Energy rich compounds, Respiratory chain, Oxidative Phosphorylation with its mechanism and energetics, Cytochromes and its functions.	4
5	<b>Genetics :-</b> Detail study of human genome, Genetic code, Protein biosynthesis (Transcription, Translation, Replication), Inhibition of protein synthesis, Regulation of gene expression.	10

**PRACTICALS**

Sr.No.	TOPIC	Hours Expts.
1	Expression of concentration such as normality , morality, molality, percent, gms/liters etc. Preparation of standard buffers (citrate, phosphates, carbonate)	1
2	Qualitative tests for carbohydrates (Glucose , Fructose , Galactose , Lactose , Maltose , Sucrose , Starch , Glycogen)	6
3	Qualitative tests for proteins Precipitation reactions Colour reactions Identity tests for albumin, globin, casein and peptone	5
4	Qualitative tests for lipids and cholesterol	1
5	Quantative estimation of carbohydrate by Folin-Wu method and Summar's method	1
6	Quantative estimation of total protein by Biuret method and Folin method.	2
7	Quantative estimation of DNA and RNA by Diphenylamine method and orcinol method respectively	2
8	Quantative estimation of amino acids by Ninhydrin method	1
9	Isolation of casein from milk	1
10	Isolation of albumin from egg.	1
11	Isolation of cystine from hair	1
12	Separation of albumin and globulin from egg by precipitation method.	1
13	To determine isoelectric point of amino acids by (Alanine, Glycine) by pH method.	1
14	Separation of amino acids by TLC method.	1
15	Separation of Lipids by TLC method.	1
16	Electrophoresis of serum protein - Demonstration	1
17	Study of activity of Salivary amylase enzyme	1

**Reference Books for Theory:**

1. Outlines of Biochemistry – E.E. Cohn and P. K. Stumpf
2. Harpers Biochemistry – R.K. Murry
3. Fundamentals of Biochemistry – A.C. Deb
4. Textbook of Biochemistry – Dr. O.P. Agrawal
5. Textbook of Biochemistry – U. Satyanarayanan
6. Textbook of Medical Biochemistry - Dr. Rana Shinde
7. Textbook of Biochemistry and Human Biology – G.P. Talwar
8. Biochemistry – Lubert Lehninger
9. The tools of Biochemistry - Cooper
10. Biochemistry – Zubay
11. Biochemistry - Lippincotts
12. Biochemistry – Lubert Stryer

**Reference Books for Practical :**

1. Practical Biochemistry - David T. Plummer
2. Practical Biochemistry – J. Jayraman
3. Practical Biochemistry – Varley
4. Practical Biochemistry – A.C. Deb
5. Basic Separation Techniques in Biochemistry – Okotore R.D.

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*M. S. S. S.*  
(N. Saraf)  
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## Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

**Subject: Anatomy Physiology and Health Education (Theory)      75 hrs., 3 hrs./week**

### Section A

S.N.	Course	Hrs.
1.	Introduction to Human body: Relation to Pharmacy, terminologies, principal systems and their functions	2
2.	Cell and tissues: Cell and its structures, functions. Types of tissues	2
3.	Integumentary system: Skin structure and function, thermoregulation.	2
4.	Blood: Composition, formation, functions of blood, coagulation mechanism, blood group, blood transfusion and complications and its safety measures.	5
5.	Cardiovascular system: Structure, functions, conducting system, physiology of cardiac muscle contraction, cardiac output, blood pressure, cardiac cycle, neuro-humoral control of heart, ECG, structure and functions of vascular system.	9
6.	Lymphatic system: Structure and function of lymphatic system, spleen, lymph gland.	2
7.	Respiratory system: Parts, functions, mechanism of breathing, exchange of gases, neural control of respiration, Lung function tests.	6
8.	Urinary system: Structure and function of urinary system, mechanism of urine formation, role of kidney in regulation of blood pressure.	6
9.	Fluid electrolyte and acid base balance: Mechanism, regulation and applications	2
	<b>Total</b>	<b>36</b>

### Section B

S.N.	Course	Hrs.
10.	Digestive system: Structure and functions of gastrointestinal system and accessory structures of GIT like salivary gland, liver and pancreas, mechanism of digestion and absorption.	6
11.	Metabolism: Basal metabolic rate, energy production, minerals, hormones and vitamins.	3
12.	Nervous system: Structure and functions of brain, spinal cord, peripheral nervous system, neuronal pathways, spinal and cranial nervous, autonomous nervous system, cerebrospinal fluid, electroencephalograph, receptors and neurotransmitters, role of hypothalamus is nervous system.	8
13.	Special senses: Structure, functions and mechanism of olfactory, gustatory, optic, auditory, tactile sensation.	2
14.	Endocrine system: Structure, functions and regulatory mechanism of endocrine glands like pituitary, thyroid, parathyroid, adrenal, pancreas, testis, ovary.	5
15.	Reproductive system: Structure and function of male and female reproductive system, spermatogenesis and menstrual cycle, pregnancy and lactation.	4
16.	Osteology: Structure and functions of bones and joints, formation of bone.	2
17.	Skeletal muscle: Structure and sliding mechanism of muscle contraction.	1
18.	Health education: Definitions, types, principles underlying health, determinants of health, preventions of disease, immunization and vaccination, Family planning methods, role of Pharmacist in health education, recent concepts in health education.	8
	<b>Total</b>	<b>39</b>

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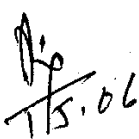
## Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

### Subject: Anatomy Physiology and Health Education (Practical)

S.N.	Title
1.	Study of microscope, its working etc, and other instruments.
2.	Methods of collection of blood sample, anticoagulants, storage of blood sample, safety measures.
3.	Estimation of hemoglobin contents and oxygen carrying capacity of blood
4.	Estimation of total erythrocyte count, mean corpuscular volume, mean erythrocyte hemoglobin, mean corpuscular hemoglobin concentration, color index of blood.
5.	Estimation of total leucocytes count
6.	Preparation of blood smear slide and its examination.
7.	Staining of blood smear slide and estimation of differential leucocytes count
8.	Estimation of clotting time and bleeding time
9.	Estimation of blood group and typing
10.	Estimation of erythrocyte sedimentation rate and friability of blood.
11.	Spirometry: Estimation of vital capacity, tidal volume etc.
12.	Listening of heart sound, recording of blood pressure, pulse rate and body temperature.
13.	Electrocardiogram and electroencephalogram
14.	Osteology: Study of skull
15.	Osteology: Study of axial skeleton
16.	Osteology: Study of appendicle skeleton
17.	Histology: Tissues and muscles
18.	Histology: Digestive and respiratory organs
19.	Histology: Urinary and nervous system
20.	Histology: Reproductive organs
21.	Study of museum specimens (at least 10 from different system) / Visit to the anatomy dissection hall
22.	Study of charts (at least 10 from different system)
23.	Study of contraceptive device and vaccines etc. – demonstration.
24.	Study of working of physiograph / Ploygraph – demonstration.
25.	Study the effects of electrolytes (Potassium and calcium) and neurotransmitters (adrenalin and acetylcholine) using frogs heart – demonstration using video tape, computer software and batch practical.







**Reference Books:****Theory :**

- Tortora G.J., Anagnostikos N.P.: Principles of Anatomy and Physiology, Harper & Row Publishers, New York
- Miller M.A., Drakantoids A.B., Leavell L.C.: Kimber-Gray-Stakpole's, Macmillam Publishing Co., New York
- Vander A.J., Sherman J.H., Luciano D.S.: Human Physiology (Tata Mc Graw Hill Publishing Co., New York
- Chakrabarti B.K., Ghosh H.N., Sahaha S.N.: Human Physiology, New Book stall, Calcutta
- Ganong W.F.: Review of Medical Physiology, Prentice Hall International, London
- Keele C.A., Neil E., Joels N.: Samson Wright's Applied Physiology, Oxford University Press
- Guyton A.C.: Text Bokk of Medica; Physiology, W.B.Saunders Co. Philadelphia
- Mc-Naught A.B., Callander R.: Illustrated Physiology, B.I.Cgurchill, Livingstone, New Delhi
- West J.B.: Best and Taylor's Physiological Basis of Medical Practice, Williams and Wilkins Baltimore
- Mountcastle: Medical Physiology
- Chatterjee C.C.: Human Physiology, Medical Allied Agency, Calcutta
- Park J.E., Perk K.: Text Book of Prevetive and social Medicine, M/S Bhanot Publishers, Jabalpur
- ChaurasiaB.D.: Human Anatomy, Regional and applied, CBS Publisher, New Delhi
- Creager J.G.: Human Anatomy and Physiology, WC Brown Publisher
- Martini: Fundamentals of Human Anatomy and Physiology, Prentice Hill
- Martini: Human Anatomy, Prentice Hill
- Keele, Neil, Joels: Samson Wrights Applied Physiology, Oxford University Press
- Sircar S: Medical Physiology, CBS Publications
- Schmidt R.F, Thews G: Human Physiology, Springer Verlag
- Datta A.K., Essentials of Human Anatomy, Current Book International
- Shalya S: Human Physiology, CBS Publisher and distributors
- McNaught A.B., Callander R: Illustrated Physiology, Churchill Livingstone.
- Parmar N.S.: Health Education and Community Pharmacy, CBS Publisher and distributors



**Practical:**

Ranade V.G., Prashan S., Joshi P.N.: A Text Book of Practical Physiology, Pune Vidyarthi  
Graha Prakashan, Pune

Goyal R.K., Patel N.M., Shah S.A.: Practical Anatomy and Biochemistry, B.S.Shah Prakashan,  
Ahmedabad

Anatomy and Physiology Laboratory manual, Mosby

Di Fiore Mariano S.H.: Atlas of Normal Histology, Lea and Febriger Philadelphia

Deb A.C.: Fundamental of Biochemistry, New Central Book Agency, Calcutta

Chaurasia B.D.: Human Osteology, CBS Publisher and Distributors, New Delhi

Singh I.B.: Text of Histology, CBS Publisher and Distributors, New Delhi

Ghai C.L.: A Text Book of Practical Physiology, Jaypee Publication

Inderbir Sing: Text Book of Human Histology, Jaypee Publication

Jain A.K.: Manual of Practical Physiology, Arya Publication.



**Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad.**

**1-4 PHARMACEUTICAL INORGANIC CHEMISTRY  
(Theory)**

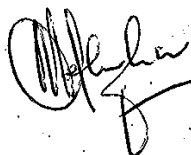
2hrs/week 50hrs

**SECTION A**

1. Pharmacopoeia and Monograph- Different pharmacopoeias and general contents of official monograph. **3hrs**
2. Impurities and factors affecting the purity of pharmaceuticals, Limit test for chlorides, sulphates, arsenic, iron, lead, heavy metals as per I.P. **6hrs**
3. Water- Hardness of water, method to remove hardness of water, different official waters, official tests for quality control of water. **2hrs**
4. Nuclear Chemistry-Structure of Nucleus, Methods of nuclear radiation measurement, Nuclear reactions, fusion and fission, Radiation dosimetry, Radioopaque contrast medium. (Therapeutic and diagnostic applications of radiopharmaceuticals, Iodine 131, Phosphorous -32, Chromium-51, Cobalt-60, Iron-59, Tc 99 Quality control of radiopharmaceuticals.) **5hrs**
5. Electrolytes- Extra and intracellular ions: Chloride, Phosphate, Bicarbonate, Na, K, Ca, Mg. Electrolytes used for replacement therapy, physiological acid base balance, Electrolytes used in acid base therapy, Electrolytes combination therapy. Sodium chloride injection, Ringer solution lactated, Ringer injections, Sodium acetate, potassium acetate, sodium bicarbonate, potassium bicarbonate, sodium citrate, sodium lactate, ammonium chloride. **6hrs**
6. Antidote classification, sodium thiosulphate, sodium nitrite **1hr**
7. Dental products **2hrs**

**SECTION B**

8. Pharmaceutical Aids and Necessities- Acids, Bases, Buffers, Antioxidants, Preservatives, Adsorbents, Diluents, Excipients, Suspending agents, Colors and Flavors. **4hrs**
9. Essential and Trace ions- Absorption, Distribution, Physiological role. Official compounds of Fe, Cu, Zn, Mn, I



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- Fe- Ferrous sulphate, Iron sorbite injection, Ferric ammonium citrate, Ferric chloride  
Cu- Copper sulphate  
I- Iodine, Potassium Iodide, Sodium Iodide.  
Zn- Zinc sulphate. **6hrs**
10. Gastrointestinal agents: Acidifiers, Hydrochloric acid, Antacids- sodium bicarbonate, aluminum hydroxide, magnesium carbonate, magnesium hydroxide. Protective and adsorbents- Bismuth subcarbonate, kaolin. Laxatives, purgatives and cathartics- Magnesium sulphate. **6hrs**
11. Topical agents: Protectives- Talc, Zinc oxide, Silicon polymers, Anti microbial and Astringents- Hydrogen peroxides, potassium permanganate, iodine solutions, sulphur, boric acid, alum **5hrs**
12. Expectorants: Emetics and their official compounds- Ammonium chloride, potassium iodide, sodium chloride, copper sulphate and antitussives. **2hrs**
13. Important official gases used in Pharmacy Oxygen, Nitrogen, Nitrous oxide, Carbon dioxide, Helium, Ammonias and their compounds as per I.P. **2hrs**

### Reference 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 Part I & Part II- A.H. Beckett & J.B. Stanlake (CBS)
7. Vogel's Textbook of Quantitative Chemical Analysis (ELBS)
8. A textbook of micro & semi micro qualitative inorganic analysis by Vogel.
9. Human physiology- Chatterjee.

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## Syllabus for First year B. Pharm.

Subject: Dispensing of Medication &amp; Hospital Pharmacy.

Theory

3 hrs/week

## 1.5 DISPENSING OF MEDICATION (Section A)

S.No.	Topic	Sub Topic	Hrs.
1	Introduction	Introduction to dispensing, Compounding and Hospital pharmacy.	2
2	Prescription	Definition, Parts, Stages in handling, methods for pricing, Ideal prescription.	4
3	Weight and measures system	Imperial and metric system, Their inter-conversion, common household measures.	2
4	Pharmaceutical Calculations	Percentage Calculations, Allegation method, Proof spirit, Isotonic solutions, Dosage calculations (including factors affecting dosage calculations), Dilutions, Reducing and enlargement of formula,	6
5	Fundamental operations in compounding.	Weighing and measuring techniques, Different types of balances, Measurement apparatus, Mixing, Dissolution, Size reduction, Filtration, Size separation (only for dispensing)	2
6	Labeling techniques for dispensing	Requirement for labeling of dispensed medications, Labels for different types of dosage forms with specific directions, caution or advice, Storage conditions, Definitions of various terms of storage conditions. Concept of Shelf life & Expiry.	2
7	Containers and closers for dispensing of medications.	Definitions of primary, secondary and tertiary packaging, ideal package, Different types of glass and glass containers for dispensing, Plastic and aluminum packaging materials, Unit dose and multi dose packaging.	3
8	Incompatibility	Definitions, types, With examples and corrections. (from Cooper and Gun's Dispensing Pharmacy)	3
9	Compounding and dispensing of following dosage forms.		
a	Solutions	Definition, formulation and compounding, solution for oral use, dilution of solution, solution to be instilled in to body cavity, solution for external use with examples, containers, storage, shelf life.	2
b	Emulsion and creams	Definitions, types, identification, Emulsifying agent classification with examples, choice of emulsifying agent for oral and internal use, HLB value its use and calculation, preparation of emulsion by Dry gum, wet gum and bottle method. Emulsion for oral use (acacia emulsion), Emulsion for external use (liniments, lotions, applications). Definition of cream, general method for preparation of creams, dilution of creams, storage, containers, and shelf life.	3
c	Suspension	Definition, Advantages and limitations, types, suspending agents, desirable properties of suspension, compounding of suspension containing diffusible substances and indiffusible substances, poorly wetttable solids, suspension containing precipitate forming liquid and volatile oil for inhalations. Shelf life, containers, labeling, directions. and storage.	3
d	Ointments/ pastes	Definitions, ointment bases with properties, advantages, limitations and examples, additives in the ointments, method of preparation, Containers and packing, directions and storage.	3
e	Plasters and poultices	Definitions, different types of plasters and their uses, Kaolin poultice.	2
f	Gels	Definitions, different types, Method of preparation, different gelling agents used. Containers and packing, directions and storage.	2

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## (Section B)

g	Powders	Definitions, Advantages and limitations, Classification, characteristics of powders, Method of preparation for compound bulk powder, its packing, Powders for external use dusting powders, dentifrices, insufflations, douches, Wrapping techniques, double wrapping. Definition of granules, general method of preparation, advantages of granulations, Effervescent granules- its composition, preparation, and packing, directions and storage.	3
h	Suppositories and passaries.	Definitions, Advantages and limitations, Different types of bases used with advantages, limitations and examples, concept and calculation of displacement value, description of mould, mould calibration, mould lubrication, method of preparation with coca butter and glycero-gelatin bases, PEG bases, Containers and packing, directions and storage.	3
i	Capsules	Definitions, different types, Sizes of hard gelatin capsules, Method of filling-manual method, hand operated capsule filling machine, Simple capsule filling apparatus. Containers and packing, directions and storage.	2
j	Tablets triturates & tablets	Dispensing & compounding of tablet triturates. Dispensing from bulk containers, packing, and directions.	1
k	Pills	Definitions, Advantages and limitations, Major ingredients, method of preparation, Containers and packing, directions and storage.	1
l	Lozenges and pastilles	Definitions, Comparison, Major ingredients, method of preparation, Containers and packing, directions and storage.	1
<b>HOSPITAL PHARMACY</b>			
10	Introduction to Hospital	Definition, Types, Functions, Layout of hospital Organization (No details of each Dept.)	2
11	Introduction to Hospital Pharmacy.	Definition, History and development, layout and manpower requirement, Objectives and Scope.	1
12	Functions and responsibilities of Hospital Pharmacists	For Inpatient (For patient care areas, Direct patient care, Central dispensing areas and general), Out / ambulatory patients.	1
13	Patient Counseling and communication skill.	Need for counseling, areas for counseling to the patient. Counseling for inpatient, out patient and while discharge of patient. Assumptions and expectations in communications, Techniques for effective communications, barriers and problems in the communications (only related to patient counseling),	2
14	Pharmacy and therapeutic committee	Definition, Objectives, Composition, working, Functions, Role in Drug Safety, Adverse drug monitoring and developing emergency drug list.	2
15	Hospital Formulary	Definition, objective, Advantages and limitations, Method and rules for preparation and Contents	1
16	Dispensing procedures and drug distribution systems.	For In patients. Out patients. Controlled medications, for hospital wards and emergency situations.	3
17	Central sterile services dept.	Definition, objective, functions, Advantages, management, location Lay out, Flow of materials, Staff required.	1
18	Sterilization in hospital pharmacy.	Introduction to diff. methods of sterilizations, (No details of equipments and workings.), Sterilization method for Powders, ointment, rubber Gloves, syringes, needles, catheters, surgical materials (cotton and bandeges),	2

19	Medical Gases	Definition, Different examples, Color-coding, Accessories required for gas therapy. Therapeutic applications.	2
20	Radio Pharmaceuticals	Definition, Types of Radiations, Half life, Therapeutic and diagnostic Radiopharmaceuticals, Facilities required for preparation, Protection of operator, Radio Pharmaceutical Kit,	2
21	Surgical instruments & Health Accessories	Surgical instruments, Wheel Chairs, Canes, Crutches, Bed Pans, Vaporizers, Syringes, Needles, Thermometers, First Aid, Hot Water bottle (No Diagrams) only with respect to prescription dispensing and patient counseling.	2
22	Hospital Pharmacy a Global Scenario including National health scheme	Hospital Pharmacy a Global Scenario including National health scheme (NHS)	1
23	Use of computers in Hospital Pharmacy.	Applications of the computers in the hospital pharmacy.	1
24	Surgical dressings	Surgical dressings, properties, absorbent dressings, wound dressings, bandages, surgical adhesive tape, protectives, plasters, standard for dressings and packaging.	2
Reference books			
1	Remington's pharmaceutical sciences	A. H. Gennaro (Mack Publication)	
2	Pharmaceutical practice	Collett & Aulton (Churchill Livingstone)	
3	Dispensing of medications	Hoover (Mack publication)	
4	Prescription pharmacy	Sprowls (Lippincotts)	
5	Pharmaceutical	Bradley (Lea & Febiger)	
6	Dispensing for pharmacy students - Cooper & Gunn	S. J. Carter (CBS publisher & distributors)	
7	USP	Official	
8	IP, BP, USP-NF, NFI & the Pharmaceutical codex	Official	
9	Martindale extra pharmacopoeia	Official	
10	Introduction to pharmaceutical calculations	J. A. Rees, I. Smeeth & B. Smith (Pharmaceutical press)	
11	Pharmacy practice	P. Stone & S. J. Curtis (Pharmaceutical press)	
12	Pharmaceutical practice	A. J. Winfield, R. M. E. Richards (Churchill Livingstone)	
13	Hospital & clinical pharmacy	H. P. Tipnis, M. S. Nagarsenkar (Nirali)	
14	Hospital Pharmacy	Quadri and Shaha	

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**Practical****3 hrs/week/batch**

Notes:

i	All the prescription 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.
<b>List of experiments</b>	
1	Study of Dispensing vs. Compounding
2. a	Study of weighing techniques for dispensing balances, sensitivity, weight box accuracy, precision of weighing.
2. b.	Measuring techniques: precision & accuracy of measuring, devices for doses measurement.
3	Prescription handling: Dispensing of an ideal prescription with reading, checking, labeling & dispensing with detailing.
4 a	Good pharmaceutical practices in compounding & dispensing.
4 b	Study of different surgical materials
5	Comparative study of dispensing lables with marketed preparations lables (of all dosage forms, minimum 25 lables)
<b>Compounding &amp; Dispensing of the following preparations</b>	
<b>Powders &amp; granules</b>	
6	Compound magnesium trisilicate oral powder Isabgol granules
7	Zinc starch and talc dusting powder Effervescent granules Eutectic powders containing menthol & camphor
<b>Solutions</b>	
8	Salicylic acid collodion Paediatric ferrous sulphate oral solution Zinc sulphate & zinc chloride mouth wash
<b>Suspension</b>	
9	Paediatric kaolin mixture Magnesium trisilicate mixture
10	Paediatric chalk mixture Inhalation containing menthol & eucalyptus.
<b>Emulsions</b>	
11	Emulsion for internal use containing acacia (any 2 emulsions)
12	Oily calamine lotion Benzyl benzoate application.
<b>Ointment</b>	
13	Sulphur ointment Whitfields ointment
14	Methyl salicylate ointment Lubricating jelly
<b>Suppositories</b>	
15	Calibration of moulds, calculation of displacement value for the given drug. Suppository with fatty base
16	Suppository with PEG base

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
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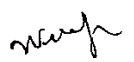
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<b>Compounding of following preparations</b>	
17	Topicals containing ointment/cream with powders, liquids and finely powdered tablets of antibacterial, anti-inflammatory & corticosteroids.
18	Anti-diarrhoeal powder for paediatric containing anti bacterial, antispasmodic, antiaemoboc with kaolin & pectin.
	Mouthwash containing Thymol, Menthol, Peppermint oil and an suitable antiseptic.
19	Scalp lotion containing Mercuric chloride, Panthenol & a hair conditioning agent, etc.
	Mixture of salts excluding sodium chloride for use as a substitute in hypertension.
20	Lozenges, Pastilles.
21	Pills, Tablet triturates.
22	Capsules & solid unit dosage forms & their preparations.
23	Prepackaging & dispensing of Paracetamol/Trimethoprim/Sulpha tablets.
24	Drug information - source- an exercise on drug information.
25	Practical based on the concept of Hospital pharmacy.

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**References:**

1	Pharmaceutical practice	Collett & Aulton (Churchill Livingstone)
2	Prescription pharmacy	Sprowls (Lippincots)
3	Remington's pharmaceutical sciences	A. H. Gennaro (Mack Publication)
4	Introduction to pharmaceutical calculations	J. A. Rees, I. Smeeth & B. Smith (Pharmaceutical press)
5	Pharmacy practice	P. Stone & S. J. Curtis (Pharmaceutical press)
6	Dispensing of medications	Hoover (Mack publication)
7	Pharmaceutical practice	A. J. Winfield, R. M. E. Richards (Churchill Livingstone)
8	Dispensing for pharmacy students - Cooper & Gunn	S. J. Carter (CBS publisher & distributors)
9	The extra pharmacopoeia	Martindale
10	Merck index	
11	USP	official
12	IP, BP, USP-NF, NFI & the Pharmaceutical codex	official
13	Martindale extra pharmacopoeia	official

  
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**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

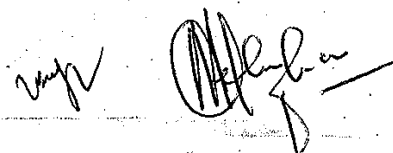
**1.6 Subject: Pharmaceutical Mathematics**

50 hrs., 2 hrs./week

S.N.	Course	Hrs.
1.	Significant figure Fraction, Exponents, Powers and roots Ratio & proportions Logarithms	6
2.	Calculus: Function and limits Derivatives Integral calculus Introductory aspects of Laplace transformation	6 7 7 1
3.	Integral Calculus: Integration by decomposition, by substitution, by parts and by successive reduction Integration of algebraic rational function Integration of trigonometric function	2 2 2 2
4.	Graphical representations: Need, types of graph	2
5.	Basic statistics Date & data handling Averages, Mode, median, data scattering: Range, Quartile, Mean deviation and standard deviation	5
6.	Correlation	2
7.	Regression	2
8.	Introduction of testing hypothesis	2
9.	Introduction of sampling Population in samples, Choosing random samples, sampling distribution of mean.	2

**Reference Book:**

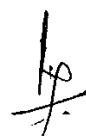
1. F. Daniels Mathematical preparation for physical chemistry, McGraw Hills, New York 1928.
2. W. Lowenthal, Pharmaceutical and calculations, in Remington's Pharmaceutical Sciences, A.R. Genaro, Vol-1, Editor, Mack Publishing: Easton, PA, 2004, p. 103
3. Sanford Boltan, Pharmaceutical statistics, Vol-80,1997 Marcial Dekker Incorporation NewYork , p. 39-61, 120-187, 190-214, 216-263,
4. G.V.Kumbohkar, Engineering Mathematics for First year Diploma, Phadake Prakashan, Kolhapur,
5. G.D. Christian, Analytical Chemistry, Jhon Willey and Sons 1994, p.14
6. Shanti Narayan Integral Calculus, S.Chand and Co. Ltd New Delhi, 2004, p. 1-112
7. Steve Dobbs and Jane Miller Statistics 1 and 2 Cambridge University press 2003, p. 54-135  
John Stillwell Mathematics and its history, Second edition, Springer 2000, p. 146-169



**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad****1-7 Subject: Computer Application**

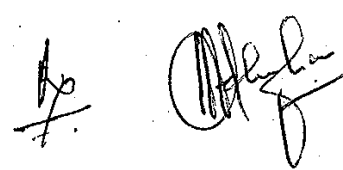
25 hrs., 1 hrs./week

S.N.	Course	Hrs.
1.	Computer Fundamentals : The basic anatomy of Computers, Components of Computer System, Classification of Computers, Number System, Input/Output Devices, Processors & Memory, Secondary Storage Devices, Software & Hardware	5
2.	Introduction of Microsoft office components as MS-Word,, Excel, PowerPoint & Access	5
3.	Introduction of ISIS chemical structure drawing utility	1
4.	Programming: Algorithm, Flow Chart, Introduction to languages, C Fundamentals : Operators & Expressions, Data Types, Statements, Looping, Functions, Program Structure, Arrays, Introduction to Pointer	7
5.	Networking: Need & Advantages of Networking, Networking Concepts, Topologies, Networking Types, Addressing Schemes	2
6.	Internet: Introduction to Internet & Intranet, Protocols, TCP/IP, Basic Services of Internet, Connecting & Browsing, E-Mail, Chat, Downloading, Search Engine, Introduction to HTML.	3
7.	Applications of Computers in Pharmacy & Drug Design.	2



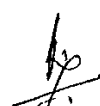

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad****Subject: Computer Application (Practical) 25 hrs., 1 hrs./week/Student**

S.N.	Title	Hrs.
1.	MSDOS: Introduction to DOS, Internal/External Commands, Batch Files and various other commands	2
2.	Windows: Introduction to Windows, Desktop, Creating Folders, Shortcuts, Windows Elements, Notepad, WordPad, Calculator, Paint & other tools of Windows	2
3.	MS Word: Creation of Documents, Formatting of document, Working with Tables, Mail Merge	3
4.	MS Excel: Creation of Worksheet, Formatting of Worksheet, Functions, Chart Creation, use of excel to solve laboratory problems & data analysis	4
5.	MS PowerPoint: Creation of Slides, Formatting of Slides, Slide layout, Slide Show settings	2
6.	MS Access: Creation of Tables, Query, Forms, Reports	2
7.	C Programming : Programs related to Operators, If Statement, Looping, Switch, Arrays, Pointers	4
8.	Internet: Internet Connectivity, Browsing, Creation of E-Mail A/c., Chatting, Search Engine, Downloading	2
9.	HTML: Creation of Web Pages, Various tags used for creation of sample web page	2
10.	Draw at least 10 structure using ISISI	2
11.	Draw at 5 to 6 step organic chemical reaction using ISISI	1



**Reference Book:**

1. Foundation of Computing by P.K. Sinha / Priti Sinha (BPB Publ.)
2. The C Programming Language by Kernighan & Ritchie – PHP
3. Exploring C by Dennis Ritchie
4. System Analysis and Design by Elias M. Awad
5. Internet in a nutshell by Alexis Leon, Vikas Publications, New Delhi
6. Computer applications in Pharmacy, Basat
7. IBM Computers
8. Remington The Science and Practice of Pharmacy, Lippincott Williams and Wilkins.



Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,  
AURANGABAD.

Syllabus for B. Pharm first Year 2006-07

1-8 SUBJECT – PHARMACEUTICAL (ORGANIC) CHEMISTRY – I

Section-A


1. **Hazards and safety in chemical laboratory** – 1 hr.
2. **Atomic structure:** Atomic orbitals, electronic configuration of atoms, definitions- ionic radii, ionization potential, electron affinity, electronegativity, Aufbau, Pauli exclusion principles, concept of Hybridization – types, Types of bonds- covalent, coordinate, ionic and hydrogen bond –5hr
3. **IUPAC nomenclature:** Structure, Nomenclature (multiple groups) aromatic, hetero cyclic compounds containing two hetero atoms –6 hrs
4. **Preparation and reactions of:** alkane, alkene, alkyne, alcohol, ethers and epoxides, alkyl halide, amine, nitro compounds, phenols, aldehyde and ketones, carboxylic acid and functional derivatives of carboxylic acids including  $\beta$  ketoester (mechanism of reaction to be covered) –15hrs
5. **Classes of reactions and classes of reagents:** Including electrophile, nucleophile and radicals –1 hrs
6. **Transient reaction Intermediate:** Carbocation, carbanion, and carbenes. Generation, structure, stability and reaction. Kinetics and thermodynamic control of reaction. – 4 hrs
7. **Theories of acidity and basicity with respect to organic compounds:** Factors affecting acidity and basicity. Resonance, inductive effect and hydrogen bonding. – 5 hrs

Section-B

8. **Factors affecting electron availability in bonds and individual atoms:** electronegativity, inductive effect and resonance effect, hyperconjugation, including rules of resonance, concept of tautomerism, and types of tautomerism. – 5 hrs
9. **Introduction to stereoisomerisms:** configuration, conformation, and concept of optical isomerism in compounds containing one asymmetric carbon atom. Isomerism and types of geometrical isomerism- Z and E Nomenclature cis & trans naming Cahn-Ingold-Prelog system for assigning Z and E Nomenclature. –5 hrs
10. **Nucleophilic substitution at saturated carbon:** SN1 and SN2 mechanism and stereochemistry (compounds containing one asymmetric carbon atom only) Factors affecting substitution: Substrate structure Nature of nucleophile Nature of leaving group and solvent. – 5 hrs

Alkaline

11. **E1 and E2 elimination:** Mechanism and stereochemistry of Saytzeff and Hoffmann rules, factors affecting for substitution Vs. elimination. -5hrs
12. **Conjugated diene:** structure, electrophilic addition to dienes, 1, 2 & 1, 4 addition  
Diel's Alder reaction - 2 hrs
13. **Benzene and aromaticity:** Huckel Rule, resonance in benzene and derivatives.  
Mechanism of electrophilic substitution reactions. Halogenation, nitration, sulfonation, and Friedel Craft reaction. Orientation and reactivity of electrophilic and aromatic substitution. Mechanism of nucleophilic aromatic substitution reaction involving benzyne intermediate. -8 hrs
14. **Common organic reactions, mechanism and applications.**  
Aldol cannizaro, Perkin, Stobbe, Dickmann condensation. Hofman-Schmidt, Ioson curtius, Beckmann, and Fries. Reimer-tiemann, Reformatsky, and Grignards reaction, Claisen, Wittig reaction, and Oppenauer oxidation, Clemmensen, Wolff-Kishner, MPV, and Birch reduction. - 8 hrs

Alicable 





**PRACTICALS****I) Preparation of Organic compounds ( Synthesis)****1. Benzoylation ( Scotten –Baumann reaction) :**

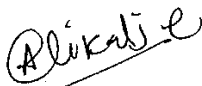
Benzanilide, Phenyl benzoate/ 2-Naphthyl Benzoate

**2. N- Acetylation : Acetanilide from aniline****3. O-Acetylation : Aspirin from salicylic acid.****4. Hydrolysis: P-bromo aniline from p-bromo acetanilide****5. Nitration: m-dinitrobenzene, p-nitroacetanilide****6. Oxidation : benzoic acid from toluene****7. Reduction : m-nitroaniline from m-dinitrobenzene****8. Friedel-craft Reaction : Benzophenone from benzene and benzoyl chloride****9. Bromination : 2,4,6-tribromoaniline, p-bromoacetanilide****10. Addition-elimination-Phenyl-hydrazone or oxime from benzaldehyde****II) Qualitative analysis of organic compounds ( 12-15)**Alternative

**Reference books:**

1. Vogel's text book of practical organic chemistry.
2. Advanced organic chemistry Jerry March
3. Fundamental organic chemistry I & II , Finar I. L.
4. Advanced organic chemistry, Soloman
5. Organic Chemistry, Morison and Boyed
6. Guide book to reaction mechanism in organic chemistry, Peter Sykes
7. Advanced organic chemistry, Bahl and Bahl
8. Organic chemistry, Jain M.K.
9. Reaction Mechanisms and Reagents, Gurudeep Chatwal
10. Practical Organic Chemistry, Mann and Saunders
11. Sterio chemistry of organic Chemistry, Nasi Puri
12. Sterio chemistry of organic compound, Kalsi P.S.
13. General Organic Chemistry, Sachinkumar Ghosh
14. Text book of Organic Chemistry, Raj K. Bansal
15. Reaction and reagents, O. P. Agarwal
16. Organic Chemistry, Pine, Handricson, Cram, Hammound.
17. Laboratory Handbook of Organic Qualitative analysis and Separation, V.S.

Kulkarni.

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