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भारतीय भेषजी परिषद्  
( भेषजी अधिनियम, 1948 के अंतर्गत स्थापित )  
**PHARMACY COUNCIL OF INDIA**  
( CONSTITUTED UNDER THE PHARMACY ACT, 1948 )

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✓ The Secretary  
(Health Department)  
of All State Govts. & Union Territories

**Sub: Comments on proposed amendments in Education Regulations, 1991 u/s 10(3) of the Pharmacy Act 1948.**

Sir

The Pharmacy Council of India (PCI) is a statutory body working under the Ministry of Health and Family Welfare, Government of India, New Delhi. It is constituted under the Pharmacy Act, 1948 to regulate pharmacy education and practice of pharmacy profession in the country.

Section 10 of the Pharmacy Act 1948 empowers the Pharmacy Council of India to frame regulations called Education Regulations, prescribing the minimum standard of education required for qualification as a pharmacist. Accordingly the Education Regulations 1991(ER 1991) are in vogue which were published in Gazette of India, Part-III, Section-4, No. 28 dated 11<sup>th</sup> July, 1992.

With a view to adopt an integrated practice approach in delivery of clinical pharmaceutical services to the society, the ER 1991 are reviewed by a committee of experts appointed by the PCI. Based on the recommendations of the expert committee, amendments have been Proposed in the ER 1991. The provisions available in the ER 1991 and amendments proposed therein in the form of draft Education Regulations, 2014 in tabulated form are enclosed as **Appendix-I**.

This Council would, appreciate to have the considered comments of the State Govts./U.Ts. on proposed amendments in ER-1991 within 3 months of issuance of this letter as required under sub-section (3) of section 10 of the Pharmacy Act, 1948. In the absence of any comments, within three months, it will be presumed that you have nothing to say in the matter and the proposed Regulations will be processed further accordingly.

Yours faithfully

(ARCHANA MUDGAL)  
Registrar-cum-Secretary

...2...

Cc - alongwith enclosures forwarded to-

The Secretary  
Government of India  
Ministry of Health & Family Welfare  
Department of Health (PMS Section)  
Nirman Bhawan  
**New Delhi – 110 011**

←  
(ARCHNA MUDGAL)  
Registrar-cum-Secretary

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**PHARMACY COUNCIL OF INDIA  
EDUCATION REGULATIONS - 2014  
FOR THE DIPLOMA IN PHARMACY (D.  
PHARM)**

Education Regulations -1991	Education Regulations -2014
<p align="center"><b>PHARMACY COUNCIL OF INDIA EDUCATION REGULATIONS, 1991 FOR THE DIPLOMA COURSE IN PHARMACY</b></p> <p>Regulations framed under section 10 of the Pharmacy Act, 1948. (As approved by the Government of India, Ministry of Health vide, letter No V. 13016/1/89-PMS dt. 2-8-1991 and notified by Pharmacy Council of India.)</p> <p><b>No. 14-55/87 (Part)-PCI/2484-2887:-</b></p> <p>In exercise of the powers conferred by section 10 of the Pharmacy Act, 1948 (8 of 1948), the Pharmacy Council of India, with the approval of the Central Government, hereby makes the following regulations namely:-</p>	<p align="center"><b>PHARMACY COUNCIL OF INDIA EDUCATION REGULATIONS, 2014 FOR THE DIPLOMA IN PHARMACY(D. PHARM)</b></p> <p>Regulations framed under section 10 of the Pharmacy Act, 1948. (As approved by the Government of India, Ministry of Health &amp; F.W vide letter No dated and notified by the Pharmacy Council of India.)</p> <p><b>No.</b></p> <p>In exercise of the powers conferred by section 10 of the Pharmacy Act, 1948 (8 of 1948), the Pharmacy Council of India, with the approval of the Central Government, hereby makes the following regulations, namely:-</p>
<p align="center"><b>CHAPTER 1</b></p> <p><b>1. Short title and commencement:-</b></p> <p>(1) These regulations may be called the Education Regulations, 1991.</p> <p>(2) They shall come into force on the date of their publication in the official Gazette.</p> <p><b>2. Qualification for Pharmacist:-</b></p> <p>The minimum qualification required for registration as a pharmacist shall be a pass in Diploma in pharmacy (Part I &amp; Part II and satisfactory completion of Diploma in Pharmacy (Part-III). <b>or</b> Any other qualification approved by the Pharmacy Council of India as equivalent to the above.</p> <p><b>3. Diploma in Pharmacy Part-I and Part-II shall consist of a certificate of having passed the course of study prescribed in Chapter-II of these regulations.</b></p> <p><b>4. Diploma in Pharmacy Part-III shall consist of a certificate of having satisfactorily completed course of practical training as prescribed in Chapter-III of these regulations.</b></p>	<p align="center"><b>CHAPTER 1</b></p> <p><b>1. Short title and commencement:-</b></p> <p>(1) These regulations may be called the Education Regulations, 2014 for Diploma in Pharmacy.</p> <p>(2) They shall come into force on the date of their publication in the official Gazette.</p> <p><b>2. Qualification for Pharmacist:-</b></p> <p>The minimum qualification required for registration as a pharmacist shall be a pass in Diploma in Pharmacy (Part-I) &amp; (Part-II) and satisfactory completion of practical training (Part-III). <b>or</b> Any other qualification approved by the Pharmacy Council of India as equivalent to the above.</p> <p><b>3. Diploma in Pharmacy (Part-I, Part-II and Part-III) shall consist of a certificate of having completed the course of study and passed the examination after satisfactorily completing the practical training as prescribed in Chapter-2 and Chapter-3 of these regulations.</b></p>

## CHAPTER 2

### 5. Diploma in Pharmacy (Part-I and Part-II):-

Minimum qualification for admission to Diploma in Pharmacy Part-I course -A pass in any of the following examinations with Physics, Chemistry and Biology or Mathematics.

- (1) Intermediate examination in Science;
- (2) The first year of the three year degree course in Science,
- (3) 10+2 examination (academic stream) in Science;
- (4) Pre degree examination;
- (5) Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examination.

Provided that there shall be reservation of seats for Scheduled Caste and Scheduled Tribes candidates in accordance with the instructions issued by the Central Govt. /State Govts./Union Territory Admns. as the case may be from time to time]

### 6. Duration of the course:-

The duration of the course shall be for two academic years with each academic year spread over a period of not less than one hundred and eighty working days in addition to 500 hours practical training spread over a period of not less than 3 months.

### 7.Course of study:-

The course of study for Diploma in Pharmacy Part-I and Diploma in Pharmacy Part-II shall include the subjects as given in the Tables I & II below. The number of hours devoted to each subject for its teaching in Theory and Practical, shall not be less than that noted against it in columns 2 and 3 of the Tables below.

## CHAPTER 2

### 4. Diploma in Pharmacy (Part-I and Part-II):-

Minimum qualification for admission to Diploma in Pharmacy-A pass in 10+2 examination (regular science academic stream) with Physics, Chemistry and Biology or Mathematics.

or

Any other qualification approved by the Pharmacy Council of India as equivalent to the above examination.

Provided that there shall be reservation of seats for Scheduled Castes and Scheduled Tribes candidates in accordance with the instructions issued by the Central Govt. /State Govts./Union Territory Admns. as the case may be, from time to time]

### 5. Duration of the course:-

- (1). The duration of the course shall be for two academic years. Each academic year shall be spread over a period of not less than one hundred and eighty working days.
- (2). In addition, there shall be a 500 hours of practical training spread over a period of not less than 3 months

### 6.Course of study:-

The course of study for Diploma in Pharmacy Part-I and Diploma in Pharmacy Part-II shall include the subjects as given in the Tables I & II below. The number of hours devoted to each subject for its teaching in Theory and Practical, shall not be less than that noted against it in columns 2 and 3 of the Tables below. However, the course of study and practical training may be modified by the Pharmacy Council of India from time to time.

**Table – I**  
**Diploma in Pharmacy (Part I)**

Subject	No. of hours of Theory	No. of hours of Practical	Subject	Number of hours		
				Theory	Practical	Tutorial
Pharmaceutics-I	75	100	Pharmaceutics	75	75	25
Pharmaceutical Chemistry-I	75	75	Pharmaceutical chemistry	75	75	25
Pharmacognosy-I	75	75	Pharmacognosy	75	75	25
Biochemistry & Clinical Pathology	50	75	Human Anatomy & Physiology	75	75	25
Human Anatomy & Physiology	75	50	Social Pharmacy	75	75	25
Health Education & Community Pharmacy	50	-				
	400	375	Total	375	300	125
775 Hours			800 Hours			

**Table – II**  
**Diploma in Pharmacy (Part II)**

Subject	No. of hours of Theory	No. of hours of Practical	Subject	Number of hours		
				Theory	Practical	Tutorial
Pharmaceutics-II	75	100	Pharmacology	75	75	25
Pharmaceutical Chemistry-II	100	75	Community Pharmacy & Management	75	75	25
Pharmacology & Toxicology	75	50	Biochemistry & Clinical Pathology	75	75	25
Pharmaceutical Jurisprudence	50	-	Pharmacotherapeutics	75	--	25
Drug Store and Business	75	-	Hospital & Clinical Pharmacy	75	--	25
Hospital and Clinical Pharmacy	75	50	Pharmacy Law & Ethics	75	--	25
	450	275		450	225	150
725 Hours			825 Hours			

**TABLE III**

**Diploma in Pharmacy (Part III)**  
**Practical Training – 500 hours**

**Activities**

<p><b>8.</b>The syllabi for each subject of study in the said tables shall be as specified in Appendix A to these regulations.</p>	<p><b>7.</b> The syllabus for each subject of study shall be as specified in Appendix – A to these regulations. The syllabus may, however, be modified by the Pharmacy Council of India from time to time</p>
	<ol style="list-style-type: none"> <li>1) Stocking of Drugs and Medical Devices</li> <li>2) Inventory Control Procedures</li> <li>3) Handling of prescriptions</li> <li>4) Dispensing (250 hours)</li> <li>5) Patient counseling</li> </ol>

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**9. Approval of the authority conducting the course of study:-**

The course of regular academic study prescribed under regulation 7 shall be conducted in an institution, approved by the Pharmacy Council of India under sub-section (1) of Section 12 of the Pharmacy Act, 1948.

Provided that the Pharmacy Council of India shall not approve any institution under this regulation unless it provides adequate arrangements for teaching in regard to building accommodation, equipment and teaching staff as specified in Appendix-B to these regulations

**10. Examinations:-**

There shall be an examination for Diploma in Pharmacy (Part-I) to examine students of the first year course and an examination for Diploma in Pharmacy (Part-II) to examine students of the second year course . Each examination may be held twice every year. The first examination in a year shall be the annual examination and the second examination shall be supplementary examination of the Diploma in Pharmacy (Part-I) or Diploma in Pharmacy (Part-II), as the case may be. The examinations shall be of written and practical (including oral) nature, carrying maximum marks for each part of a subject, as indicated in Table III and IV below: -

**8. Approval of the authority conducting the course of study:-**

(1) No authority in a State shall start or conduct Diploma in Pharmacy course of study without the prior approval of the Pharmacy Council of India.

(2) The course of regular academic study prescribed under regulation 6 shall be conducted in an institution, approved by the Pharmacy Council of India under sub-section (1) of Section 12 of the Pharmacy Act, 1948

Provided that the Pharmacy Council of India shall not approve any institution under this regulation unless it provides adequate arrangements for teaching in regard to building accommodation, equipments and teaching staff etc. as specified in Appendix-B to these regulations which may be amended by the Pharmacy Council of India from time to time.

**9. Examinations:-**

1) There shall be an annual examination at the end of the academic year

2) If necessary, there shall be a supplementary examination for the students who are not able to pass Diploma in Pharmacy Part-I or Part-II, as the case may be, as per the criteria specified by the examining authority.

3) The examinations shall be of written and practical (including vica – voce) nature, carrying maximum marks for each part of a subject as indicated in Table IV and V below.

**Table – III**

**DIPLOMA IN PHARMACY (PART-I)  
EXAMINATION**

Maximum marks for Theory			Maximum marks for Practicals		
Exa minat	*Se ss	Tota l	Exa min	*Se ss	Tota l

**Table – IV**

**DIPLOMA IN PHARMACY (PART-I)  
EXAMINATION**

Maximum marks for Theory			Maximum marks for Practicals		
Ex am	*S ess	Total	Ex am	*S ess	Tota l

Subject	ion	iona l		atio n	iona l		Subject	ina tio n	ion al		ina tio n	ion al	
Pharmaceutics-I	80	20	100	80	20	100	Pharmaceutics	80	20	100	80	20	100
Pharmaceutical Chemistry-I	80	20	100	80	20	100	Pharmaceutical chemistry	80	20	100	80	20	100
Pharmacognosy	80	20	100	80	20	100	Pharmacognosy	80	20	100	80	20	100
Biochemistry & Clinical Pathology	80	20	100	80	20	100	Human Anatomy & Physiology	80	20	100	80	20	100
Human Anatomy & Physiology	80	20	100	80	20	100	Social Pharmacy	80	20	100	-	-	-
Health Education & Community Pharmacy	80	20	100	-	-	-							
<b>600 + 400 = 1000</b>							<b>500 + 400 = 900</b>						

\*internal assessment

**Table – IV**  
**DIPLOMA IN PHARMACY (PART-II)**  
**EXAMINATION**

**Table – V**  
**DIPLOMA IN PHARMACY (PART-II)**  
**EXAMINATION**

Subject	Maximum marks for Theory			Maximum marks for Practicals			Subject	Maximum marks for Theory			Maximum marks for Practicals		
	Exa minat ion	*Se ss iona l	Tota l	Exa minat ion	*Se ss iona l	Tota l		Ex am ina tio n	*S ess ion al	Total	Ex am ina tio n	*S ess ion al	Tota l
Pharmaceutics-II	80	20	100	80	20	100	Pharmacology	80	20	100	80	20	100
Pharmaceutical Chemistry-II	80	20	100	80	20	100	Community Pharmacy & Management	80	20	100	80	20	100
Pharmacology & Toxicology	80	20	100	80	20	100	Biochemistry & Clinical Pathology	80	20	100	80	20	100
Pharmaceutical Jurisprudence	80	20	100	-	-	-	Pharmacotherapeutics	80	20	100	-	-	-
Drug Store and Business Management	80	20	100	-	-	-	Hospital and Clinical Pharmacy	80	20	100	-	-	-
Hospital and Clinical Pharmacy	80	20	100	80	20	100	Pharmacy law & Ethics	80	20	100	-	-	-
<b>600 + 400 = 1000</b>							<b>600 + 300 = 900</b>						

\*internal assessment

<p><b>11. Eligibility for appearing at the Diploma in Pharmacy Part-I examination:-</b> Only such candidates who produce certificate from the Head of the Academic institution in which he /she has undergone the Diploma in Pharmacy Part-I course, in proof of his /her having regularly and satisfactorily undergone the course of study by attending not less than 75% of the classes held both in theory and in practical separately in each subject shall be eligible for appearing at the Diploma in Pharmacy (Part-I) examination.</p> <p><b>12. Eligibility for appearing at the Diploma in Pharmacy Part-II examination:-</b> Only such candidates who produce certificate from the Head of the academic institution in which he/she has undergone the Diploma in Pharmacy Part-II course, in proof of his /her having regularly and satisfactorily undergone the Diploma in Pharmacy Part-II course by attending not less than 75% of the classes held both in theory and in practical separately in each subject shall be eligible for appearing at the Diploma in Pharmacy (Part-II) examination.</p>	<p><b>10. Eligibility for appearing at the Diploma in Pharmacy Part-I and Part II examination:-</b> Only such candidates who produce certificate from the Head of the academic institution in which he has undergone the Diploma in Pharmacy course, in proof of his having regularly and satisfactorily undergone the course of study by attending not less than 75% of the classes held both in theory and in practical separately in each subject shall be eligible for appearing at the Diploma in Pharmacy (Part-I) or (Part II) examination, as the case may be.</p>
<p><b>13. Mode of examinations:-</b></p> <ol style="list-style-type: none"> <li>(1) Each theory and practical examination in the subjects mentioned in Table-III &amp; IV shall be of three hours duration.</li> <li>(2) A Candidate who fails in theory or practical examination of a subject shall re-appear both in theory and practical of the same subject.</li> <li>(3) Practical examination shall also consist of a viva-voce (Oral) examination.</li> </ol>	<p><b>11. Mode of examinations:-</b></p> <ol style="list-style-type: none"> <li>(1) Theory and Practical examination in the subjects mentioned in Tables – IV &amp; V shall be of three hours examination. Both Theory and Practical are considered as two separate papers.</li> <li>(2) A candidate who fails in theory or practical examination of a subject shall re-appear for the failed subject. Theory and Practical of a particular subject are considered as individual subjects for the purpose of pass criteria.</li> <li>(3) Practical examination shall also consist of a viva-voce examination</li> </ol>
<p><b>14. [Award of Sessional marks and maintenance of records:-</b></p> <ol style="list-style-type: none"> <li>(1) A regular record of both theory and practical class work and examinations conducted in an institution imparting training for diploma in Pharmacy Part-I and diploma in Pharmacy Part II courses, shall be maintained for each student in the institution and 20 marks for each theory and 20 marks for each practical subject shall be allotted as sessional.</li> <li>(2) There shall be at least two periodic sessional examinations during each academic year .The highest aggregate of any two performances shall form the basis of calculating sessional marks.</li> </ol>	<p><b>12. Award of sessional marks and maintenance of records:-</b></p> <ol style="list-style-type: none"> <li>(1) A regular record of both theory and practical class work done and examinations held in an institution imparting training for diploma in Pharmacy Part-I and diploma in Pharmacy Part-II courses shall be maintained for each student in the institution and 20 marks for each theory and 20 marks for each practical subject shall be allotted as sessional marks.</li> <li>(2) There shall be two or more periodic sessional (internal assessment) examinations during each academic year. The highest aggregate of any two performances shall form the basis of calculating sessionals marks</li> </ol>

<p>(3) The sessional marks in practicals shall be allotted on the following basis:-</p> <p>(i) Actual performance in the sessional examination 10marks</p> <p>(ii) Day to day assessment in the practical classwork 10marks.</p>	<p>(3) The sessional marks in practical shall be allotted on the following basis:-</p> <p>(i) Actual performance in the sessional/spacing examination=10 marks</p> <p>(ii) Day to day assessment in the practical class/spacing work= 10 marks.</p>
<p><b>15. Minimum marks for passing the examination:</b></p> <p>A student shall not be declared to have passed Diploma in Pharmacy examination unless he /she secures at least 50% marks in each of the subject separately in the theory examinations, including sessional marks and at least 50% marks in each of the practical examinations including sessional marks. The candidates securing 60% marks or above in aggregate in all subjects in a single attempt at the Diploma in Pharmacy (Part-I) or Diploma in Pharmacy (Part-II) examinations shall be declared to have passed in first class the Diploma in Pharmacy (Part-I) or Diploma in Pharmacy (Part-II) examinations, as the case may be. Candidates securing 75% marks or above in any subject or subjects shall be declared to have passed with distinction in the subject or those subjects provided he/she passes in all the subjects in a single attempt.</p>	<p><b>13. Minimum marks for passing the examination:-</b></p> <p>A student shall not be declared to have passed Diploma in Pharmacy examination unless he secures at least 40% marks in each of the subjects separately in the theory as well as the practical examinations including sessional marks. The candidates securing 60% marks or above in aggregate in all subjects shall be declared to have passed in first class. The candidates securing 75% marks or above in any subject or subjects shall be declared to have passed with distinction in that subject or those subjects.</p>
<p><b>16. Eligibility for promotion to Diploma in Pharmacy (Part-II):-</b></p> <p>All candidates who have appeared for all the subjects and passed the Diploma in Pharmacy Part-I examination are eligible for promotion to the Diploma in Pharmacy Part-II class. However, failure in more than two subject shall debar him/ from promotion to the Diploma in Pharmacy Part-II class.</p>	<p><b>14. Eligibility for promotion to Diploma in Pharmacy (Part-II):-</b></p> <p>All candidates who have appeared for all the subjects and passed the Diploma in Pharmacy Part-I examination are eligible for promotion to the Diploma in Pharmacy Part-II class. However, the students may be promoted to second year with full carryover of all subjects.</p>
<p><b>17. Improvement of sessional marks:-</b></p> <p>Candidates who wish to improve sessional marks can do so, by appearing in two additional sessional examinations during the next academic year. The average score of the two examination shall be the basis for improved sessional marks in theory .The sessional of practicals shall be improved by appearing in additional practical examinations. Marks awarded to a candidate for day to day assessment in the practical class can not be improved unless he /she attends a regular course of study again.</p>	<p><b>15. Improvement of sessional marks:-</b></p> <p>The candidates who wish to improve sessional marks can do so by appearing in two additional sessional examinations during the next academic year. The average score of the two examinations shall be the basis for improved sessional marks in theory as well as in practical. Marks awarded to a candidate for day to day assessment in the practical class cannot be improved unless he attends a regular course of study again.</p>

<p><b>18. Approval of examinations:-</b> The examinations mentioned in regulations 10 to 13 and 15 shall be held by an authority herein after referred to as the Examining Authority in a State , which shall be approved by the Pharmacy Council of India under sub-section (2) of section 12 of the Pharmacy Act, 1948. Such approval shall be granted only if the Examining Authority concerned fulfills the conditions as specified in Appendix-C to these regulations.</p> <p><b>19. Certificate of passing examination for Diploma in Pharmacy (Part-II):-</b></p> <p>Certificate to having passed the examination for the Diploma in Pharmacy Part II shall be granted by the Examining Authority to a successful student.</p>	<p><b>16. Approval of examinations:-</b> The examinations mentioned in regulations 8 to 11 and 12 shall be held by an authority (herein=after referred to as the examining authority) in a State which shall be approved by the Pharmacy Council of India under sub-section (2) of section 12 of the Pharmacy Act, 1948. Such approval shall be granted only if the examining authority concerned fulfills the conditions as specified in Appendix-C to these regulations.</p> <p><b>17. Certificate of passing examination for Diploma in Pharmacy (Part-II):-</b></p> <p>Certificate of having passed the Diploma in Pharmacy Part-II shall be granted by the examining authority to a successful student.</p>
<p><b>20. Period and other conditions for Practical Training:-</b></p> <p>(1) After having appeared in Part-II examination for the Diploma in Pharmacy, conducted by Board/University or other approved Examining Body or any other course accepted as being equivalent by the Pharmacy Council of India, a candidate shall be eligible to undergo practical training in one or more of the following institutions namely:</p> <p>(i) Hospitals/Dispensaries run by Central/State Govt (ii) A Pharmacy, Chemist and Druggist licensed under the Drugs and Cosmetics Rules, 1945 made under the Drugs and Cosmetics Act, 1940 (23 of 194</p> <p>(iii) Drugs manufacturing Unit licensed under the Drugs and Cosmetics Act, 1940 &amp; rules made thereunder.</p> <p>(2) The institutions referred in sub-regulation (1) shall be eligible to impart training subject to the condition that number of student pharmacists that may be taken in any hospital, pharmacy, chemist and druggist and drugs manufacturing unit licensed under the Drugs and Cosmetics Rules, 1945 made under the Drugs and Cosmetics Act, 1940 shall not exceed two where there is one registered pharmacist engaged in the work in which the student pharmacist is undergoing practical training, where there is more than one registered pharmacist similarly engaged, the number shall not exceed one</p>	<p><b>18. Period and other conditions for practical training:-</b></p> <p>(1) After having appeared in Part-II examination for the Diploma in Pharmacy held by an approved examining authority, a candidate shall be eligible to undergo practical training in one or more of the following institutions namely:</p> <p>(i) Hospitals/Dispensaries run by Central Govt. /State Govts. (ii) A pharmacy licensed for retail sale of drugs under the Drugs and Cosmetics Rules, 1945 having the services of registered pharmacists. (iii) Hospitals and dispensaries other than those specified in sub-regulation (i) and (ii) above for the purpose of giving practical training shall have to be recognized by the Pharmacy Council of India on fulfilling the conditions specified in Appendix "D" to these regulations.</p> <p>(2) The institutions referred in sub-regulation (1) shall be eligible to impart training subject to the condition that number of student pharmacists that may be taken in any hospital, dispensary or pharmacy licensed under the Drugs and Cosmetics Rules, 1945 shall not exceed <b>FOUR</b> where there is one registered pharmacist. Where there are more than one registered pharmacists the number shall not exceed <b>TWO</b> for each additional such registered pharmacists.</p>

<p>for each additional such registered pharmacist.</p> <p>(3) Hospital and Dispensary other than those specified in sub-regulation (1) for the purpose of giving practical training shall have to be recognised by Pharmacy Council of India on fulfilling the conditions specified in Appendix "D" to these regulations.</p> <p>(4) In the course of practical training, the trainee shall have exposure to</p> <p>(i) Working knowledge of keeping of records required by various Acts concerning the profession of Pharmacy, and</p> <p>(ii) Practical experience in-</p> <p>(a) the manipulation of pharmaceutical apparatus in common use.</p> <p>(b) the reading, translation and copying of prescription including checking of doses;</p> <p>(c) the dispensing of prescription illustrating the commoner methods of administering medicaments; and</p> <p>(d) the storage of drugs and medical preparations</p> <p>(5) The practical training shall be not less than five hundred hours spread over a period of not less than three months, provided that not less than two hundred and fifty hours are devoted to actual dispensing of prescriptions</p>	<p>(3) In the course of practical training, the trainee shall have exposure to-</p> <p>(i) Working knowledge of keeping of records required by various Legislative Acts concerning the profession of pharmacy; and</p> <p>(ii) Practical experience in activities mentioned in Table III under regulation 6 of these regulations.</p> <p>(5) The practical training shall be of not less than five hundred hours spread over a period of not less than three months provided that not less than two hundred and fifty hours are devoted to actual dispensing of prescriptions.</p>
<p><b>21. Procedure to be followed prior to commencing of the training:-</b></p> <p>(1) The head of an academic training institution, on application, shall supply in triplicate 'Practical Training Contract Form for qualification as a Pharmacist' (hereinafter referred to as the Contract Form ) to candidate eligible to undertake the said practical training. The Contract Form shall be as specified in Appendix-E to these regulations.</p> <p>(2) The Head of an academic training institution shall fill section I of the Contract Form. The trainee shall fill Section II of the said Contract Form and the Head of the institution agreeing to impart the training (hereinafter referred to as the Apprentice Master) shall fill Section III of the said Contract Form.</p> <p>(3) It shall be the responsibility of the trainee to ensure that one copy (hereinafter referred to as the</p>	<p><b>21. Procedure to be followed prior to commencement of the training:-</b></p> <p>(1) The head of an academic training institution, on application, shall supply in triplicate 'Practical Training Contract Form for Pharmacist' (hereinafter referred to as the Contract Form) to the candidate eligible to undertake the said practical training. The Contract Form shall be as specified in Appendix-E to these regulations.</p> <p>(2) The head of an academic training institution shall fill Section I of the Contract Form. The trainee shall fill Section II of the said Contract Form and the head of the institution agreeing to impart the training (hereinafter referred to as the Apprentice Master) shall fill Section III of the said Contract Form.</p> <p>(3) It shall be the responsibility of the trainee to ensure that one copy (hereinafter referred to as the first copy</p>

<p>first copy of the Contract Form) so filled is submitted to the Head of the academic training institution and the other two copies (hereinafter referred to as the Second copy and the third copy) shall be filed with the Apprentice Master (if he so desires) or with the trainee pending completion of the training.</p>	<p>of the Contract Form) so filled is submitted to the head of the academic training institution and the other two copies (hereinafter referred to as the second copy and the third copy) shall be filed with the Apprentice Master (if he so desires) or with the trainee till completion of the training.</p>
<p><b>22. Certificate of passing Diploma in Pharmacy Part-III:-</b></p> <p>On satisfactory completion of the apprentice period, the Apprentice Master shall fill SECTION IV of the second copy and third copy of the Contract Form and cause it to be sent to the head of the academic training institution who shall suitably enter in the first copy of the entries from the second copy and third copy and shall fill SECTION V of the three copies of Contract Form and thereafter hand over both the second copy and third copy to the trainee.</p> <p>This, if completed in all respects, shall be regarded as a certificate of having successfully completed the course of Diploma in Pharmacy (Part-III).</p>	<p><b>20. Certificate of passing Diploma in Pharmacy Part-III:-</b></p> <p>On satisfactory completion of the practical training period, the Apprentice Master shall fill Section IV of the second copy and third copy of the Contract Form and cause it to be sent to the head of the academic training institution who shall suitably enter in the first copy of the entries from the second copy and the third copy and shall fill Section V of the three copies of Contract Form and thereafter hand over both the second copy and the third copy to the trainee.</p> <p>This Contract Form, completed in all respects, shall be regarded as a certificate of having successfully completed the course of Diploma in Pharmacy (Part-III).</p>
<p><b>23. Certificate of Diploma in Pharmacy:</b></p> <p>A certificate of Diploma in Pharmacy shall be granted by the Examining Authority to a successful candidate on producing certificate of having passed the Diploma in Pharmacy Part I and Part II and satisfactory completion of practical training for Diploma in Pharmacy (Part-III).</p>	<p><b>21. Certificate of Diploma in Pharmacy:</b></p> <p>A certificate of Diploma in Pharmacy shall be granted by the examining authority to a successful candidate on producing certificates of having passed the Diploma in Pharmacy Part I and Part II and satisfactory completion of practical training for Diploma in Pharmacy (Part-III).</p>
<p><b>24. Miscellaneous:</b></p> <p>No course of training in pharmacy shall be considered for approval under regulation 18 unless it satisfies all the conditions prescribed under these regulations</p>	
<p><b>25. Repeal and Savings:</b></p> <p>(1) The Education Regulations, 1981 (hereinafter referred to as the said regulations) published by the Pharmacy Council of India vide No 14-55/79 Pt. I/PCI/4235-4650 dt. 8th July 1981 is hereby repealed.</p> <p>(2) Notwithstanding such repeal,</p> <p>(a) Anything done or any action taken under the said regulations shall be deemed to have been done or taken under the corresponding provision of these regulations.</p> <p>(b) A person who was admitted as a student</p>	<p><b>22. Repeal and Savings:</b></p> <p>(1) The Education Regulations, 1991 (hereinafter referred to as the said regulations) published by the Pharmacy Council of India vide No. dt. is hereby repealed.</p> <p>(2) Notwithstanding such repeal,</p> <p>(a) Anything done or any action taken under the said regulations shall be deemed to have been done or taken under the corresponding provision of these regulations.</p> <p>(b) A person who has admitted as a student under the said regulations to the course of training for Diploma in Pharmacy and who had not passed the examination at the</p>

under the said regulation to the course of training for Diploma in Pharmacy and who had not passed the examination at the commencement of these regulations shall be required to pass the examination in accordance with the provision of the said regulation as if these regulations had not come into force:

Provided however, the Examining Authority in a particular State may fix a date after which the examinations under the said Regulations shall not be conducted.

commencement of these regulations shall be required to pass the examination in accordance with the provisions of the said regulations as if these regulations had not come into force:

Provided that the examining authority in a particular State may fix a date after which the examination under the said regulations shall not be conducted and this date shall not be more than four academic years after the publication of these regulations.

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### Diploma in Pharmacy Part-I

Sl.No.	Subjects	Number of Hours		
		Theory	Practical	Tutorial
1.	Pharmaceutics	75	75	25
2.	Pharmaceutical Chemistry	75	75	25
3.	Pharmacognosy	75	75	25
4.	Human Anatomy and Physiology	75	75	25
5.	Social Pharmacy	75	--	25
	<b>Total</b>	<b>375</b>	<b>300</b>	<b>125</b>
		<b>800</b>		

### Diploma in Pharmacy Part-II

Sl.No.	Subjects	Number of Hours		
		Theory	Practical	Tutorial
1.	Pharmacology	75	75	25
2.	Community Pharmacy & Management	75	75	25
3.	Biochemistry & Clinical Pathology	75	75	25
4.	Pharmacotherapeutics	75	--	25
5.	Hospital & Clinical Pharmacy	75	--	25
6.	Pharmacy Law & Ethics	75	--	25
	<b>Total</b>	<b>450</b>	<b>225</b>	<b>150</b>
		<b>825</b>		

### Diploma in Pharmacy Part-I

Sl.No.	Subjects	Number of Hours		
		Theory	Practical	Tutorial
1.	Pharmaceutics	75	75	25
2.	Pharmaceutical Chemistry	75	75	25
3.	Pharmacognosy	75	75	25
4.	Human Anatomy and Physiology	75	75	25
5.	Social Pharmacy	75	--	25
	<b>Total</b>	<b>375</b>	<b>300</b>	<b>125</b>
		<b>800</b>		

## Diploma in Pharmacy Part-II

Sl.No.	Subjects	Number of Hours		
		Theory	Practical	Tutorial
1.	Pharmacology	75	75	25
2.	Community Pharmacy & Management	75	75	25
3.	Biochemistry & Clinical Pathology	75	75	25
4.	Pharmacotherapeutics	75	--	25
5.	Hospital & Clinical Pharmacy	75	--	25
6.	Pharmacy Law & Ethics	75	--	25
	<b>Total</b>	<b>450</b>	<b>225</b>	<b>150</b>
		<b>825</b>		

## 1. Pharmaceutics

**Scope:** This course is designed to impart basic knowledge on the art and science of formulating and dispensing of different dosage forms.

**Objectives:** Upon completion of the course, the student shall be able to understand

- the formulation aspects of different dosage forms
- the evaluation of pharmaceutical dosage forms
- the importance of good manufacturing practices.

**Theory**

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

Chapter	Topic	Hours
1	<ul style="list-style-type: none"><li>• History of profession of Pharmacy in India in relation to Pharmacy education, industry and associations.</li><li>• Pharmacy as a career</li><li>• Pharmacopoeia: Introduction to IP, BP, USP, NF and extra pharmacopoeia. Salient features of Indian Pharmacopoeia</li></ul>	5
2	<b>Prescription:</b> Definition, significance, parts and handling of prescription. <b>Posology:</b> Definition, factors affecting dose selection. Calculation of doses for infants & children based on age, body weight and body surface area	4
<b>Pharmaceutical Dosage forms:</b> Definition, classification, advantages, disadvantages, formulation, storage and quality control tests of		
3	<b>Tablets</b> – coated and uncoated	6
4	<b>Capsules</b> - hard and soft gelatin capsules	4
5	<b>Liquid oral preparations</b> - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution	6
6	<b>Topical preparations</b> - ointments, creams, pastes, gels, liniments and lotions Suppositories and pessaries	6
7	Nasal preparations	4
8	<b>Powders and granules</b> - Insufflations, dusting powders, effervescent powders and effervescent granules	4
9	<b>Sterile formulations</b> – Injectables, eye drops and eye ointments	6
10	<b>Pharmaceutical Aerosols:</b> Definition, types of aerosol systems, propellants, containers and valves	4
11	<b>Immunological products:</b> Definition, classification of sera, vaccines, toxoids and storage conditions	4
12	<b>Quality assurance:</b> Definition and concept of quality control, quality assurance, good manufacturing practice (GMP), calibration and validation	4
13	<b>Packaging materials:</b> Types, selection criteria, advantages and disadvantages of glass, plastic, metal, rubber as packaging materials	8
14	<b>Pharmaceutical aids:</b> Organoleptics and preservatives: Definition, types with examples and uses	5
15	<b>Novel drug delivery systems:</b> Introduction, Classification with examples	5

## Practicals

75 Hours (3 hrs/week)

Minimum of 25 experiments to be conducted

1. Formulation of the following dosage forms
  - Liquid orals: Simple syrup, Piperazine citrate elixir, Aqueous Iodine solution, Strong Iodine solution
  - Emulsion: Castor oil emulsion, Cod liver oil emulsion
  - Suspension: Calamine lotion, Magnesium hydroxide mixture
  - Ointments: Simple ointment base, Sulphur ointment
  - Dry powder: Effervescent powder, Dusting powder,
  - Sterile Injections: Calcium gluconate Injection
  - Capsules: Indomethacin capsules, Tetracycline capsules
2. Demonstration for tablet manufacturing including all types of coated tablets
3. Demonstration of methods for evaluation of all types of above formulations as per IP

## Recommended Books

1. History of Pharmacy in India by Dr. Harikishan Singh
2. Indian Pharmacopoeia, Govt. of India Publication
3. A Text book of Pharmaceuticals Formulation by B.M. Mithal, Vallabh Prakashan.
4. Bentleys' Text book of Pharmaceutics, 8<sup>th</sup> Edition, editor E.A. Rawlins, published by Elsevier Int.,
5. The Theory and Practice of Industrial Pharmacy. Leon Lachman, Herbert Lieberman and Joseph Kanig, Editors, Lea and Febiger, Philadelphia. Latest edition Verghese publishing House

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## 2. Pharmaceutical Chemistry

**Scope:** This course is designed to impart basic knowledge on the chemistry of drugs and pharmaceuticals. The course gives knowledge of chemical structure, storage conditions and medicinal uses of organic and inorganic chemicals and quality control aspects of pharmaceuticals.

**Objectives:** Upon completion of the course, the student shall be able to understand

- the various impurities in pharmaceuticals and tests to identify them
- the chemical nature and medicinal uses of drug substances
- the storage conditions of pharmaceuticals
- the quantitative and qualitative analysis of official compounds

Theory

75 Hours (3 hrs/week)

Chapter	Topic	Hours
1	<b>Introduction to Pharmaceutical chemistry:</b> Scope and objectives <b>Sources and types of errors:</b> Accuracy, precision, significant figures. <b>Impurities in Pharmaceuticals:</b> Source and effect of impurities in pharmacopoeial substances, importance of limit test, Principle and procedures of Limit tests for chlorides, sulphates, iron, heavy metals and arsenic.	8
2	<b>Volumetric analysis:</b> Fundamentals of volumetric analysis, Acid-base titration, Non-aqueous titration, precipitation titration, complexometric titration, redox titration <b>Gravimetric analysis:</b> Principle and method.	8
3	<b>Inorganic Pharmaceuticals:</b> Pharmaceutical formulations, storage conditions and uses of <ul style="list-style-type: none"><li>• Haematinics: Ferrous sulphate, Ferrous gluconate</li><li>• Antacids: Aluminium hydroxide gel, Magnesium hydroxide</li><li>• Anti microbial agents: Hydrogen peroxide, Boric acid, Bleaching powder</li><li>• Dental products: Calcium carbonate, Sodium fluoride</li><li>• Medicinal gases: Carbon dioxide, nitrous oxide, oxygen</li></ul>	7
4	Introduction to nomenclature of organic chemical systems with particular reference to heterocyclic compounds containing up to Three rings	2
<b>Study of the following category of medicinal compounds with respect to classification, chemical name, chemical structure (compounds marked with*) uses, stability and storage conditions, different types of formulations and their popular brand names</b>		
5	<b>Drugs acting on Central Nervous System</b> <ul style="list-style-type: none"><li>• <b>Anaesthetics:</b> Thiopental sodium*, Ketamine hydrochloride*.</li><li>• <b>Sedatives and Hypnotics:</b> Diazepam*, Alprazolam*, Nitrazepam, Phenobarbital*, <b>Antipsychotics:</b> Chlorpromazine hydrochloride*, Haloperidol*, Droperidol, Risperidone*, Sulperide*</li><li>• <b>Anticonvulsants:</b> Phenytoin*, Ethosuximide, Carbamazepine*, Clonazepam, Primidone, Valproic acid*, Gabapentin*</li><li>• <b>Anti-depressants:</b> Amitriptyline hydrochloride*, Imipramine hydrochloride*, Fluoxetine*.</li></ul>	9
6	<b>Drugs acting on Autonomic Nervous System</b> <ul style="list-style-type: none"><li>• <b>Sympathomimetic agents:</b> Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine, Dopamine, Terbutaline, Salmeterol, Salbutamol, Albuterol, Naphazoline, Tetrahydrazoline, Oxymetazoline. Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexadrine. Agents with mixed mechanism: Ephedrine, Metaraminol.</li><li>• <b>Adrenergic Antagonists:</b> Alpha adrenergic blockers: Tolazoline, Phentolamine,</li></ul>	9

	<p>Phenoxybenzamine, Prazosin, Doxazosin. Beta adrenergic blockers: Propranolol, Practolol, Acebutolol, Atenolol, Esmolol, Metoprolol, Labetolol and Carvedilol</p> <ul style="list-style-type: none"> <li>• <b>Cholinergic drugs and related agents:</b> Direct acting agents: Acetylcholine, Carbachol, Bethanechol, Methacholine and Pilocarpine. Cholinesterase inhibitors: Neostigmine, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambinonium chloride, Pralidoxime chloride, Isofluorophate, Echothiophate iodide, Parathione, Malathion.</li> <li>• <b>Cholinergic Blocking agents:</b> Solanaceous alkaloids and analogues: Atropine sulphate, Homatropine hydrogen bromide, Ipratropium bromide. Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride, Clindinium bromide, Dicyclomine hydrochloride, Procyldine hydrochloride Tridihex ethylchloride, Isopropamide iodide, and Ethopropazine hydrochloride</li> </ul>	
7	<p><b>Drugs acting on Cardiovascular System</b></p> <ul style="list-style-type: none"> <li>• <b>Anti-arrhythmic Drugs:</b> Quinidine sulphate, Procainamide hydrochloride, Verapamil, Diltiazem hydrochloride, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcanide hydrochloride, amiodarone and Sotalol.</li> <li>• <b>Anti-hypertensive Agents:</b> Propranolol, timolol, Captopril, Lisinopril, Enalapril, Benzapril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride, Clonidine hydrochloride. Reserpine, Hydralazine hydrochloride, Nifedipine,</li> <li>• <b>Antianginal agents:</b> isosorbide dinitrate, amyl nitrite</li> </ul>	5
8	<b>Diuretics:</b> acetazolamide, frusemide, bumetanide, chlorthiazide, benzthiazide, xipmide, spiranolactone	2
9	<b>Hypoglycemic agents:</b> insulin and its preparations, metformin, tolbutamide, glibenclamide, glipizide, Glimepiride, pioglitazone, ripaglinide	3
10	<b>Analgesic and anti-inflammatory agents:</b> Morphine analogues, Narcotic antagonists; Nonsteroidal anti inflammatory agents (NSAIDs) aspirin, diclofenac, ibuprofen, piroxicam, celecoxib, mefenamic acid, paracetamol	3
11	<p><b>Anti-infective agents</b></p> <p><b>Antifungal agents:</b> Amphotericin-B and Griseofulvin, Econazole nitrate, Miconazole, Ketoconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate.</p> <p><b>Urinary tract anti-infective agents:</b> Nalidixic Acid, Cinoxacin, Norfloxacin, Ciprofloxacin, Ofloxacin, Lomefloxacin, Sparfloxacin.</p> <p><b>Anti-tubercular Agents:</b> INH, Ethionamide, ethambutol, Pyrazinamide, Para amino salicylic acid, Rifampicin</p> <p><b>Antiviral agents:</b> Amantadine hydrochloride, Idoxuridine, Acyclovir, Gancyclovir, Foscarnet, Zidovudine, Lamivudine, Ribavirin</p> <p><b>Antimalarials:</b> Quinine sulphate, Chloroquine phosphate, Primaquine phosphate, Quinacrine hydrochloride, Mefloquine, Cycloguanil, proguanil, Pyrimethamine</p> <p><b>Sulfonamides:</b> History and development, mechanism of action sulfanilamide, sulfadiazine, sulfamethoxazole, sulfacetamide, mefenide acetate and cotrimoxazole</p>	8
12	<b>Antibiotics:</b> Penicillin G, ampicillin, amoxicillin, cloxacillin, clavulanic acid, cephalosporins, streptomycin, neomycin, tetracycline, doxycycline, minocycline, erythromycin, azithromycin, chloramphenicol, clindamycin.	8
13	<b>Anti-neoplastic agents:</b> Meclorothamine, Cyclophosphamide, Busulfan, Thiotepe, Mercaptopurine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate, Azathioprine, Dactinomycin, Daunorubicin hydrochloride, Doxorubicin hydrochloride, Etoposide, Vinblastin sulphate, Vincristin sulphate, Cisplatin, Mitotane and bromostanolone propionate.	3

## Practical

75 hours (3 hours/week)

Minimum of 25 practicals should be conducted

1	<b>Limit tests</b> <ul style="list-style-type: none"> <li>• Limit test for chlorides</li> <li>• Limit test for sulphate</li> <li>• Limit test for Iron</li> <li>• Limit test for heavy metals</li> </ul>
2	Identification tests for Anions and cations as per IP
3	<b>Fundamentals of volumetric analysis</b> Preparation of standard solution and standardization of Sodium hydroxide, ceric ammonium sulfate, potassium permanganate
4	<b>Assay of the following compounds</b> <ul style="list-style-type: none"> <li>• Ferrous sulphate- by redox titration</li> <li>• Calcium gluconate-by complexometry</li> <li>• Sodium chloride-by Modified Volhard's method</li> <li>• Ascorbic acid by cerimetry</li> <li>• Metronidazole by Non Aqueous Titration</li> <li>• Ibuprofen by alkalimetry</li> </ul>
5	<b>Fundamentals of preparative organic chemistry</b> Determination of Melting point and boiling point of organic compounds
6	<b>Preparation of organic compounds.</b> <ul style="list-style-type: none"> <li>• Acetanilide from aniline</li> <li>• Aspirin from salicylic acid</li> </ul>
7	<b>Identification and test for purity of pharmaceuticals</b> Aspirin, caffeine, paracetamol, sulfanilamide

### Recommended Books

1. Medicinal & Pharmaceutical chemistry by Harikishan Singh and VK Kapoor
2. Wilson and Gisvold's Text book of Organic Medicinal and pharmaceutical Chemistry
3. Practical Organic Chemistry by Mann and Saunders.
4. Practical Pharmaceutical Chemistry, Volume- I & II by Beckett and J. B. Stanlake
5. Indian Pharmacopoeia
6. Vogel's text book of Practical Organic Chemistry

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### 3. Pharmacognosy

**Scope:** This course is designed to impart knowledge of medicinal uses of various naturally occurring drugs. It also emphasizes the study of evaluation of crude drugs, alternative system of medicine nutraceuticals and herbal cosmetics.

**Objectives:** Upon the completion of the course, the student shall be able to

- Identify the important crude drugs of natural origin
- Know the herbs used as nutraceuticals and cosmeceuticals
- Understand the principles of alternative system of medicines
- Understand the importance of quality control of drugs of natural origin

#### Theory

75 Hours (3Hrs/Week)

1	Definition, history, present status and scope of Pharmacognosy	02																																		
2	<b>Classification of drugs:</b> <ul style="list-style-type: none"><li>• Alphabetical</li><li>• Taxonomical</li><li>• Morphological</li><li>• Pharmacological</li><li>• Chemical</li><li>• Chemo-taxonomical</li></ul>	04																																		
3	<b>Quality control of crude drugs:</b> <ul style="list-style-type: none"><li>• Different methods of adulteration of crude drugs</li><li>• Evaluation of crude drugs</li></ul>	06																																		
4	Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.	06																																		
5	Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs. <table><tr><td>Laxatives</td><td>- Aloe, Castor oil, Ispaghula, Senna</td></tr><tr><td>Cardiotonics</td><td>- Digitalis, Arjuna</td></tr><tr><td>Carminatives and G.I. regulators</td><td>-Coriander, Fennel, Cardamom, Ginger, Clove, Black Pepper, Asafoetida, Nutmeg, Cinnamon</td></tr><tr><td>Astringents</td><td>- Myrobalan, Black Catechu</td></tr><tr><td>Drugs acting on nervous system</td><td>- Hyoscyamus, Belladonna, Ephedra, Opium, Tea leaves, Coffee seeds, Coca</td></tr><tr><td>Anti-hypertensive</td><td>- Rauwolfia</td></tr><tr><td>Anti-tussives</td><td>- Tolu Balsam</td></tr><tr><td>Anti-rheumatics</td><td>- Colchicum seed</td></tr><tr><td>Anti-tumor</td><td>- Vinca, Podophyllum</td></tr><tr><td>Anti-leprotics</td><td>- Chaulmoogra oil</td></tr><tr><td>Antidiabetics</td><td>- Pterocarpus, Gymnema</td></tr><tr><td>Diuretics</td><td>- Gokhru, Punarnava</td></tr><tr><td>Anti-dysenterics</td><td>- Ipecacuanha</td></tr><tr><td>Antiseptics and disinfectants</td><td>- Benzoin, Myrrh, Neem, Turmeric</td></tr><tr><td>Antimalarials</td><td>- Cinchona, Artemisia</td></tr><tr><td>Oxytocics</td><td>- Ergot</td></tr><tr><td>Vitamins</td><td>- Cod liver oil, Shark liver oil</td></tr></table>	Laxatives	- Aloe, Castor oil, Ispaghula, Senna	Cardiotonics	- Digitalis, Arjuna	Carminatives and G.I. regulators	-Coriander, Fennel, Cardamom, Ginger, Clove, Black Pepper, Asafoetida, Nutmeg, Cinnamon	Astringents	- Myrobalan, Black Catechu	Drugs acting on nervous system	- Hyoscyamus, Belladonna, Ephedra, Opium, Tea leaves, Coffee seeds, Coca	Anti-hypertensive	- Rauwolfia	Anti-tussives	- Tolu Balsam	Anti-rheumatics	- Colchicum seed	Anti-tumor	- Vinca, Podophyllum	Anti-leprotics	- Chaulmoogra oil	Antidiabetics	- Pterocarpus, Gymnema	Diuretics	- Gokhru, Punarnava	Anti-dysenterics	- Ipecacuanha	Antiseptics and disinfectants	- Benzoin, Myrrh, Neem, Turmeric	Antimalarials	- Cinchona, Artemisia	Oxytocics	- Ergot	Vitamins	- Cod liver oil, Shark liver oil	34
Laxatives	- Aloe, Castor oil, Ispaghula, Senna																																			
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Vitamins	- Cod liver oil, Shark liver oil																																			

	Enzymes Pharmaceutical Aids Miscellaneous	- Papaya, Diastase, Pancreatin, Yeast - Kaolin, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin - Squill, Galls, Pale catechu, Aswagandha, Vasaka, Tulsi, Guggul	
6	<b>Plant fibers used as surgical dressings:</b> Sutures – Surgical Catgut and Ligatures	Cotton, silk, wool and regenerated fibers	<b>03</b>
7	<b>1. Basic principles involved in the alternative system of medicine like:</b> Ayurveda, Sidha, Unani and Homeopathy <b>2. Method of preparation of Ayurvedic formulations in like:</b> Arista, Asava, Gutika, Taila, Churna, Lehya and Bhasma		<b>08</b>
8	Role of medicinal and aromatic plants in national economy and their export potential		<b>02</b>
9	<b>Herbs as health food:</b> Brief introduction and therapeutic applications of: Nutraceuticals, Antioxidants, Pro-biotics, Pre-biotics, Dietary fibers, Omega-3-fatty acids, Spirulina, Carotenoids, Soya and Garlic		<b>05</b>
10	<b>Herbal cosmetics:</b> Sources, chemical constituents, commercial preparations, therapeutic and cosmetic uses of : Aloe vera gel, Almond oil, Lavender oil, Olive oil, Rosemary oil, Sandal Wood oil		<b>05</b>

## Practicals

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

### Minimum of 25 experiments to be conducted

- 1 Morphological Identification of drug :  
Ispaghula, Senna, Coriander, Fennel, Cardamom, Ginger, Nutmeg  
Black Pepper, Cinnamon, Clove, Ephedra, Rauwolfia, Gokhru,  
Punarnava, Cinchona, Agar.
- 2 Gross anatomical studies (Transverse Section) of the following drugs:  
Senna, Datura, Cinnamon, Cinchona, Coriander, Fennel, Clove,  
Ginger, Nuxvomica, Ipecacuanha.
- 3 Physical and chemical tests for evaluation of drugs  
Asafoetida, Benzoin, Pale catechu, Black catechu, Castor oil, Acacia,  
Tragacanth, Agar, Guar gum, Gelatin.

### Recommended Books

1. Text book of Pharmacognosy by C. K. Kokate, S. B. Gokhale, A.P. Purohith, Nirali Prakashan
2. Text book of Pharmacognosy by C.S. Shah and J. S. Quadry, CBS Publishers & Distributors Pvt. Ltd.
3. Text Book of Pharmacognosy by T. E. Wallis. CBS Publishers & Distributors Pvt. Ltd.
4. Study of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
5. Powder crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal
6. Anatomy of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal

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#### 4. Human Anatomy and Physiology

**Scope:** This course is designed to impart basic knowledge on the structure and functions of the human body. It helps in understanding both homeostasis mechanism and homeostatic imbalances of various systems of human body.

**Objectives:** Upon the completion of the course, the student shall be able to

- Understand the structure and functions of the various organs of the human body
- Understand the various homeostatic mechanisms and their imbalance
- Perform the haematological tests and also record the blood pressure, heart rate, pulse rate and respiratory volumes

**Theory**

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

Chapter	Topic	Hours
1	Scope of Anatomy and Physiology. Definition of various terminology	2
2	<b>Structure of Cell:</b> components and its functions	2
3	<b>Tissues of the human body:</b> Epithelial, Connective, Muscular and Nervous tissues – their sub-types and characteristics.	4
4	a) <b>Osseous system</b> : structure and functions of bones of axial and appendicular skeleton b) Classification, types and movements of joints, disorders of joints	3 3
5	<b>Haemopoetic system</b> <ul style="list-style-type: none"><li>• Composition and functions of blood</li><li>• Process of Haemopoiesis</li><li>• Characteristics and functions of RBC's, WBC's and platelets</li><li>• Mechanism of Blood Clotting</li><li>• Importance of Blood groups</li></ul>	8
6	<b>Lymphatic system</b> <ul style="list-style-type: none"><li>• Lymph and lymphatic system, composition, function and its formation.</li><li>• Structure and functions of spleen and lymph node.</li></ul>	3
7	<b>Cardiovascular system</b> <ul style="list-style-type: none"><li>• Anatomy and Physiology of heart</li><li>• Blood vessels and circulation (Pulmonary, coronary and systemic circulation)</li><li>• Cardiac cycle and Heart sounds, Basic knowledge of ECG</li><li>• Blood pressure and its regulation</li></ul>	8
8	<b>Respiratory system</b> <ul style="list-style-type: none"><li>• Anatomy of respiratory organs and their functions.</li><li>• Regulation of respiration.</li><li>• Respiratory volumes and capacities ( definition)</li></ul>	4
9	<b>Digestive system</b> <ul style="list-style-type: none"><li>• Anatomy and Physiology of GIT.</li><li>• Anatomy and functions of accessory glands.</li><li>• Physiology of digestion and absorption</li></ul>	8
10	<b>Skeletal muscles</b> <ul style="list-style-type: none"><li>• Histology</li><li>• Physiology of muscle contraction</li><li>• Disorder of skeletal muscles</li></ul>	2
11	<b>Nervous system</b> <ul style="list-style-type: none"><li>• Classification of nervous system</li></ul>	8

	<ul style="list-style-type: none"> <li>Anatomy and physiology of cerebrum, cerebellum, mid brain</li> <li>Function of hypothalamus, medulla oblongata and basal ganglia</li> <li>Spinal cord-structure and reflexes</li> <li>Names and functions of cranial nerves.</li> <li>Anatomy and physiology of sympathetic and parasympathetic nervous system (ANS)</li> </ul>	
12	<b>Sense organs</b> Anatomy and physiology of <ul style="list-style-type: none"> <li>Eye,</li> <li>Ear,</li> <li>Skin</li> <li>Tongue and nose</li> </ul>	6
13	<b>Urinary system</b> <ul style="list-style-type: none"> <li>Anatomy and physiology of urinary system</li> <li>Physiology of urine formation</li> <li>Renin - angiotensin system</li> <li>Clearance tests and micturition.</li> </ul>	4
14	<b>Endocrine system (Hormones and their functions)</b> <ul style="list-style-type: none"> <li>Pituitary gland</li> <li>Adrenal gland</li> <li>Thyroid and parathyroid gland</li> <li>Pancreas and gonads</li> </ul>	6
15	<b>Reproductive system</b> <ul style="list-style-type: none"> <li>Anatomy of Male and female reproductive system</li> <li>Physiology of menstruation</li> <li>Spermatogenesis and Oogenesis</li> <li>Pregnancy and parturition</li> </ul>	4

## Practicals

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

### List of experiments

- Study of compound microscope
- General techniques for the collection of blood
- Microscopic examination of Epithelial tissue, Cardiac muscle, Smooth muscle, Skeletal muscle, connective tissue and Nervous tissue.
- Study of Human Skeleton-Axial skeleton and appendicular skeleton
- Study of appliances used in Haematological experiments
- Determination of
  - Blood group
  - ESR
  - Haemoglobin content of blood
  - Bleeding time and Clotting time
- Determination of WBC count of blood
- Determination of RBC count of blood
- Determination of Differential count of blood
- Recording of Blood Pressure
- Recording of Body temperature, Pulse rate and Heart rate
- Study of various systems and organs with the help of chart, models and specimen
  - Cardiovascular system
  - Respiratory system
  - Digestive system

- d) Urinary system
- e) Endocrine system
- f) Reproductive system
- g) Nervous system
- h) Eye
- i) Ear
- j) Skin

**Recommended Books:**

1. Human Physiology by C. C. Chatterjee
2. Human Anatomy and Physiology by S. Chaudhary and A. Chaudhary
3. Derasari and Gandhi's elements of Human Anatomy, Physiology and Health Education
4. S.R. Kale and R.R. Kale, Textbook of Practical Anatomy and Physiology

**Reference Books:**

1. Ross and Wilson Anatomy and Physiology in Health and illness
2. Human Anatomy and Physiology by Tortora Gerard J
3. Fundamentals of medical Physiology by K.Sambulingam and Prana Sambulingam
4. Ranade V.G. Text book of Practical Physiology
5. Goyal R.K., Natvar M.P. and Shah S.A., Practical Anatomy, Physiology and biochemistry, Experimental Physiology

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## **5. Social Pharmacy**

**Scope:** This course is designed to impart basic knowledge on public health, safe use of medicines, smoking cessation, health promotion, immunisation, de-addiction, abuse and misuse of drugs.

**Objectives:** Upon completion of the course, the student shall be able to understand

- the disease preventive measures
- health promotion and education
- the social responsibility of the pharmacist in public health

**Theory**

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

Chapter	Topic	Hours
1	<b>Introduction to Social Pharmacy</b> <ul style="list-style-type: none"> <li>• Definition and Scope. Social Pharmacy as a discipline and its scope in improving the public health. Role of Pharmacist in Public Health.</li> <li>• Concept of Health-WHO Definition, various dimensions, determinants, and health indicators.</li> <li>• National Health Policy</li> </ul>	4
2	<b>Preventive care</b> <ul style="list-style-type: none"> <li>• Demography and Family Planning.</li> <li>• Mother and child health, importance of breastfeeding, ill effects of weaning foods and bottle feeding</li> <li>• Vaccines and immunizations</li> <li>• Effect of Environment on Health– Water pollution, importance of safe drinking water, waterborne diseases, air pollution, noise pollution, sewage and solid waste disposal, occupational illnesses</li> <li>• Psychosocial Pharmacy: Drugs of misuse and abuse – psychotropics, narcotics, alcohol, tobacco and tobacco products. Social Impact of these habits on social health and productivity</li> <li>• Personal hygiene and sanitation in reproductive age group</li> <li>• Role of pharmacist in preventive care</li> </ul>	16
3	<b>Nutrition and Health</b> <ul style="list-style-type: none"> <li>• Basics of nutrition – Macronutrients and Micronutrients</li> <li>• Fibre diet– importance and sources (Plant and animal origin),</li> <li>• Calorific and nutritive values of various foods</li> <li>• Balanced diet, nutrition deficiency diseases, ill effects of junk foods</li> <li>• Genetically modified foods – Definition, advantages, disadvantages</li> <li>• Ill effects of artificial ripening, hybridization, use of pesticides, adulteration of foods.</li> <li>• Nutrition/dietary recommendation for diabetes, blood pressure, Hyperlipidemia, arthritis, renal disease, liver disease.</li> <li>• Artificial sweeteners, zero calorie concept, glycemic index of foods</li> <li>• Dietary supplements, nutraceuticals, food supplements, – indications, benefits, Drug -Food Interactions</li> </ul>	10
4	<b>Health Promotion and Health education</b> Epidemiology of Communicable Diseases : Causative agents and Clinical presentations and Role of Pharmacist in educating the public in prevention of communicable diseases : <ul style="list-style-type: none"> <li>• Respiratory infections – chickenpox, measles, rubella, mumps, influenza (including Avian-Flu, H1N1), diphtheria, whooping cough, meningococcal meningitis, acute respiratory infections, tuberculosis</li> </ul>	40

	<ul style="list-style-type: none"> <li>• Intestinal infections – poliomyelitis, viral hepatitis, cholera, acute diarrhoeal diseases, typhoid, food poisoning, amebiasis, worm infestations</li> <li>• Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya</li> <li>• Surface infections – trachoma, tetanus, leprosy, STDs, HIV/AIDS</li> </ul>	
5	Introduction to health systems and National health programs in India. Basics of disaster management.	5

### Recommended Books

1. Social Pharmacy – Innovation and development edt. Geoff Harding, Sarah Nettleton and Kevin taylor. The Pharmaceutical Press.
2. Text Book of Community Pharmacy Practice. RPSGB Publication
3. Community Pharmacy Handbook- Jonathan Waterfield
4. S.Khurana, P Suresh and R Kalsi. Health Education & Community Pharmacy. S Vikas & Co
5. Social Pharmacy: Tayler,Geoffery. Pharmaceutical Press. London.

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## 1. Pharmacology

**Scope:** The subject provides basic knowledge of drugs with regard to definition, classification, pharmacokinetics and pharmacodynamics, uses, dose, route of administration, contraindications.

**Objectives:** Upon the completion of the course, the student shall be able to understand

- pharmacokinetics and pharmacodynamics of various drugs
- the clinical uses, dose, adverse effects indications and contraindications of various drugs

**Theory**

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

Chapter	Topic	Hours
1	<b>General Pharmacology</b> <ul style="list-style-type: none"><li>• Introduction and scope of Pharmacology</li><li>• Various routes of drug administration- advantages and disadvantages</li><li>• Drug absorption- definition, types, factors affecting drug absorption</li><li>• Bio availability and the factors affecting the bioavailability</li><li>• Drug distribution- definition, factors affecting drug distribution</li><li>• Biotransformation of drugs- Definition, types of biotransformation reactions</li><li>• Excretion of drugs- Definition, routes of drug elimination</li><li>• General mechanisms of drug action and factors modifying drug action</li></ul>	8
2	<b>Drugs Acting on Peripheral Nervous System</b> <ul style="list-style-type: none"><li>• Steps involved in neurohumoral transmission</li><li>• Definition, classification, pharmacological actions, dose, indications, and contraindications of<ul style="list-style-type: none"><li>a) Cholinergic drugs</li><li>b) Anti-Cholinergic drugs</li><li>c) Adrenergic drugs</li><li>d) Adrenergic receptor blockers</li><li>e) Neuromuscular blocking agents</li><li>f) Drugs used in Myasthenia gravis</li><li>g) Local anaesthetic agents</li><li>h) Non Steroidal Anti-Inflammatory drugs (NSAIDs)</li></ul></li></ul>	13
3	<b>Drugs Acting on Eye</b> Definition, classification, pharmacological actions, dose, indications and contraindications of Miotics, Mydriatics and Cycloplegics	2
4	<b>Drugs Acting on the Central Nervous System</b> Definition, classification, pharmacological actions, dose, indications and contraindications of <ul style="list-style-type: none"><li>• General anaesthetics</li><li>• Hypnotics and sedatives</li><li>• Anti-Convulsant drugs</li><li>• Anti-anxiety drugs</li><li>• Anti-depressant drugs</li><li>• Centrally acting muscle relaxants</li><li>• Narcotic analgesics</li></ul>	10
5	<b>Drugs Acting on Cardiovascular System</b> Definition, classification, pharmacological actions, dose, indications and contraindications of <ul style="list-style-type: none"><li>• Anti-hypertensive drugs</li><li>• Anti-anginal drugs</li></ul>	6



	<ul style="list-style-type: none"> <li>• Anti-arrhythmic drugs</li> <li>• Drugs used in atherosclerosis and congestive heart failure.</li> </ul>	
6	<b>Drugs Acting on Blood and Blood Forming Organs</b> Definition, classification, pharmacological actions, dose, indications and contraindications of Haematinics, Anti-coagulants and Anti platelet drugs.	4
7	Definition, classification, pharmacological actions, dose, indications and contraindications of <ul style="list-style-type: none"> <li>• Bronchodilators</li> <li>• Expectorants</li> <li>• Anti-tussives</li> </ul>	2
8	<b>Drugs Acting on Gastro Intestinal Tract</b> Definition, classification, pharmacological actions, dose, indications and contraindications of <ul style="list-style-type: none"> <li>• Anti-ulcer drugs</li> <li>• Anti-emetics</li> <li>• Laxatives and purgatives</li> <li>• Anti-diarrheal drugs</li> </ul>	5
8	<b>Drugs Acting on Kidney</b> Definition, classification, pharmacological actions, dose, indications, and contraindications of <ul style="list-style-type: none"> <li>• Diuretics</li> <li>• Anti-Diuretics</li> </ul>	2
9	<b>Hormones and Hormone Antagonists</b> <ul style="list-style-type: none"> <li>• Physiological and pathological role and clinical uses of thyroid hormones and anti-thyroid drugs, Parathormone, calcitonin and vitamin D</li> <li>• Insulin, Oral hypoglycemic agents</li> <li>• Estrogen and Progesterone</li> <li>• Oxytocin</li> </ul>	8
10	<b>Autocoids</b> <ul style="list-style-type: none"> <li>• Physiological role of Histamine, 5 HT and Prostaglandins.</li> <li>• Classification, clinical uses and adverse effects of antihistamines and 5 HT antagonists</li> </ul>	3
11	<b>Chemotherapy</b> Classification, dose, indication and contraindications of drugs belonging to <ul style="list-style-type: none"> <li>• Penicillins</li> <li>• Cephalosporins</li> <li>• Aminoglycosides</li> <li>• Fluoroquinolones</li> <li>• Anti-tubercular drugs</li> <li>• Anti-fungal drugs</li> <li>• Anti-viral drugs</li> <li>• Anti-cancer</li> </ul>	12

## Practicals

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

- Demonstration with recommended software and explanations only
- No use of animals for doing the Experiments

### Minimum of 25 experiments to be conducted

1. Introduction to experimental pharmacology
2. Study of laboratory animals (a. Mice, b. Rats c. Guinea pigs, d. Rabbits)
3. Commonly used instruments in Experimental Pharmacology
4. Study of different routes of administration of drugs
5. Study of Local anaesthetics on rabbit eye and study of Mydriatic and Mitotic effect on rabbit eye
6. Demonstration of effect of analgesics using Analgesiometer
7. Principles involved in screening of anti-convulsant in mice or rats
8. Principles involved in screening of Muscle relaxants using Rota Rod apparatus
9. Principles involved in screening of CNS stimulants and depressants using actophotometer
10. Pyrogen testing by rabbit method
11. Study of effect of drugs on isolated heart
12. Effect of drugs on ciliary motility on frog's buccal cavity

### Recommended Books

1. Satoskar, R.S. and Bhandarkar, S.D. Pharmacology and Pharmacotherapeutics
2. B. Suresh, A Text Book of Pharmacology
3. Derasari and Ghandhi, Elements of Pharmacology
4. S.K.Kulkarni ,Practical Pharmacology and Clinical Pharmacy
5. Ex- pharm 1.00 soft ware

### Reference Books

6. H.K.Sharma. Principles of Pharmacology
7. Mary J.Mycek, Lippincott Williams and Wilkins. Lippincott's illustrated Reviews:Pharmacology
8. Tripathi, K.D. Essentials of Medical Pharmacology.

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## 2. Community Pharmacy and Management

**Scope:** The course is designed to impart basic knowledge and skills to provide various pharmaceutical care services to patients and general practitioners in the community setup.

**Objectives:** Upon completion of the course, the student shall be able to understand the procedure to set up and manage the community pharmacy

- to review and fill the prescriptions
- to counsel the patients about the disease and medications.

- to check Blood Pressure, capillary blood glucose and lung function

## Theory

75 Hours (3 hrs/week)

Chapter	Topic	Hours
1	<b>Community Pharmacy Practice</b> – Definition, history and development of community pharmacy- International and Indian scenario	2
2	Professional responsibilities of community pharmacist.  Introduction to concept of Good Pharmacy Practice	3
3	<b>Prescription and prescription handling</b> <ul style="list-style-type: none"> <li>• Definition, Parts of prescriptions, legality of prescriptions, Prescription handling, labelling of dispensed medications (Main label, Ancillary label, pictograms), brief instructions on medication usage.</li> <li>• Dispensing process, dispensing errors and strategies to minimize them</li> </ul>	6
4	<b>Patient counselling</b> <ul style="list-style-type: none"> <li>• Definition and Benefits of patient counselling,</li> <li>• Stages – counselling Introduction, counselling content, counselling process and counselling conclusion,</li> <li>• Barriers –Types and strategies to overcome the barriers</li> <li>• Counselling points for the selected chronic diseases ( Hypertension, Diabetes, Asthma, Tuberculosis, Chronic obstructive pulmonary disease and AIDS)</li> <li>• PPIs – (Patient Package Insert) - Definition, Importance and benefits of PPIs. Scenario of PPI use in India and other countries.</li> <li>• Patient Information leaflets- Definition and uses</li> </ul>	10
6	<b>Communication skills</b> <ul style="list-style-type: none"> <li>• Definition, types of communication skills</li> <li>• Interactions with professionals and patients</li> <li>• Verbal communication skills (one-to-one, over the telephone)</li> <li>• Written communication skills</li> <li>• Body language,</li> <li>• Patient interview techniques</li> </ul>	6
7	<b>Medication Adherence</b> Definition, factors influencing non adherence, strategies to overcome non adherence	2
8	<b>Health Screening services</b> <ul style="list-style-type: none"> <li>• Introduction and usefulness of health screening services</li> <li>• Blood Pressure measurement</li> <li>• Recording of capillary blood glucose</li> <li>• Lung function assessment using peak flow meter</li> <li>• Calculation of Body mass index</li> </ul>	5
9	<b>Over The Counter (OTC) medications</b> <ul style="list-style-type: none"> <li>• Definition, need and role of Pharmacist in OTC medication dispensing.</li> <li>• OTC medications in India, counseling for OTC products.</li> <li>• Self medication and role of pharmacist in promoting safe self-medication</li> </ul>	3
10	<b>Responding to symptoms/minor ailments</b> Etiopathogenesis, clinical presentations, non-pharmacological and	20

	pharmacological drug therapy of following minor ailments <ul style="list-style-type: none"> <li>• Head ache,</li> <li>• GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhea, constipation),</li> <li>• Worm infestations,</li> <li>• Pyrexia,</li> <li>• Ophthalmic disorders (Glaucoma and Conjunctivitis)</li> <li>• Upper Respiratory Tract infections,</li> <li>• Skin infections,</li> <li>• Oral and dental disorders.</li> </ul>	
11	<b>Community Pharmacy Management</b> <ul style="list-style-type: none"> <li>• Legal requirements to set up a community pharmacy</li> <li>• Site selection requirements,</li> <li>• Pharmacy designs and interiors</li> <li>• Vendor selection and ordering</li> <li>• Procurement, inventory control methods, and inventory management</li> <li>• Financial planning and management</li> <li>• Accountancy in community pharmacy – Day book, Cash book</li> <li>• Introduction to pharmacy operation softwares – usefulness and availability.</li> <li>a) Standard Operating Procedures (SOP) of Pharmacy management</li> </ul>	18

### Practicals

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

Minimum of 25 experiments to be conducted

1. Introduction to community pharmacy practice
2. Review of prescriptions for legality and completeness
3. Review of prescriptions for drug-drug interactions
4. Preparation of dispensing labels for medicines
5. Health Screening services – B.P recording, Capillary Blood Glucose check up, Lung function assessment through peak flow meter.
6. Counselling of patients for chronic diseases and medications
7. Counselling of patients in minor ailments
8. Visit to other community pharmacies and study of the activities and prepare a report

### Recommended Books

1. Health Education and Community Pharmacy by N.S.Parmar.
2. WHO consultative group report.
3. Drug store & Business management by Mohammed Ali & Jyoti.
4. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical Press
5. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams & Wilkins.
6. Good Pharmacy Practices Training Manual by IPA/CDSCO/WHO India

7. Training Module for Community Pharmacists in TB Care and Control/ by MoH/IPA
8. Hand Book of PharmaSoS, Drugs in Special population- Pregnancy and Lactation, Tobacco free future- Choice is yours: KSPC Publications.

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### 3. Biochemistry & Clinical Pathology

- **Scope:** This course is designed to impart basic knowledge on the study of structure and functions of bio molecules and the chemical process associated with living cells in normal and abnormal state. The course is emphasize on the clinical pathology of blood and urine

**Objectives:** Upon completion of the course, the student shall be able to understand

- the structure and functions of biomolecules
- the catalytic activity, diagnostic and therapeutic importance of enzymes
- the metabolic pathways of biomolecules in health and illness (metabolic disorders)
- the biochemical principles of organ function tests and their clinical significance
- qualitative and quantitative determination of biomolecules/metabolites in the body fluids.
- the clinical pathology of blood and urine

Chapter	Topic	Hours
1	<b>Introduction to biochemistry:</b> Scope of biochemistry in pharmacy; Cell and its biochemical organization.	2
2	<b>Carbohydrates</b> <ul style="list-style-type: none"> <li>Definition, classification with examples</li> <li>Monosaccharides-Structure of glucose, fructose and galactose</li> <li>Disaccharides-Structure of maltose, lactose and sucrose</li> <li>Polysaccharides-chemical nature of starch and glycogen</li> <li>Qualitative tests and biological role carbohydrates</li> </ul>	5
3	<b>Proteins</b> <ul style="list-style-type: none"> <li>Definition, classification of proteins based on composition and solubility with examples</li> <li>Definition, classification of amino acids based on chemical nature and nutritional requirements with examples</li> <li>Structure of proteins (four level of organization of protein structure)</li> <li>Qualitative tests and biological role proteins and amino acids.</li> <li>Diseases related to malnutrition of proteins.</li> </ul>	6
4	<b>Lipids</b> <ul style="list-style-type: none"> <li>Definition, classification with examples</li> <li>Structure and properties of triglycerides (oils and Fats)</li> <li>Fatty acid classification-Based on chemical and nutritional requirements with examples</li> <li>Structure and functions of cholesterol in the body</li> <li>Lipoproteins- types, composition and functions in the body</li> <li>Qualitative tests and functions of lipids</li> </ul>	5
5	<b>Nucleic acids</b> <ul style="list-style-type: none"> <li>Definition, purine and pyrimidine bases</li> <li>Components of nucleosides and nucleotides with examples</li> <li>Structure of DNA (Watson &amp; Crick model), RNA and their functions</li> </ul>	4
6	<b>Enzymes</b> <ul style="list-style-type: none"> <li>Definition, properties and IUB &amp; MB classification</li> <li>Factors affecting enzyme activity</li> <li>Enzyme inhibitors,</li> <li>Therapeutic and pharmaceutical importance of enzymes</li> </ul>	5
7	<b>Vitamins</b> <ul style="list-style-type: none"> <li>Definition and classification with examples</li> <li>Sources, chemical nature, functions, coenzyme form, recommended dietary requirements, deficiency diseases of fat and water soluble vitamins</li> </ul>	6
8	<b>Metabolism</b> (Study of cycle/pathways without chemical structures) <ul style="list-style-type: none"> <li>Metabolism of Carbohydrates: Glycolysis, TCA cycle and glycogen metabolism, regulation of blood glucose level. Diseases related to abnormal metabolism of Carbohydrates</li> <li>Metabolism of lipids: Lipolysis, <math>\beta</math>-oxidation of Fatty acid (Palmitic acid) and its energetic, ketogenesis and ketolysis. Diseases related to</li> </ul>	20

	<p>abnormal metabolism of lipids such as ketoacidosis, Fatty liver, Hypercholesterolemia</p> <ul style="list-style-type: none"> <li>Metabolism of Amino acids (Proteins): General reactions of amino acids and its significance—Transamination, deamination, Urea cycle and decarboxylation. Diseases related to abnormal metabolism of amino acids, Disorders of ammonia metabolism, phenylketonuria, alkaptonuria and Jaundice.</li> <li>Biological oxidation: Electron transport chain and Oxidative phosphorylation</li> </ul>	
9	<b>Minerals:</b> Functions, Deficiency diseases, recommended dietary requirements of calcium, phosphorus, iron, sodium and chloride	<b>05</b>
10	<p><b>Water and Electrolytes</b></p> <ul style="list-style-type: none"> <li>Distribution, functions of water in the body</li> <li>Water turnover &amp; balance.</li> <li>Electrolyte composition of the body fluids, Dietary intake of electrolyte and Electrolyte balance.</li> <li>Dehydration, causes of dehydration and oral dehydration therapy.</li> </ul>	<b>05</b>
11	<p><b>Organ function tests</b></p> <ul style="list-style-type: none"> <li>Functions of kidney and routinely performed tests to assess the functions of kidney and their clinical significances.</li> <li>Functions of liver and routinely performed test to assess the functions of liver and their clinical significances.</li> <li>Lipid profile tests and its clinical significances</li> </ul>	<b>06</b>
12	<p><b>Introduction to Pathology of Blood and Urine</b></p> <ul style="list-style-type: none"> <li>Lymphocytes and Platelets, their role in health and disease</li> <li>Erythrocytes - Abnormal cells and their significance</li> <li>Normal and Abnormal constituents of Urine and their significance</li> </ul>	<b>06</b>

## Practical

**75 Hours (3 Hours/Week)**

- |   |   |               |
|---|---|---------------|
| 1 | Qualitative analysis of carbohydrates   | 4 experiments |
| 2 | Qualitative analysis of Proteins & amino acids  | 4 experiments |
| 3 | Qualitative analysis of lipids  | 2 experiments |
| 4 | Qualitative analysis of urine for normal and abnormal constituents                                      | 4 experiments |
| 5 | Determination of constituents of urine (glucose, creatinine, chlorides)                                 | 2 experiments |
| 6 | Determination of constituents of blood/serum (Creatine, glucose, cholesterol, Calcium, Urea, SGOT/SGPT) | 5 experiments |
| 7 | Study the hydrolysis of starch from acid and salivary amylase enzyme                                    | 1 experiment  |

## Recommended Books

1. Essentials of Biochemistry by U. Satyanarayan, Books and Allied (P) Ltd.
2. A Textbook of Biochemistry by A.V.S.S. Rama Rao, UBS Publishers' Distributors Pvt. Ltd.
3. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
4. Laboratory manual of Biochemistry by Pattabiraman and Sitaram Acharya

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## 4. Pharmacotherapeutics

**Scope:** The course is designed to impart basic knowledge of etiopathogenesis, disease management and drug related problems.

**Objectives:** Upon completion of the course, the student shall be able to understand the clinical manifestations of various diseases

- drug therapy of various diseases
- medication counselling points

**Theory**

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

Chapter	Topic	Hours
I	Pharmacotherapeutics – Introduction, scope and objectives	1



II.	Definition, etiopathogenesis, clinical manifestations, non pharmacological and pharmacological management of the diseases associated with	
1	<b>Cardiovascular System</b> <ul style="list-style-type: none"> <li>• Hypertension</li> <li>• Angina and Myocardial infarction</li> <li>• Hyperlipidemia</li> <li>• Congestive Heart Failure</li> </ul>	10
2	<b>Respiratory System</b> <ul style="list-style-type: none"> <li>• Asthma</li> <li>• COPD</li> </ul>	4
3	<b>Endocrine System</b> <ul style="list-style-type: none"> <li>• Diabetes.</li> <li>• Thyroid disorders- Hypo and Hyperthyroidism</li> </ul>	4
4	<b>CNS</b> <ul style="list-style-type: none"> <li>• Epilepsy,</li> <li>• Parkinson's disease,</li> <li>• Stroke</li> <li>• Migraine</li> </ul>	8
5	<b>GI Disorders</b> <ul style="list-style-type: none"> <li>• Gastro esophageal reflux disease</li> <li>• Acid Pepsin Disease,</li> <li>• Alcoholic liver disease</li> <li>• Inflammatory Bowel Diseases (Crohns disease and Ulcerative colitis).</li> </ul>	8
6	<b>Hematological disorders</b> <ul style="list-style-type: none"> <li>• Iron deficiency anemia,</li> <li>• Megaloblastic anemia</li> </ul>	4
8	<b>Infectious diseases</b> <ul style="list-style-type: none"> <li>• Tuberculosis</li> <li>• Pneumonia</li> <li>• Urinary tract infections,</li> <li>• Gonorrhoea and Syphilis</li> <li>• Malaria</li> <li>• HIV &amp; Opportunistic infections</li> </ul>	12
9	<b>Musculoskeletal disorders</b> <ul style="list-style-type: none"> <li>• Rheumatoid arthritis,</li> <li>• Osteoarthritis</li> </ul>	4
10	<b>Dermatology:</b> <ul style="list-style-type: none"> <li>• Psoriasis,</li> <li>• Scabies,</li> <li>• Eczema</li> <li>• Impetigo</li> </ul>	6
11	<b>Ophthalmology</b> <ul style="list-style-type: none"> <li>• Conjunctivitis (bacterial and Viral)</li> </ul>	4

	<ul style="list-style-type: none"> <li>• Glaucoma</li> </ul>	
12	<b>Women's Health</b> <ul style="list-style-type: none"> <li>• Contraception – Chemical Methods, IUDs</li> <li>• Disorders related to Menstrual Cycle – Polycystic ovary Syndrome, Dysmenorrhea, Premenstrual Syndrome.</li> </ul>	10

### Recommended Books

1. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication
2. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
3. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA]

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## 5. Hospital and Clinical Pharmacy

**Scope:** This course is designed to impart basic knowledge on drug procurement and distribution to out-patients and in- patients and clinical pharmacy services in the hospital.

**Objectives:** Upon completion of the course, the student shall be able to understand

- the responsibilities of hospital pharmacist and clinical pharmacist
- the drug distribution methods and inventory control techniques
- the biochemical parameters and their significance
- the adverse drug reaction monitoring and reporting

**Theory**

**75 Hours (3 Hours/week)**

S.No.	Topic	Hours
1	<b>Hospital Pharmacy</b> <ul style="list-style-type: none"> <li>• Definition, scope, national and international scenario</li> <li>• Organisational structure,</li> <li>• Professional responsibilities,</li> </ul>	6

	<ul style="list-style-type: none"> <li>• Qualification and experience requirements, job specifications, work load requirements and inter professional relationships,</li> <li>• Good Pharmacy Practice (GPP) in hospital.</li> </ul>	
<b>2</b>	<b>Pharmacy and Therapeutic Committee</b> Objectives, Composition, functions of Pharmacy and Therapeutics committee. <b>Hospital Formulary</b> Definition, procedure for development and use of hospital formulary	<b>4</b>
<b>3</b>	<b>Supply chain &amp; Inventory Control</b> <ul style="list-style-type: none"> <li>• Procedures of Drug Purchases – Drug selection, short term, long term and tender process</li> <li>• Inventory control techniques: Economic Order Quantity, Reorder Quantity Level, Inventory Turnover etc</li> <li>• Inventory Management of Central Drug Store – Storage conditions, Distribution</li> <li>• Documentation- purchase and inventory</li> </ul>	<b>9</b>
<b>4</b>	<b>Drug distribution</b> <ul style="list-style-type: none"> <li>• Drug distribution – Definition, advantages and disadvantages of Individual prescription Order Method, Floor Stock Method, Unit Dose Drug Distribution Method, Drug Basket Method.</li> <li>• Distribution of drugs to ICCU/ICU/Emergency wards.</li> <li>• Automated drug dispensing systems and devices</li> <li>• Distribution of Narcotic and Psychotropic substances</li> </ul>	<b>12</b>
<b>5</b>	<b>Radio Pharmaceuticals</b> Storage, dispensing and disposal of radiopharmaceuticals	<b>2</b>
<b>6</b>	<b>Clinical Pharmacy:</b> Definition, scope and development <b>Daily activities of clinical pharmacist:</b> Definition, goal and procedure of - <ul style="list-style-type: none"> <li>• Ward round participation</li> <li>• Treatment Chart Review</li> <li>• Adverse drug reaction monitoring</li> <li>• Drug information and poisons information</li> <li>• Medication history</li> <li>• Patient counselling</li> </ul> <b>Pharmaceutical care:</b> Definition, classification of drug related problems. Principles and procedure to provide pharmaceutical care	<b>12</b>
<b>7</b>	<b>Clinical laboratory tests used in the evaluation of disease states and interpretation of test results</b> <ul style="list-style-type: none"> <li>• Hematological, Liver function, Renal function, thyroid function tests</li> <li>• Tests associated with cardiac disorders</li> <li>• Fluid and electrolyte balance</li> <li>• Pulmonary Function Tests</li> </ul>	<b>10</b>
<b>8</b>	<b>Drugs and Poison information services</b> – Definition, Information resources with examples, and their advantages and disadvantages, Drug Information Centre services.	<b>4</b>
<b>9</b>	<b>Pharmacovigilance</b> <ul style="list-style-type: none"> <li>• Definition, aim and scope</li> <li>• Overview of Pharmacovigilance</li> </ul>	<b>2</b>
<b>10</b>	<b>Medication errors:</b> Definition, types, consequences, and strategies to minimize the medication errors <b>Drug Interactions:</b> Definition, types, clinical significance of drug	<b>4</b>

	interactions	
<b>11</b>	<b>Poisoning:</b> Types of poisoning: Clinical manifestations and antidotes	<b>2</b>
<b>12</b>	Application of computers in Hospital Pharmacy Practice, Soft ware used in hospital pharmacy	<b>2</b>
<b>13</b>	Medical and Surgical devices	<b>4</b>

### Recommended Books

1. A text book of Clinical Pharmacy Practice; Essential concepts and skills, Dr.G.Parthasarathi et al, Orient Orient Langram Pvt.Ltd. ISSN8125026.
2. Text Book of Hospital and Clinical Pharmacy by Dr. Pratibha Nand and Dr. Roop K Khar, Birla publications, New Delhi
3. Gupta B.K and Gupta R.N., GPP in Hospital Pharmacy, Vallabh Prakashan.
4. Gennaro et al., Ed. "Remington: The Science & Practice of Pharmacy," 20<sup>th</sup> ed., Lippincott Williams & Wilkins, 2000.
5. The Theory and Practice of Industrial Pharmacy. Leon Lachman, Herbert Lieberman, and Joseph Kanig, editors. Lea & Febiger, Philadelphia.
6. Chittion & Witcofski : "Nuclear Pharmacy," Lea & Febiger. Aiiwodd & Fell
7. Australian drug information - Procedure manual. The Society of Hospital Pharmacists of Australia.

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### 6. Pharmacy Law and Ethics

**Scope:** This course is designed to impart basic knowledge on several important legislations related to the profession of pharmacy in India.

**Objectives:** Upon completion of the course, the student shall be able to understand

- the Pharmaceutical legislations and their implications in the development and marketing
- various Indian pharmaceutical Acts and Laws
- the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
- the code of ethics during the pharmaceutical practice

**Theory**

**75 hours (3 hrs/wk)**

Chapter	Topics	Hours
1	General Principals of Law, History and various Acts related to Drugs and Pharmacy profession	4
2	<b>Pharmacy Act-1948 &amp; Rules:</b> Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state	5

	pharmacy councils, Registration of Pharmacists, Offences and Penalties.	
3	<p><b>Drugs and Cosmetics Act 1940 and Rules 1945 &amp; New Amendments</b> Objectives, Definitions, Legal definitions of schedules to the Act and Rules</p> <p><b>Import of drugs</b> – Classes of drugs and cosmetics prohibited from import, Import under license or permit.</p> <p><b>Manufacture of drugs</b> – Prohibition of manufacture and sale of certain drugs, Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.</p> <p>Study of schedule C &amp; C1, G, H, K, P, M, N, and X.</p> <p><b>Sale of Drugs</b> – Wholesale, Retail sale and Restricted license.</p> <p>Drugs Prohibited for manufacture and sale in India</p> <p><b>Administration of the Act and Rules</b> – Drugs Technical Advisory Board, Central Drugs Laboratory, Drugs Consultative Committee, Government analysts, Licensing authorities, controlling authorities, Drug Inspectors.</p>	34
4	<b>Medicinal and Toilet Preparations Act 1955:</b> Objectives, Definitions, Licensing, Offences and Penalties	2
5	<b>Narcotic Drugs and psychotropic substance Act 1985 and Rules</b> Objectives, Definitions, Authorities and Officers, Prohibition, Control and Regulation, Offences and Penalties.	2
6	<b>Drugs and Magic remedies (Objectionable Advertisement) Act 1955</b> Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties.	2
7	<b>Prevention of cruelty to Animals Act-1960:</b> Objectives, Definitions, Institutional Animal Ethics Committee, Breeding and Stocking of Animals, Performance of Experiments, Transfer and Acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties.	2
8	<b>Poisons Act-1919</b> :Introduction, objective, definition, possession, possession for sales and sale of any poison, import of poisons	2
9	<b>Prevention of food adulteration Act, 1954 and Rules:</b> Objective, definition, central committee for food standards, FSSAI (Food Safety and Standards Authority of India), prohibition of import, prohibition of sale, and manufacture, offences and penalties	2
10	<b>National Pharmaceutical Pricing Authority:</b> Drugs Price Control Order (DPCO)-2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, Pharmaceutical policy 2002, National List of Essential Medicines (NLEM)	5

11	<b>Code of Pharmaceutical Ethics:</b> Definition, ethical principles, ethical problem solving, registration, code of ethics for Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath.	15
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### Recommended books

1. Forensic Pharmacy by B. Suresh
2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publications.

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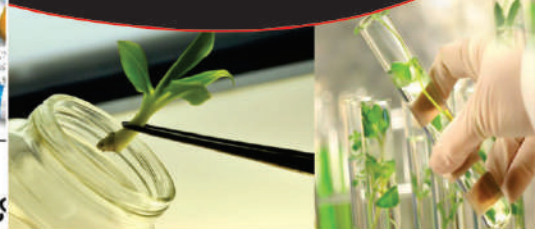


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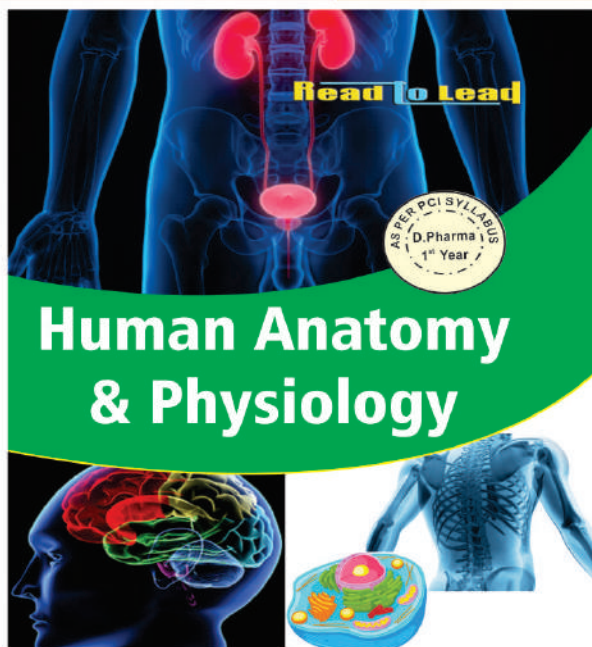


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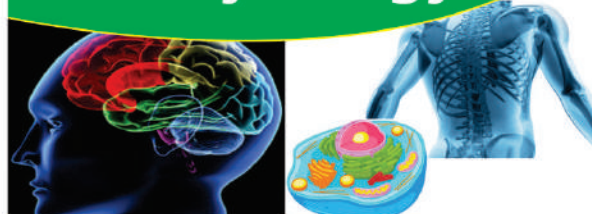


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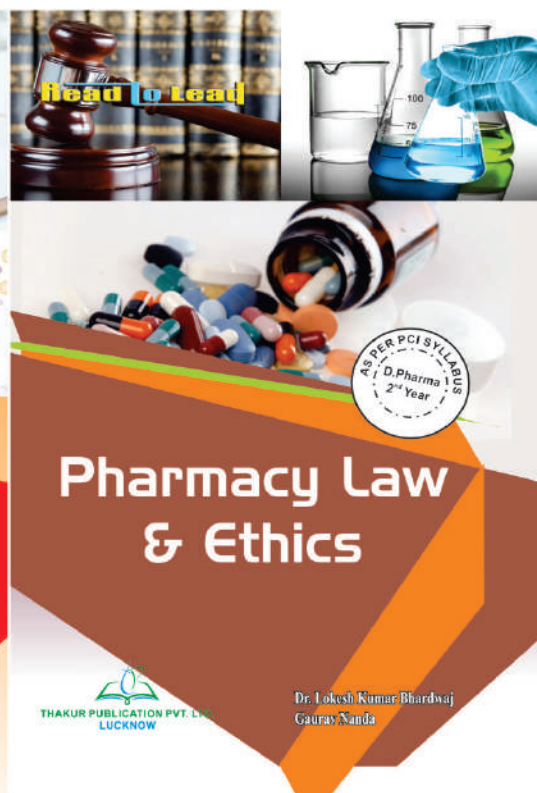
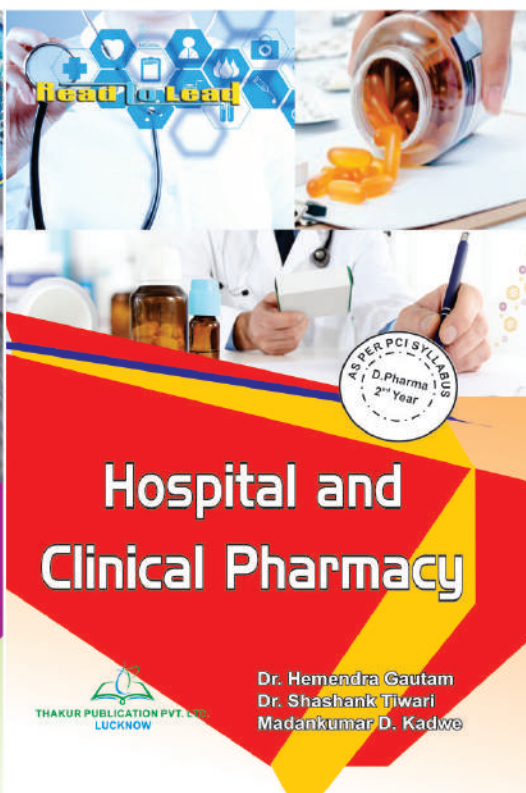
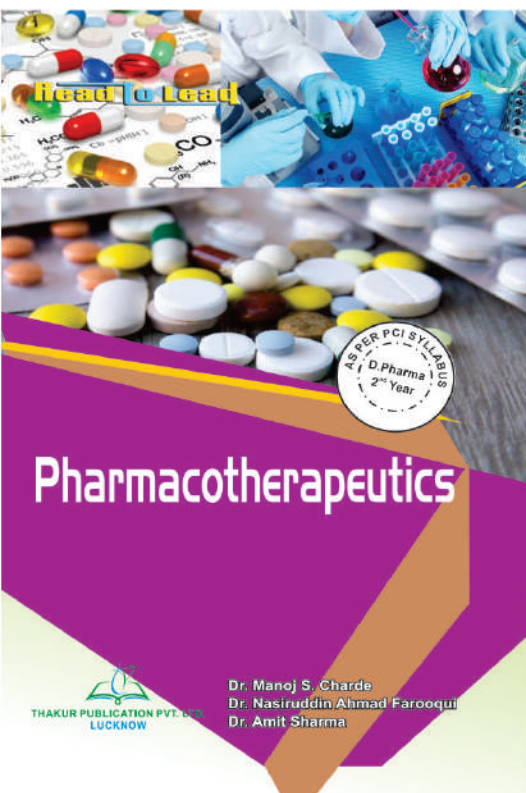
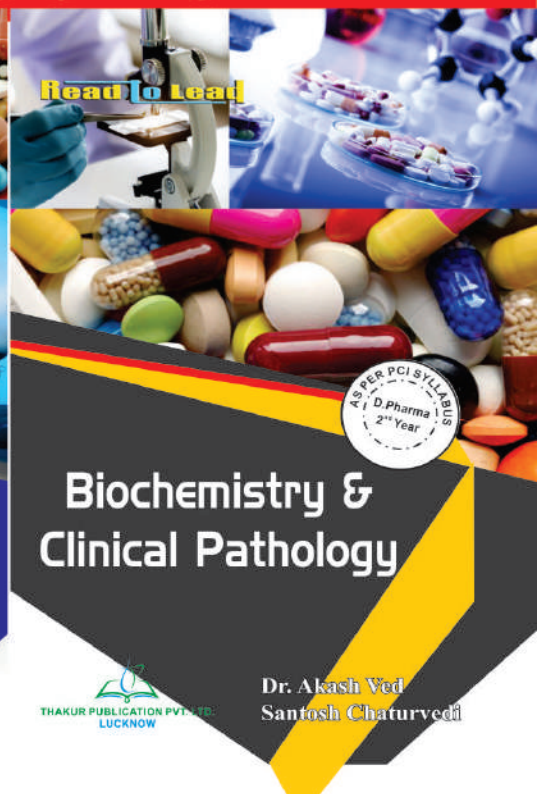
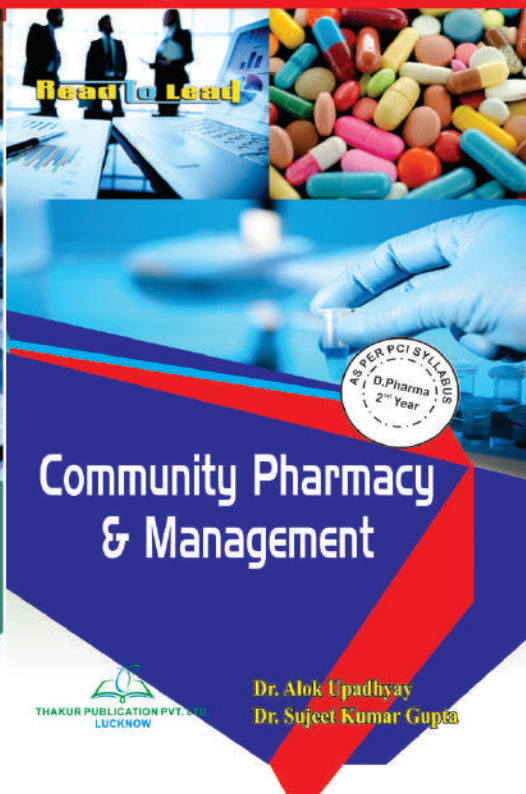
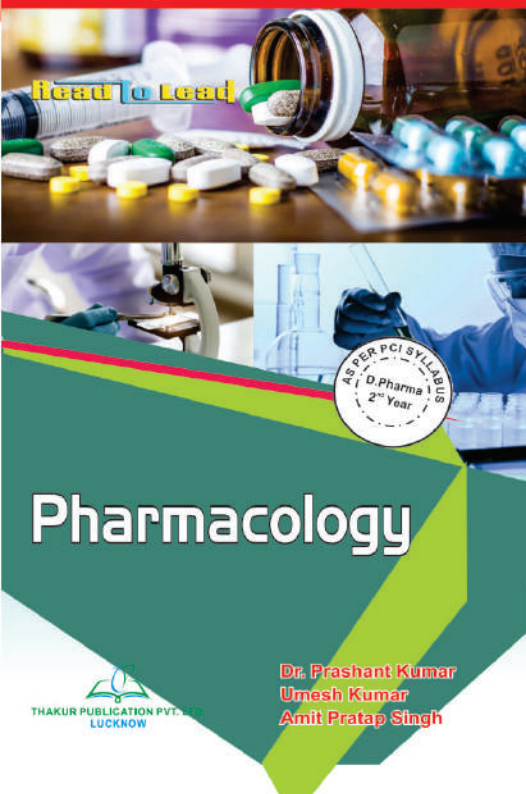


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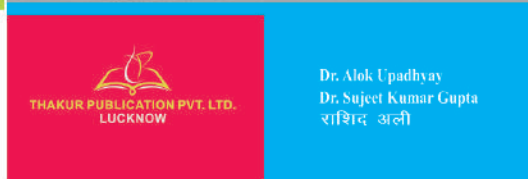
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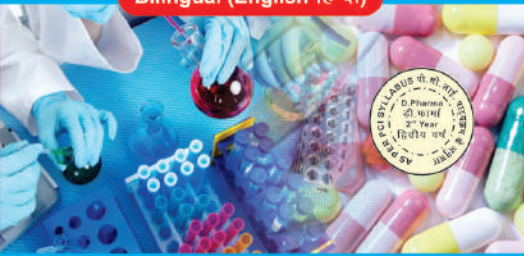
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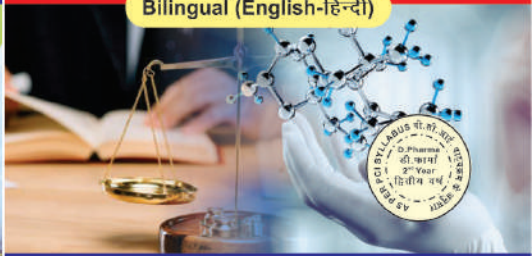
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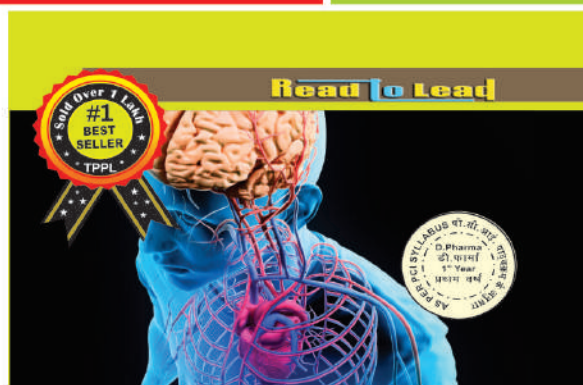
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