

**Diploma in Pharmacy**  
**Curriculum & Syllabus**  
*based on*  
**Education Regulations 2020**



**Pharmacy Council of India**  
**New Delhi**

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## 1. Preamble

“Revamping the curriculum, pedagogy, assessment, and student support” is one of the vision statements and recommendations of the National Education Policy (NEP) of Govt. of India for attaining enhanced learning experiences by the students. In light of this, Pharmacy Council of India, the apex body regulating the pharmacy education in the country, committed to revise the education regulations of Diploma in Pharmacy (DPharm) program and thus, the ‘Education Regulations 2020’ (ER-2020) has been notified in the gazette of India in October, 2020. This new regulation has given due consideration for the fact that, universally the roles of pharmacists undergo continuous evolution from that of ‘dispenser of medicines’ to that of ‘medicine expert’ in the multidisciplinary health care team.

Accordingly, the courses of the existing education regulations (ER-91) have been revisited, compared with the present and future needs of the society, expectations of the healthcare team and other stakeholders from the pharmacists were assessed, feedback from the experts in the pharmacy and other healthcare professions were sought. Thus, the course of study prescribed in ER-2020 is an amalgamation of all such exercises to arrive at a curriculum structure for DPharm that is more relevant to the current practice standards, dynamic to accommodate and address the upcoming changes.

Though the total number of courses across the program remain 21 as that of ER-91, the number of theory courses is reduced from 12 to 11 in the new regulation, while the number of practical courses is increased from 9 to 10. Further, the theory teaching hours across the program have been reduced from 850 to 825, while the practical hours have been increased from 750 to 800 in the new regulation. Three practical courses have been introduced for the first time in ER-2020. Further, about 275 hours have been assigned for the first time in DPharm curriculum for ‘Tutorial’ activities. All such changes explicitly reveal that the ER-2020 is intended to provide a little edge to the experiential learning through the practical courses and encourages the small group teaching-learning, self-directed learning, etc. in the tutorial hours.

Introduction of ‘Pharmacotherapeutics’ courses (theory and practical) is one of the revolutionary changes in the new curriculum, that will help the students to hone their knowledge and skills in the area of pharmaceutical care services which will certainly redefine the roles of the DPharm qualified pharmacists in both community and hospital settings. Also, the introduction of ‘Social Pharmacy’ courses (theory and practical) will provide insights about the primary and preventive healthcare concepts in the country and the potential roles of pharmacists in such healthcare segments.

In this backdrop, the Council has formulated a Committee which comprised of 16 Members who have rich experiences in various domains such as education, hospital

pharmacy practice, community pharmacy practice, clinical pharmacy practice, administrative and regulatory affairs to design the syllabus for the individual theory and practical courses as per the curriculum framework defined in ER-2020. The Committee with its clear understanding about the philosophy and objectives of the ER-2020, drafted the syllabus for individual theory and practical courses with utmost care to avoid repetitions, redundancy, over/under utilization of hours, etc. Every course is defined with scope, set of course objectives and course outcomes which will help to understand the significance and the expectations of the course from both teachers and students. Lots of scope has been given in the syllabus for the active learning by the students through the assignment topics and field visit activities which will enhance their critical thinking, searching scientific literatures, interpretational skills and communication skills.

According to the ER-2020 curriculum framework, the students do not earn any credits based on the academic hours they spend. However, as per the conventional methodology of credit calculations, the curriculum of ER-2020 shall be deemed equivalent to 80 credits, that shall be used for the administrative purposes, wherever necessary.

Further, the 'Competencies for the Indian DPharm Holders' based on the knowledge, skill, attitude and value that are essential for the successful practice of the profession have been derived. These competencies have also been mapped with the individual courses of the curriculum based on the expected outcomes of the individual course. Thus, the courses and the competencies are interlaced in such a way that multiple courses contribute to build one competency and one course contributes to build more than one competency, which reveal the strength of the competency mapping.

The Council strongly believes that the ER-2020 regulations, curriculum and syllabus will uplift the knowledge and skills of the students on par with the contemporary and future professional demands and enable them to be a successful practitioner in the chosen field of pharmacy.

By considering the substantial changes and inclusion of advanced and current subject matters in the new syllabus, the Council shall conduct series of meetings, seminars, conferences, workshops, and webinars for the faculty members handling DPharm courses and equip them to deliver such new courses / topics more effectively and efficiently.

The Council appreciate all the efforts of the Members for successfully bringing out the ER-2020 regulations, curriculum and syllabus. Also, profound gratitude to all the stakeholders who contributed directly or indirectly in completing this task.

## 2. Competencies for the Indian DPharm Holders

Competency is defined as “A distinct composite of knowledge, skill, attitude and value that is essential to the practice of the profession in real life contexts”.

The candidates who successfully complete the Diploma in Pharmacy (DPharm) program of Education Regulations 2020 (ER-2020), from the institutions approved by the Pharmacy Council of India are expected to attain the following professional competencies.

1. Review the Prescriptions
2. Dispense Prescription / Non-Prescription Medicines
3. Provide Patient Counselling / Education
4. Hospital and Community Pharmacy Management
5. Expertise on Medications
6. Proficiency on drugs / pharmaceuticals
7. Entrepreneurship and Leadership
8. Deliver Primary and Preventive Healthcare
9. Professional, Ethical and Legal Practice
10. Continuing Professional Development

**1. Review the Prescriptions:** The student should receive and handle the prescriptions in a professional manner and be able to check for its completeness and correctness. Also, the prescribers should be contacted for any clarifications and corrections in the prescriptions with suggestions if any.

**2. Dispense Prescription / Non-Prescription Medicines:** The student should be able to dispense the various scheduled drugs / medicines as per the implications of the Drug & Cosmetics Act and Rules thereunder. Also, the non-prescription medicines (over-the-counter drugs) should be dispensed judiciously to the patients as required.

**3. Provide Patient Counselling / Education:** The student should be able to effectively counsel / educate the patients / caretakers about the prescription / non-prescription medicines and other health related issues. Effective communication includes using both oral and written communication skills and various communication techniques.

**4. Hospital and Community Pharmacy Management:** The student should be able to manage the drug distribution system as per the policies and guidelines of the hospital pharmacy, good community pharmacy practice and the recommendations of regulatory agencies. Also, be able to manage the procurement, inventory and distribution of medicines in hospital / community pharmacy settings.

**5. Expertise on Medications:** The student should be able to provide an expert opinion on medications to the health care professionals on safe and effective medication-use, relevant policies and procedures based on available evidences.

**6. Proficiency on Pharmaceutical Formulations:** The student should be able to describe the chemistry, characteristics, types, merits and demerits of both drugs and excipients used in the pharmaceutical formulations based on her/his knowledge and scientific resources.

**7. Entrepreneurship and Leadership:** The student should be able to acquire the entrepreneurial skills in the dynamic professional environments. Also, be able to achieve leadership skills through teamwork and sound decision making skills.

**8. Deliver Primary and Preventive Healthcare:** The student should be able to contribute to various healthcare programs of the nation including disease prevention initiatives to improve public health. Also contribute to the promotion of national health policies.

**9. Professional, Ethical and Legal Practice:** The student should be able to deliver professional services in accordance with legal, ethical and professional guidelines with integrity.

**10. Continuing Professional Development:** The student should be able to recognize the gaps in the knowledge and skills in the effective delivery of the professional services from time to time and be self-motivated to bridge such gaps by attending continuing professional development programs.

### 3. Competency Mapping with the Courses (Part I, II & III) of Education Regulations 2020

Competencies	Pharmaceutics	Pharmaceutical Chemistry	Pharmacognosy	Human Anatomy & Physiology	Social Pharmacy	Pharmacology	Community Pharmacy & Management	Biochemistry & Clinical Pathology	Pharmacotherapeutics	Hospital & Clinical Pharmacy	Pharmacy Law & Ethics	Practical Training
	1. Review the Prescriptions	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
2. Dispense Prescription / Non-Prescription Medicines	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
3. Provide Patient Counselling / Education	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Hospital and Community Pharmacy Management					✓		✓			✓	✓	✓
5. Expertise on Medications	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6. Proficiency on Pharmaceutical Formulations	✓	✓	✓			✓			✓			✓
7. Entrepreneurship and Leadership							✓			✓		✓
8. Deliver Primary and Preventive Healthcare				✓	✓	✓	✓	✓	✓	✓	✓	✓
9. Professional, Ethical and Legal Practice					✓		✓		✓	✓	✓	✓
10. Continuing Professional Development	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓

## 4. ER-2020 DPharm Syllabus – An Overview

The ER-2020 DPharm Syllabus has the following structure in every course. Though the theory and practical courses are not mutually exclusive, as per the regulations, the theory and practical are to be considered as individual courses.

**Scope:** These are broader statements on the purpose of the course in the curriculum, key contents of the course that will contribute to the specific knowledge and or skill developments. The teacher is expected to orient the students about the scope of the particular course at the beginning and intermittently.

**Course Objectives:** The course objectives describe the key topics that are intended by the teacher to be covered in the course. In general, these are more specific than the scope and broader than the course outcomes. The teacher is expected to discuss the objectives of the course with the students and break-down the course objectives into micro levels as objectives of a specific topic / objectives of a specific lecture, etc. Such an exercise shall make the students to understand the significance of the course / topic / lecture and enhance their attention on the course / topic / lecture.

**Course Outcomes:** The course outcomes are more specific than the course objectives describe that describe the abilities of the students to perform/act, upon successful completion of the course. Hence, conventionally the course outcomes are described with verbs that are measurable or observable actions. The teacher is expected to describe the desired outcomes of the particular course, so that the students shall understand the various assessment criteria, modalities and parameters. This also serves as a broader guideline for the teachers for preparing the assessment plan. A well-structured assessment plan associated with the course outcomes shall enable to mapping with the professional competencies and their attainment levels that are attributed to the program outcomes.

**Theory Courses:** The theory courses basically provide concepts and explain the relationships between the concepts. Understanding of the theoretical courses enable the students to identify the problems in real life situation and make a plan for addressing such problems. Also, the theory course helps to understand what is not known and thus is the tool for accumulation of knowledge. The syllabus of the theory courses has been systematically and logically described as different chapters and the minimum number of hours to be spent on teaching are mentioned chapter wise and course wise. The teachers shall further distribute the total hours of any given chapter among the sub-topics as required by the subject matter.

**Practical Courses:** The practical courses are designed for applying the theoretical knowledge in the given experimental / simulated conditions. The practical courses deepen the understanding of theories, develop the skills, hone professional

competencies, provide opportunities to observe, think and analyse problem solving methods. Further, they help to gain experience with the real things in practice. The teachers shall train the students in actual / simulated practical conditions.

**Tutorials:** The purpose of the tutorial hour is typically to engage the students in smaller groups in order to pay a closer attention on their learning process. This is an opportunity for the students to complete their assignments, develop specific skills, discuss any problems in the study topics in a less formal way. During the tutorial hour, the students shall exchange their ideas within the small group, and learn to accept constructive criticism and listen to others. Also, the tutorial hour enables the teachers to closely monitor the progress of the individual student and provide additional academic support to individuals, if necessary.

**Assignments:** The purpose the assignments are to encourage the students for self-directed learning. Further, the assignments will provoke the critical thinking, enhance the skills such as literature search, data mining, data interpretation, report formatting, time-management and written communication. This is also a mode of self-assessment for the student about the level understanding the concepts of a particular course. The teachers shall apply their knowledge and wisdom in choosing the assignment topics at micro level in alignment with the topics given in the syllabus. The assignments shall be evaluated against a set of criteria. A typical format for the assessment of an assignment is given in Appendix -1.

**Field Visits:** The purpose of field visits is to provide the real-world experience to the students. The field visits will help them to realize that what they learn within the walls of the classroom / laboratory can help them solve the problems they see in the world around them. Also, this is helpful to the teachers to widen their horizons of knowledge and broadening the scope of the syllabus. Every student shall submit a report describing their objectives, experience, learning points, etc. pertaining to the field trip in the typical format given in Appendix-2.

**Recommended Books:** For each course, a list of recommended books is given in the syllabus. The list shall be considered as important and common resource for the teaching-learning process, but not the complete list. It is always encouraged to use the latest edition of the books specified. Further, the teachers and students are encouraged to explore more primary, secondary and tertiary resources as required.

**Practical Training:** The goal of the practical training for the students is to provide a real-time, supervised experience on the professional tasks emphasised in their course of study. Further, it helps them to apply their acquired knowledge and skills in the professional working environment. The practical training intensively prepares the students with adequate competencies and qualifications required for the career opportunity in the future.

Thus, the ER 2020 DPharm syllabus is designed to nurture the students in all the three domains of Bloom's Taxonomy viz. cognitive (knowledge), affective (attitude) and psychomotor (skills). Further, it also provides ample of scope to the students for different learning styles viz. visual, auditory and kinesthetics, i.e., 'see, hear and do'.

The summary of the curriculum, courses and other activities and their metrics across the ER-2020 DPharm program (Part I, II & III) are given here.

Criteria	Metrics
Number of subject areas (considering both theory & practical together)	11
Number of theory courses	11
Number of practical courses	10
Number of theory hours	825
Number of practical hours	600
Number of practical training hours	500
Number of tutorial hours	275
Number of course outcomes for theory courses	45
Number of course outcomes for practical courses	40
Number of courses which have given assignments	9
Number of assignment topics given	75
Number of assignments reports each student shall submit	27
Number of courses which have given field visit	5
Number of field visit reports each student shall submit	9
Number of professional competencies	10

## 5. Guidelines for the conduct of theory examinations

### Sessional Exams

There shall be two or more periodic sessional (internal assessment) examinations during each academic year. The duration of the sessional exam shall be 90 minutes. The highest aggregate of any two performances shall form the basis of calculating the sessional marks. The scheme of the question paper for theory sessional examinations shall be as given below.

I. Long Answers (Answer 3 out of 4)	=	3 x 5 = 15
II. Short Answers (Answer 5 out of 6)	=	5 x 3 = 15
III. Very Short Answers (Answer any 5 out of 6)	=	5 x 2 = 10
		-----
	Total =	40 marks
		-----

**Internal assessment:** The marks secured by the students out of the total 40 shall be reduced to 20 in each sessional, and then the internal assessment shall be calculated based on the best two averages for 20 marks.

## Final Board / University Exams

The scheme of the question paper for the theory examinations conducted by the examining authority (Board / University) shall be as given below. The duration of the final examination shall be 3 hours.

I. Long Answers (Answer 6 out of 7)	=	6 x 5 = 30
II. Short Answers (Answer 10 out of 11)	=	10 x 3 = 30
III. Very Short Answers (Answer any 10 out of 11)	=	10 x 2 = 10
		-----
Total	=	80 marks
		-----

## 6. Guidelines for the conduct of practical examinations

### Sessional Exams

There shall be two or more periodic sessional (internal assessment) practical examinations during each academic year. The duration of the sessional exam shall be three hours. The highest aggregate of any two performances shall form the basis of calculating the sessional marks. The scheme of the question paper for practical sessional examinations shall be as given below.

I. Synopsis	=	10
II. Experiments	=	50*
III. Viva voce	=	10
IV. Practical Record Maintenance	=	10
		-----
Total	=	80 marks
		-----

\* The marks for the experiments shall be divided into various categories, viz. major experiment, minor experiment, spotters, etc. as per the requirement of the course.

**Internal assessment:** The marks secured by the students out of the total of 80 shall be reduced to 10 in each sessional, and then the internal assessment shall be calculated based on the best two averages for 10 marks from the sessional and other 10 marks shall be awarded as per the details given below.

Actual performance in the sessional examination	=	10 marks
Assignment marks (Average of three)	=	5 marks*
Field Visit Report marks (Average for the reports)	=	5 marks\$
		-----
Total	=	20 marks
		-----

\*, \$ Only for the courses given with both assignments and field visit/s

**Note:**

1. For the courses having either assignments or field visit/s, the assessments of assignments or field visit/s shall be done directly for 10 marks and added to the sessional marks.
2. For the courses not having both assignment and field visit, the whole 20 marks shall be calculated from the sessional marks.

**Final Board / University Exams**

The scheme of question paper for the practical examinations conducted by the examining authority (Board / University) shall be as given below. The duration of the final examination shall be 3 hours.

I. Synopsis	=	10
II. Experiments	=	60*
III. Viva voce	=	10
		-----
Total	=	80 marks
		-----

\* The marks for the experiments shall be divided into various categories, viz. major experiment, minor experiment, spotters, etc. as per the requirement of the course.

## 7. ER-2020 DPharm Syllabus – Part I

<b>S. No.</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>Total Hours</b>	<b>Hours per Week</b>
1.	ER20-11T	Pharmaceutics – Theory	75	3
2.	ER20-11P	Pharmaceutics – Practical	75	3
3.	ER20-12T	Pharmaceutical Chemistry – Theory	75	3
4.	ER20-12P	Pharmaceutical Chemistry – Practical	75	3
5.	ER20-13T	Pharmacognosy – Theory	75	3
6.	ER20-13P	Pharmacognosy – Practical	75	3
7.	ER20-14T	Human Anatomy & Physiology – Theory	75	3
8.	ER20-14P	Human Anatomy & Physiology – Practical	75	3
9.	ER20-15T	Social Pharmacy – Theory	75	3
10.	ER20-15P	Social Pharmacy – Practical	75	3

## PHARMACEUTICS – THEORY

**Course Code: ER20-11T**

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

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

**Course Objectives:** This course will discuss the following aspects of pharmaceutical dosage forms

1. Basic concepts, types and need
2. Advantages and disadvantages, methods of preparation / formulation
3. Packaging and labelling requirements
4. Basic quality control tests, concepts of quality assurance and good manufacturing practices

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Describe about the different dosage forms and their formulation aspects
2. Explain the advantages, disadvantages and quality control tests of different dosage forms
3. Discuss the importance quality assurance & good manufacturing practices

Chapter	Topics	Hours
1	<ul style="list-style-type: none"><li>• History of the profession of Pharmacy in India in relation to Pharmacy education, industry, pharmacy practice, and various professional 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>	7
2	<b>Packaging materials:</b> Types, selection criteria, advantages and disadvantages of glass, plastic, metal, rubber as packaging materials	5
3	<b>Pharmaceutical aids:</b> Organoleptic (Colouring, flavouring, and sweetening) agents <b>Preservatives:</b> Definition, types with examples and uses	3
4	<b>Unit operations:</b> Definition, objectives/applications, principles, construction and workings of: <b>Size reduction:</b> hammer mill and ball mill <b>Size separation:</b> Classification powder according to IP, Cyclone separator, Sieves and standards of sieves <b>Mixing:</b> Double cone blender, Turbine mixer, Triple roller mill and Silverson mixer homogenizer	9

	<b>Filtration:</b> Theory of filtration, membrane filter and sintered glass filter	
	<b>Drying:</b> working of fluidized bed dryer and process of freeze drying	
	<b>Extraction:</b> Definition, Classification, method and applications	
<b>5</b>	<b>Tablets</b> – coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, double layered)	<b>8</b>
	<b>Capsules</b> - hard and soft gelatine capsules	<b>4</b>
	<b>Liquid oral preparations</b> - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution	<b>6</b>
	<b>Topical preparations</b> - ointments, creams, pastes, gels, liniments and lotions, suppositories and pessaries	<b>8</b>
	Nasal preparations, Ear preparations	<b>2</b>
	<b>Powders and granules</b> - Insufflations, dusting powders, effervescent powders and effervescent granules	<b>3</b>
	<b>Sterile formulations</b> – Injectables, eye drops and eye ointments	<b>6</b>
	<b>Immunological products:</b> Sera, vaccines, toxoids and their manufacturing methods.	<b>4</b>
<b>6</b>	<b>Basic structure, layout, sections and activities of pharmaceutical manufacturing plants</b> <b>Quality control and quality assurance:</b> Definition and concepts of quality control & quality assurance, current good manufacturing practice (cGMP), Introduction to concept of calibration and validation	<b>5</b>
<b>7</b>	<b>Novel drug delivery systems:</b> Introduction, Classification with examples, advantages and challenges	<b>5</b>

## PHARMACEUTICS – PRACTICAL

**Course Code: ER20-11P**

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

**Scope:** This course is designed to train the students in formulating and dispensing common pharmaceutical dosage forms.

**Course Objectives:** This course will discuss and train the following aspects of preparing and dispensing various pharmaceutical dosage forms

1. Calculation of working formula from the official master formula
2. Formulation of dosage forms based on working formula
3. Appropriate Packaging and labelling requirements
4. Methods of basic quality control tests

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Calculate the working formula from the given master formula
2. Formulate the dosage form and dispense in appropriate container
3. Design the label with necessary product and patient information
4. Perform the basic quality control tests for the common dosage forms

### Practicals

1. Handling and referring the official references: Pharmacopoeias, Formularies, etc. for retrieving formulas, procedures, etc.
2. Formulation of the following dosage forms as per monograph standards and dispensing with appropriate packaging & labelling
  - **Liquid Oral:** Simple syrup, Piperazine citrate elixir, Aqueous Iodine solution, Strong Iodine solution
  - **Emulsion:** Castor oil emulsion, Cod liver oil emulsion, olive oil emulsion
  - **Suspension:** Calamine lotion, Magnesium hydroxide mixture
  - **Ointment:** Simple ointment base, Sulphur ointment
  - **Cream:** Cetrimide cream
  - **Gel: Sodium alginate gel**
  - **Liniment:** Turpentine liniment, White liniment BPC
  - **Dry powder:** Effervescent powder granule, Dusting powder
  - **Sterile Injection:** Normal Saline, Calcium gluconate Injection
  - **Hard Gelatine Capsule:** Indomethacin capsules, Tetracycline capsules
  - **Tablet:** Paracetamol tablet granules ready for compression
3. Demonstration on various stages of tablet manufacturing processes (including coating tablets, if possible)

4. Appropriate methods of usage, and storage of special dosage forms including different types of inhalers, spacers, insulin pens
5. Demonstration of quality control tests and evaluation of common dosage forms viz. tablets, capsules, emulsion, sterile injections as per the monographs

### **Assignments**

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Various systems of measures commonly used in prescribing, compounding and dispensing practices
2. Market preparations (including Fixed Dose Combinations) of each type of dosage forms, generic name, minimum three brand names and label contents of the dosage forms mentioned in theory/practical
3. Overview of various machines / equipments / instruments involved in the formulation and quality control of various dosage forms / pharmaceutical formulations.
4. Overview of extemporaneous preparations at community / hospital pharmacy vs. manufacturing of dosage forms at industrial level
5. Basic pharmaceutical calculations: ratios; conversion to percentage fraction, allegation, proof spirit, isotonicity

### **Field Visit**

The students shall be taken for an industrial visit to pharmaceutical industries to witness and understand the various processes of manufacturing of any of the common dosage forms viz. tablets, capsules, liquid orals, injectables, etc. Individual reports from each student on their learning experience from the field visit shall be submitted.

### **Recommended Books (Latest Editions)**

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. Bantley's Text book of Pharmaceutics, editor E.A. Rawlins, Elsevier Int.,
5. The Theory and Practice of Industrial Pharmacy. Leon Lachman, Herbert Lieberman and Joseph Kanig, Editors, Lea and Febiger, Philadelphia. Verghese Publishing House
6. Responsible Use of Medicines: A Layman's Handbook, [www.ipapharma.org/](http://www.ipapharma.org/) publications

## PHARMACEUTICAL CHEMISTRY – THEORY

**Course Code: ER20-12T**

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

**Scope:** This course is designed to impart basic knowledge on the chemical structure, storage conditions and medicinal uses of organic and inorganic chemical substances used as drugs and pharmaceuticals. Also, this course discusses the impurities, quality control aspects of chemical substances used in pharmaceuticals.

**Course Objectives:** This course will discuss the following aspects of the chemical substances used as drugs and pharmaceuticals for various disease conditions

1. Chemical classification, chemical name, chemical structure
2. Pharmacological uses, doses, stability and storage conditions
3. Different types of formulations / dosage form available and their brand names
4. Impurity testing and basic quality control tests

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Describe the chemical class, structure and chemical name of the commonly used drugs and pharmaceuticals of both organic and inorganic nature
2. Discuss the pharmacological uses, dosage regimen, stability issues and storage conditions of all such chemical substances commonly used as drugs
3. Describe the quantitative and qualitative analysis, impurity testing of the chemical substances given in the official monographs
4. Identify the dosage form & the brand names of the drugs and pharmaceuticals popular in the marketplace

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	<p><b>Inorganic Pharmaceuticals:</b> Pharmaceutical formulations, market preparations, storage conditions and uses of</p> <ul style="list-style-type: none"> <li>● <b>Haematinics:</b> Ferrous sulphate, Ferrous fumarate, Ferric ammonium citrate, Ferrous ascorbate, Carbonyl iron</li> <li>● <b>Antacids:</b> Aluminium hydroxide gel, Magnesium hydroxide, Magaldrate, Sodium bicarbonate, Calcium Carbonate</li> <li>● <b>Anti-microbial agents:</b> Silver Nitrate, Ionic Silver, Chlorhexidine Gluconate, Hydrogen peroxide, Boric acid, Bleaching powder, Potassium permanganate</li> <li>● <b>Dental products:</b> Calcium carbonate, Sodium fluoride, Denture cleaners, Denture adhesives, Mouth washes</li> <li>● <b>Medicinal gases:</b> 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
<p><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></p>		
5	<p><b>Drugs Acting on Central Nervous System</b></p> <ul style="list-style-type: none"> <li>● <b>Anaesthetics:</b> Thiopental Sodium*, Ketamine Hydrochloride*, Propofol</li> <li>● <b>Sedatives and Hypnotics:</b> Diazepam*, Alprazolam*, Nitrazepam, Phenobarbital*</li> <li>● <b>Antipsychotics:</b> Chlorpromazine Hydrochloride*, Haloperidol*, Risperidone*, Sulpiride*, Olanzapine, Quetiapine, Lurasidone</li> <li>● <b>Anticonvulsants:</b> Phenytoin*, Carbamazepine*, Clonazepam, Valproic Acid*, Gabapentin*, Topiramate, Vigabatrin, Lamotrigine</li> <li>● <b>Anti-Depressants:</b> Amitriptyline Hydrochloride*, Imipramine Hydrochloride*, Fluoxetine*, Venlafaxine, Duloxetine, Sertraline, Citalopram, Escitalopram, Fluvoxamine, Paroxetine</li> </ul>	9
6	<p><b>Drugs Acting on Autonomic Nervous System</b></p> <ul style="list-style-type: none"> <li>● <b>Sympathomimetic Agents: <i>Direct Acting:</i></b> Nor-Epinephrine*, Epinephrine, Phenylephrine, Dopamine*, Terbutaline, Salbutamol (Albuterol),</li> </ul>	9

	<p>Naphazoline*, Tetrahydrozoline. <b>Indirect Acting Agents:</b> Hydroxy Amphetamine, Pseudoephedrine. Agents With Mixed Mechanism: Ephedrine, Metaraminol</p> <ul style="list-style-type: none"> <li>● <b>Adrenergic Antagonists:</b> Alpha Adrenergic Blockers: Tolazoline, Phentolamine</li> <li>● Phenoxybenzamine, Prazosin. Beta Adrenergic Blockers: Propranolol*, Atenolol*, Carvedilol</li> <li>● <b>Cholinergic Drugs and Related Agents:</b> Direct Acting Agents: Acetylcholine*, Carbachol, And Pilocarpine. Cholinesterase Inhibitors: Neostigmine*, Edrophonium Chloride, Tacrine Hydrochloride, Pralidoxime Chloride, Echothiopate Iodide</li> <li>● <b>Cholinergic Blocking Agents:</b> Atropine Sulphate*, Ipratropium Bromide</li> </ul> <p><b>Synthetic Cholinergic Blocking Agents:</b> Tropicamide, Cyclopentolate Hydrochloride, Clidinium Bromide, Dicyclomine Hydrochloride*</p>	
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, Phenytoin Sodium*, Lidocaine Hydrochloride, Lorcaïnide Hydrochloride, Amiodarone and Sotalol</li> <li>● <b>Anti-Hypertensive Agents:</b> Propranolol*, Captopril*, Ramipril, Methyldopate Hydrochloride, Clonidine Hydrochloride, Hydralazine Hydrochloride, Nifedipine,</li> <li>● <b>Antianginal Agents:</b> Isosorbide Dinitrate</li> </ul>	5
8	<p><b>Diuretics:</b> Acetazolamide, Frusemide*, Bumetanide, Chlorthalidone, Benzthiazide, Metolazone, Xipamide, Spironolactone</p>	2
9	<p><b>Hypoglycemic Agents:</b> Insulin and Its Preparations, Metformin*, Glibenclamide*, Glimepiride, Pioglitazone, Repaglinide, Gliflozins, Gliptins</p>	3
10	<p><b>Analgesic And Anti-Inflammatory Agents:</b> Morphine Analogues, Narcotic Antagonists; <b>Nonsteroidal Anti-Inflammatory Agents (NSAIDs)</b> - Aspirin*, Diclofenac, Ibuprofen*, Piroxicam, Celecoxib, Mefenamic Acid, Paracetamol*, Aceclofenac</p>	3
11	<p><b>Anti-Infective Agents</b></p> <ul style="list-style-type: none"> <li>● <b>Antifungal Agents:</b> Amphotericin-B, Griseofulvin, Miconazole, Ketoconazole*, Itraconazole, Fluconazole*, Naftifine Hydrochloride</li> <li>● <b>Urinary Tract Anti-Infective Agents:</b> Norfloxacin,</li> </ul>	8

	Ciprofloxacin, Ofloxacin*, Moxifloxacin, ● <b>Anti-Tubercular Agents:</b> INH*, Ethambutol, Para Amino Salicylic Acid, Pyrazinamide, Rifampicin, Bedaquiline, Delamanid, Pretomanid* ● <b>Antiviral Agents:</b> Amantadine Hydrochloride, Idoxuridine, Acyclovir*, Foscarnet, Zidovudine, Ribavirin, Remdesivir, Favipiravir ● <b>Antimalarials:</b> Quinine Sulphate, Chloroquine Phosphate*, Primaquine Phosphate, Mefloquine*, Cycloguanil, Pyrimethamine, Artemisinin ● <b>Sulfonamides:</b> Sulfanilamide, Sulfadiazine, Sulfamethoxazole, Sulfacetamide*, Mafenide Acetate, Cotrimoxazole, Dapsone*	
12	<b>Antibiotics:</b> Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin, <b>Tetracyclines:</b> Doxycycline, Minocycline, <b>Macrolides:</b> Erythromycin, Azithromycin, <b>Miscellaneous:</b> Chloramphenicol* Clindamycin	8
13	<b>Anti-Neoplastic Agents:</b> Cyclophosphamide*, Busulfan, Mercaptopurine, Fluorouracil*, Methotrexate, Dactinomycin, Doxorubicin Hydrochloride, Vinblastine Sulphate, Cisplatin*, Dromostanolone Propionate	3

## PHARMACEUTICAL CHEMISTRY – PRACTICAL

**Course Code:** ER20-12P

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

**Scope:** This course is designed to impart basic training and hands-on experiences to synthesis chemical substances used as drugs and pharmaceuticals. Also, to perform the quality control tests, impurity testing, test for purity and systematic qualitative analysis of chemical substances used as drugs and pharmaceuticals.

**Course Objectives:** This course will provide the hands-on experience on the following aspects of chemical substances used as drugs and pharmaceuticals

1. Limit tests and assays of selected chemical substances as per the monograph
2. Volumetric analysis of the chemical substances
3. Basics of preparatory chemistry and their analysis
4. Systematic qualitative analysis for the identification of the chemical drugs

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Perform the limit tests for various inorganic elements and report
2. Prepare standard solutions using the principles of volumetric analysis

3. Test the purity of the selected inorganic and organic compounds against the monograph standards
4. Synthesize the selected chemical substances as per the standard synthetic scheme
5. Perform qualitative tests to systematically identify the unknown chemical substances

### Practicals

S. No.	Experiment
1	<b>Limit test for</b> <ul style="list-style-type: none"> <li>● Chlorides; sulphate; Iron; heavy metals</li> </ul>
2	Identification tests for Anions and Cations as per Indian Pharmacopoeia
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 complexometric</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
8	Systematic Qualitative analysis experiments (4 substances)

## Assignments

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Different monographs and formularies available and their major contents
2. Significance of quality control and quality assurance in pharmaceutical industries
3. Overview on Green Chemistry
4. Various software programs available for computer aided drug discovery
5. Various instrumentations used for characterization & quantification of drug

## Recommended Books (Latest Edition)

1. Medicinal & Pharmaceutical chemistry by Harikishan Singh and VK Kapoor
2. Wilson and Griswold'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. Stenlake
5. Indian Pharmacopoeia
6. Vogel's text book of Practical Organic Chemistry

## PHARMACOGNOSY – THEORY

**Course Code: ER20-13T**

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

**Scope:** This course is designed to impart knowledge on the medicinal uses of various drugs of natural origin. Also, the course emphasizes the fundamental concepts in the evaluation of crude drugs, alternative systems of medicine, nutraceuticals and herbal cosmetics.

**Course Objectives:** This course will discuss the following aspects of drug substances derived from natural resources.

1. Occurrence, distribution, isolation, identification tests of common phytoconstituents
2. Therapeutic activity and pharmaceutical applications of various natural drug substances and phytoconstituents
3. Biological source, chemical constituents of selected crude drugs and their therapeutic efficacy in common diseases and ailments
4. Basic concepts in quality control of crude drugs and various system of medicines
5. Applications of herbs in health foods and cosmetics

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Identify the important/common crude drugs of natural origin
2. Describe the uses of herbs in nutraceuticals and cosmeceuticals
3. Discuss the principles of alternative system of medicines
4. Describe the importance of quality control of drugs of natural origin

Chapter	Topic	Hours
1	Definition, history, present status and scope of Pharmacognosy	2
2	<b>Classification of drugs:</b> Alphabetical Taxonomical Morphological Pharmacological Chemical Chemo-taxonomical	4
3	<b>Quality control of crude drugs:</b> Different methods of adulteration of crude drugs Evaluation of crude drugs	6

4	Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.	6	
5	Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs.	34	
	Laxatives		Aloe, Castor oil, Ispaghula, Senna
	Cardiotonic		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-tussive		Vasaka, Tolu Balsam
	Anti-rheumatics		Colchicum seed
	Anti-tumour		Vinca, Podophyllum
	Antidiabetics		Pterocarpus, Gymnema
	Diuretics		Gokhru, Punarnava
	Anti-dysenteric		Ipecacuanha
	Antiseptics and disinfectants		Benzoin, Myrrh, Neem, Turmeric
	Antimalarials		Cinchona, Artemisia
	Oxytocic		Ergot
	Vitamins	Cod liver oil, Shark liver oil	
	Enzymes	Papaya, Diastase, Pancreatin, Yeast	
	Pharmaceutical Aids	Kaolin, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatine	
	Miscellaneous	Squill, Galls, Pale catechu, Ashwagandha, Vasaka, Tulsi, Guggul	
6	<b>Plant fibres used as surgical dressings:</b> Cotton, silk, wool and regenerated fibres Sutures – Surgical Catgut and Ligatures	3	
7	<b>Basic principles involved in the traditional systems of medicine like:</b> Ayurveda, Siddha, Unani and Homeopathy <b>Method of preparation of Ayurvedic formulations like:</b> Arista, Asava, Gutika, Taila, Churna, Lehya and Bhasma	8	

8	Role of medicinal and aromatic plants in national economy and their export potential	2
9	<b>Herbs as health food:</b> Brief introduction and therapeutic applications of: Nutraceuticals, Antioxidants, Pro-biotics, Pre-biotics, Dietary fibres, Omega-3-fatty acids, Spirulina, Carotenoids, Soya and Garlic	4
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	4
11	Phytochemical investigation of drugs	2

## PHARMACOGNOSY – PRACTICAL

**Course Code: ER20-13P**

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

**Scope:** This course is designed to train the students in physical identification, morphological characterization, physical and chemical characterization and evaluation of commonly used herbal drugs.

**Course Objectives:** This course will provide hands-on experiences to the students in

1. Identification of the crude drugs based on their morphological characteristics
2. Various characteristic anatomical characteristics of the herbal drugs studied through transverse section
3. Physical and chemical tests to evaluate the crude drugs

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Identify the given crude drugs based on the morphological characteristics
2. Take a transverse section of the given crude drugs
3. Describe the anatomical characteristics of the given crude drug under microscopical conditions
4. Carry out the physical and chemical tests to evaluate the given crude drugs

### Practicals

#### 1. Morphological Identification of the following drugs:

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:**

Ajwain, Datura, Cinnamon, Cinchona, Coriander, Ashwagandha, Liquorice, Clove, Curcuma, Nuxvomica, Vasaka

## **3. Physical and chemical tests for evaluation of any FIVE of the following drugs:**

Asafoetida, Benzoin, Pale catechu, Black catechu, Castor oil, Acacia, Tragacanth, Agar, Guar gum, Gelatine.

### **Assignments**

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Market preparations of various dosage forms of Ayurvedic, Unani, Siddha, Homeopathic (Classical and Proprietary), indications, and their labelling requirements
2. Market preparations of various herbal cosmetics, indications, and their labelling requirements

### **Field Visit**

The students shall be taken in groups to a medicinal garden to witness and understand the nature of various medicinal plants discussed in theory and practical courses. Additionally, they shall be taken in groups to the pharmacies of traditional systems of medicines to understand the availability of various dosage forms and their labelling requirements. Individual reports from each student on their learning experience from the field visit shall be submitted.

### **Recommended Books (Latest Editions)**

1. Text book of Pharmacognosy by C. K. Kokate, S. B. Gokhale, A.P. Purohit, Nirali Prakashan
2. Text book of Pharmacognosy by C.S. Shah and J. S. Qadry, 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
7. Augmented Text Book of Homeopathic Pharmacy by Dr. D D Banerjee, B Jain Publishers (P) Ltd

## HUMAN ANATOMY AND PHYSIOLOGY – THEORY

**Course Code: ER20-14T**

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

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

**Course Objectives:** This course will discuss the following

1. Structure and functions of the various organ systems and organs of the human body
2. Homeostatic mechanisms and their imbalances in the human body
3. Various vital physiological parameters of the human body and their significances

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Describe the various organ systems of the human body
2. Discuss the anatomical features of the important human organs and tissues
3. Explain the homeostatic mechanisms regulating the normal physiology in the human system
4. Discuss the significance of various vital physiological parameters of the human body

Chapter	Topic	Hours
1	Scope of Anatomy and Physiology Definition of various terminologies	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	<b>Osseous system:</b> structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints	3 3
5	<b>Haemopoietic system</b> <ul style="list-style-type: none"><li>● Composition and functions of blood</li><li>● Process of Hemopoiesis</li><li>● Characteristics and functions of RBCs, WBCs and platelets</li><li>● Mechanism of Blood Clotting</li><li>● Importance of Blood groups</li></ul>	8

<b>6</b>	<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>	<b>3</b>
<b>7</b>	<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, Basics of ECG</li> <li>• Blood pressure and its regulation</li> </ul>	<b>8</b>
<b>8</b>	<b>Respiratory system</b> <ul style="list-style-type: none"> <li>• Anatomy of respiratory organs and their functions.</li> <li>• Regulation Mechanism of respiration.</li> <li>• Respiratory volumes and capacities – definitions</li> </ul>	<b>4</b>
<b>9</b>	<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>	<b>8</b>
<b>10</b>	<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>	<b>2</b>
<b>11</b>	<b>Nervous system</b> <ul style="list-style-type: none"> <li>• Classification of nervous system</li> <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>	<b>8</b>
<b>12</b>	<b>Sense organs - Anatomy and physiology of</b> <ul style="list-style-type: none"> <li>• Eye</li> <li>• Ear</li> <li>• Skin</li> <li>• Tongue</li> <li>• Nose</li> </ul>	<b>6</b>
<b>13</b>	<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>	<b>4</b>

<b>14</b>	<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>	<b>6</b>
<b>15</b>	<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>	<b>4</b>

## HUMAN ANATOMY AND PHYSIOLOGY – PRACTICAL

**Course Code: ER20-14P**

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

**Scope:** This course is designed to train the students and instil the skills for carrying out basic physiological monitoring of various systems and functions.

**Course Objectives:** This course will provide hands-on experience in the following

1. General blood collection techniques and carrying out various haematological assessments and interpreting the results
2. Recording and monitoring the vital physiological parameters in human subjects and the basic interpretations of the results
3. Microscopic examinations of the various tissues permanently mounted in glass slides
4. Discuss the anatomical and physiological characteristics of various organ systems of the body using models, charts and other teaching aids

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Perform the haematological tests in human subjects and interpret the results
2. Record, monitor and document the vital physiological parameters of human subjects and interpret the results
3. Describe the anatomical features of the important human tissues under the microscopical conditions
4. Discuss the significance of various anatomical and physiological characteristics of the human body

### **Practicals**

1. Study of compound microscope
2. General techniques for the collection of blood

3. Microscopic examination of Epithelial tissue, Cardiac muscle, Smooth muscle, Skeletal muscle, Connective tissue and Nervous tissue of ready / pre-prepared slides.
4. Study of Human Skeleton-Axial skeleton and appendicular skeleton
5. Study of appliances used in Haematological experiments (only identification and listing the appliances)
6. Determination of
  - a. Blood group
  - b. ESR
  - c. Haemoglobin content of blood
  - d. Bleeding time and Clotting time
7. Determination of WBC count of blood
8. Determination of RBC count of blood
9. Determination of Differential count of blood
10. Recording of Blood Pressure in various postures, different arms, before and after exertion and interpreting the results
11. Recording of Body temperature (using mercury, digital and IR thermometers at various locations), Pulse rate/ Heart rate (at various locations in the body, before and after exertion), Respiratory Rate
12. Recording Pulse Oxygen (before and after exertion)
13. Recording force of air expelled using Peak Flow Meter
14. Measurement of height, weight, and BMI
15. Study of various systems and organs with the help of chart, models and specimens
  - a) Cardiovascular system
  - b) Respiratory system
  - c) Digestive system
  - d) Urinary system
  - e) Endocrine system
  - f) Reproductive system
  - g) Nervous system
  - h) Eye
  - i) Ear
  - j) Skin

### **Recommended Books (Latest Editions)**

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
5. Ross and Wilson Anatomy and Physiology in Health and illness
6. Human Anatomy and Physiology by Tortora Gerard J
7. Fundamentals of Medical Physiology by K. Sambulingam and Prana Sambulingam

8. Ranade V.G. Text Book of Practical Physiology
9. Goyal R.K., Natvar M.P. and Shah S.A., Practical Anatomy, Physiology and Biochemistry, Experimental Physiology

## SOCIAL PHARMACY – THEORY

**Course Code: ER20-15T**

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

**Scope:** This course is designed to impart basic knowledge on public health, epidemiology, preventive care and other social health related concepts. Also, to emphasize the roles of pharmacists in the public health programs.

**Course Objectives:** This course will discuss about basic concepts of

1. Public health and national health programs
2. Preventive healthcare
3. Food and nutrition related health issues
4. Health education & promotion
5. General roles and responsibilities of pharmacists in public health

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Discuss about roles of pharmacists in the various national health programs
2. Describe various sources of health hazards and disease preventive measures
3. Discuss the healthcare issues associated with food and nutritional substances
4. Describe the general roles and responsibilities of pharmacists in public health

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 Pharmacists in Public Health. (2)</li><li>• Concept of Health - WHO Definition, various dimensions, determinants, and health indicators. (3)</li><li>• National Health Policy – Indian perspective (1)</li><li>• Introduction to Millennium Development Goals, Sustainable Development Goals, FIP Development Goals (1)</li></ul>	7
2	<b>Preventive healthcare – Role of Pharmacists in the following</b> <ul style="list-style-type: none"><li>• Demography and Family Planning (3)</li><li>• Mother and child health, importance of breastfeeding, ill effects of infant milk substitutes and bottle feeding (2)</li><li>• Overview of Vaccines, types of immunity and immunization (5)</li></ul>	18

	<ul style="list-style-type: none"> <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, Environmental pollution due to pharmaceuticals (6)</li> <li>• Psychosocial Pharmacy: Drugs of misuse and abuse – psychotropics, narcotics, alcohol, tobacco products. Social Impact of these habits on social health and productivity and suicidal behaviours (2)</li> </ul>	
<b>3</b>	<p><b>Nutrition and Health</b></p> <ul style="list-style-type: none"> <li>• Basics of nutrition – Macronutrients and Micronutrients (2)</li> <li>• Importance of water and fibres in diet (1)</li> <li>• Balanced diet, nutrition deficiency diseases, ill effects of junk foods, calorific and nutritive values of various foods, fortification of food (3)</li> <li>• Introduction to food safety, adulteration of foods, effects of artificial ripening, use of pesticides, genetically modified foods (1)</li> <li>• Dietary supplements, nutraceuticals, food supplements – indications, benefits, Drug-Food Interactions (2)</li> </ul>	<b>7</b>
<b>4</b>	<p>Introduction to Microbiology and common microorganisms (3)</p> <p><b>Epidemiology:</b> Introduction to the terms Epidemiology, its applications, terms such as epidemic, pandemic, endemic, mode of transmission, quarantine, isolation, incubation period, contact tracing. (2)</p> <p>Causative agents, epidemiology and clinical presentations and Role of Pharmacists in educating the public in prevention of the following communicable diseases:</p> <ul style="list-style-type: none"> <li>• Respiratory infections – chickenpox, measles, rubella, mumps, influenza (including Avian-Flu, H1N1, SARS, MERS, COVID-19), diphtheria, whooping cough, meningococcal meningitis, acute respiratory infections, tuberculosis, Ebola (10)</li> <li>• Intestinal infections – poliomyelitis, viral hepatitis, cholera, acute diarrheal diseases, typhoid, amebiasis, worm infestations, food poisoning (8)</li> <li>• Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya (4)</li> <li>• Surface infections – trachoma, tetanus, leprosy (3)</li> </ul>	<b>33</b>

	<ul style="list-style-type: none"> <li>• STDs, HIV/AIDS (3)</li> </ul>	
<b>5</b>	Introduction to health systems and <b>all ongoing</b> National health programs in India, their objectives, functioning, outcome and the role of pharmacists.	<b>5</b>
<b>6</b>	Role of Pharmacists in disaster management.	<b>2</b>
<b>7</b>	Pharmacoeconomics - basics, Health Insurance, Health Maintenance Organizations (HMOs), Health spending, Out-of-pocket expenses	<b>3</b>

### **SOCIAL PHARMACY – PRACTICAL**

**Course Code: ER20-15P**

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

**Scope:** This course is designed to provide simulated experience in various public health and social pharmacy activities.

**Course Objectives:** This course will train the students on various roles of pharmacists in public health and social pharmacy activities in the following areas

1. National immunization programs
2. Reproductive and child health programs
3. Food and nutrition related health programs
4. Health education and promotion
5. General roles and responsibilities of the pharmacists in public health
6. First Aid for various emergency conditions including basic life support and cardiopulmonary resuscitation

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Describe the roles and responsibilities of pharmacists in various National health programs
2. Design promotional materials for public health awareness
3. Describe various health hazards including microbial sources
4. Advice on preventive measures for various diseases
5. Provide first aid for various emergency conditions including basic life support and cardiopulmonary resuscitation

**Note:** Demonstration / Hands-on experience / preparation of charts / models / promotional materials / role plays / enacting / e-brochures / e-flyers / podcasts / video podcasts / any other innovative activities to understand the concept of various

elements of social pharmacy listed here. (At least one activity to be carried out for each one of the following):

### **Practicals**

1. National immunization schedule for children, adult vaccine schedule, Vaccines not included in the National Immunization Program.
2. RCH – reproductive and child health – nutritional aspects
3. Family planning devices
4. Microscopical observation of different microbes (readymade slides)
5. Oral Health and Hygiene
6. Personal hygiene and etiquettes – hand washing techniques, Cough and sneeze etiquettes. Various types of masks, PPE gear, wearing/using them, and disposal.
7. Menstrual hygiene, products used
8. Marketed preparations of disinfectants, antiseptics, fumigating agents, antilarval agents, mosquito repellents, etc.
9. Health Communication: Audio / Video podcasts, Images, Power Point Slides, Short Films, etc. in regional language(s) for mass communication / education / awareness on 5 different communicable diseases, their signs and symptoms, and prevention
10. Water purification techniques, use of water testing kit, calculation of content/percentage of  $\text{KMnO}_4$ , bleaching powder to be used for wells/tanks
11. Counselling children on junk foods, balanced diets – using Information, Education and Communication (IEC), counselling, etc. (Simulation Experiments)
12. Preparation of various charts on nutrition, sources of various nutrients from locally available foods, calculation of caloric needs of different groups (e.g., child, mother, sedentary lifestyle, etc.). Chart of glycemic index of foods
13. Tobacco cessation, counselling, identifying various tobacco containing products through charts/pictures
14. First Aid – Theory, basics, demonstration, hands on training, audio-visuals, and practices, BSL (Basic Life Support) Systems [SCA - Sudden Cardiac Arrest, FBAO - Foreign Body Airway Obstruction, CPR, Defibrillation (using AED) (include CPR techniques, First Responder)

### **Assignment**

The students shall be asked to submit the written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. An overview on Antibiofilms
2. Study the labels of various packed foods to understand their nutritional contents
3. Calorie free sweeteners - market examples, and their contents

4. Breastfeeding counselling, guidance – using Information, Education and Communication (IEC)
5. Information about the organizations working on deaddiction services in the region (city / district, etc.)
6. Role of a pharmacist in disaster management – A case study
7. Overview on the National Tuberculosis Elimination Programme (NTEP)
8. Drug disposal systems in the country, at industry level and citizen level
9. Various Prebiotics or Probiotics (dietary and market products)
10. Emergency preparedness: Study local Government structure with respect to Fire, Police departments, health department
11. Prepare poster/presentation for general public on any one of the World Health Days. e.g., TB Day, AIDS Day, Handwashing Day, World Diabetes Day, World Heart Day, etc.
12. List of home medicines, their storage, safe handling and disposal of unused medicines
13. Responsible Use of Medicines: From Purchase to Disposal
14. Collection of newspaper clips (minimum 5) relevant to any one topic and its submission in an organized form with collective summary based on the news items
15. Read a minimum one article relevant to any theory topic, from Pharma /Science/ or other Periodicals and prepare summary of it for submission
16. Mental health and its significances among the various segments of the society
17. Potential roles of pharmacists in rural India

### **Field Visits**

The students shall be taken in groups to visit any THREE of the following facilities to witness and understand the activities of such centres/facilities from the perspectives of the topics discussed in theory and/or practical courses. Individual reports from each student on their learning experience from the field visits shall be submitted.

1. Garbage Treatment Plant
2. Sewage Treatment Plant
3. Bio-medical Waste Treatment Plant
4. Effluent Treatment Plant
5. Water purification plant
6. Orphanage / Elderly-Care-Home / School and or Hostel/Home for persons with disabilities
7. Primary health care centre

### **Recommended Books (Latest Editions)**

1. Social Pharmacy – Innovation and development. 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, Geoffrey. Pharmaceutical Press. London.
6. Websites of Ministry of Health and Family Welfare, National Health Portal
7. Pharmacists at the Frontlines: A Novel Approach at Combating TB  
[www.ipapharma.org](http://www.ipapharma.org) Visit Publications
8. Where There Is No Doctor: A Village Health Care Handbook by David Werner ,2015 updated version
9. Various WHO publications [www.who.int](http://www.who.int)

## 8. ER-2020 DPharm Syllabus – Part II

S. No.	Course Code	Name of the Course	Total Hours	Hours per Week
1.	ER20-21T	Pharmacology – Theory	75	3
2.	ER20-21P	Pharmacology – Practical	50	2
3.	ER20-22T	Community Pharmacy & Management – Theory	75	3
4.	ER20-22P	Community Pharmacy & Management – Practical	75	3
5.	ER20-23T	Biochemistry & Clinical Pathology – Theory	75	3
6.	ER20-23P	Biochemistry & Clinical Pathology – Practical	50	2
7.	ER20-24T	Pharmacotherapeutics – Theory	75	3
8.	ER20-24P	Pharmacotherapeutics – Practical	25	1
9.	ER20-25T	Hospital & Clinical Pharmacy – Theory	75	3
10.	ER20-25P	Hospital & Clinical Pharmacy – Practical	25	1
11.	ER20-26T	Pharmacy Law & Ethics	75	3

## PHARMACOLOGY – THEORY

**Course Code: ER20-21T**

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

**Scope:** This course provides basic knowledge about different classes of drugs available for the pharmacotherapy of common diseases. The indications for use, dosage regimen, routes of administration, pharmacokinetics, pharmacodynamics, and contraindications of the drugs discussed in this course are vital for successful professional practice.

**Course Objectives:** This course will discuss the following:

1. General concepts of pharmacology including pharmacokinetics, pharmacodynamics, routes of administration, etc.
2. Pharmacological classification and indications of drugs
3. Dosage regimen, mechanisms of action, contraindications of drugs
4. Common adverse effects of drugs

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Describe the basic concepts of pharmacokinetics and pharmacodynamics
2. Enlist the various classes and drugs of choices for any given disease condition
3. Advise the dosage regimen, route of administration and contraindications for a given drug
4. Describe the common adverse drug reactions

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>• Bioavailability and the factors affecting bioavailability</li><li>• Drug distribution - definition, factors affecting drug distribution</li><li>• Biotransformation of drugs - Definition, types of biotransformation reactions, factors influencing drug metabolisms</li><li>• Excretion of drugs - Definition, routes of drug excretion</li><li>• General mechanisms of drug action and factors modifying drug action</li></ul>	10

2	<p><b>Drugs Acting on the Peripheral Nervous System</b></p> <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) Anti-adrenergic drugs</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>	11
3	<p><b>Drugs Acting on the Eye</b></p> <p>Definition, classification, pharmacological actions, dose, indications and contraindications of</p> <ul style="list-style-type: none"> <li>• Miotics</li> <li>• Mydriatics</li> <li>• Drugs used in Glaucoma</li> </ul>	2
4	<p><b>Drugs Acting on the Central Nervous System</b></p> <p>Definition, classification, pharmacological actions, dose, indications and contraindications of</p> <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>• Anti-psychotics</li> <li>• Nootropic agents</li> <li>• Centrally acting muscle relaxants</li> <li>• Opioid analgesics</li> </ul>	8
5	<p><b>Drugs Acting on the Cardiovascular System</b></p> <p>Definition, classification, pharmacological actions, dose, indications and contraindications of</p> <ul style="list-style-type: none"> <li>• Anti-hypertensive drugs</li> <li>• Anti-anginal drugs</li> <li>• Anti-arrhythmic drugs</li> <li>• Drugs used in atherosclerosis and</li> <li>• Congestive heart failure</li> </ul>	6
6	<p><b>Drugs Acting on Blood and Blood Forming Organs</b></p> <p>Definition, classification, pharmacological actions, dose, indications and contraindications of</p>	4

	<ul style="list-style-type: none"> <li>• Hematinic agents</li> <li>• Anti-coagulants</li> <li>• Anti-platelet agents</li> <li>• Thrombolytic drugs</li> </ul>	
7	<p>Definition, classification, pharmacological actions, dose, indications and contraindications of</p> <ul style="list-style-type: none"> <li>• Bronchodilators</li> <li>• Expectorants</li> <li>• Anti-tussive agents</li> <li>• Mucolytic agents</li> </ul>	2
8	<p><b>Drugs Acting on the Gastro Intestinal Tract</b>  Definition, classification, pharmacological actions, dose, indications and contraindications of</p> <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
9	<p><b>Drugs Acting on the Kidney</b>  Definition, classification, pharmacological actions, dose, indications, and contraindications of</p> <ul style="list-style-type: none"> <li>• Diuretics</li> <li>• Anti-Diuretics</li> </ul>	2
10	<p><b>Hormones and Hormone Antagonists</b>  Physiological and pathological role and clinical uses of</p> <ul style="list-style-type: none"> <li>• Thyroid hormones</li> <li>• Anti-thyroid drugs</li> <li>• Parathormone</li> <li>• Calcitonin</li> <li>• Vitamin D</li> <li>• Insulin</li> <li>• Oral hypoglycemic agents</li> <li>• Estrogen</li> <li>• Progesterone</li> <li>• Oxytocin</li> <li>• Corticosteroids</li> </ul>	8
11	<p><b>Autocoids</b></p> <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

<b>12</b>	<p><b>Chemotherapeutic Agents:</b> Introduction, basic principles of chemotherapy of infections, infestations and neoplastic diseases, Classification, dose, indication and contraindications of drugs belonging to</p> <ul style="list-style-type: none"> <li>• Penicillins</li> <li>• Cephalosporins</li> <li>• Aminoglycosides</li> <li>• Fluoroquinolones</li> <li>• Macrolides</li> <li>• Tetracyclines</li> <li>• Sulphonamides</li> <li>• Anti-tubercular drugs</li> <li>• Anti-fungal drugs</li> <li>• Anti-viral drugs</li> <li>• Anti-amoebic agents</li> <li>• Anthelmintics</li> <li>• Anti-malarial agents</li> <li>• Anti-neoplastic agents</li> </ul>	<b>12</b>
<b>13</b>	<p><b>Biologicals</b> Definition, types and indications of biological agents with examples</p>	<b>2</b>

### PHARMACOLOGY – PRACTICAL

**Course Code: ER20-21P**

**50 Hours (2 Hours/week)**

**Scope:** This course provides the basic understanding about the uses, mechanisms of actions, dose dependent responses of drugs in simulated virtual animal models and experimental conditions.

**Course Objectives:** This course will demonstrate / provide hands-on experience in the virtual platform using appropriate software on the following

1. Study of pharmacological effects of drugs like local anaesthetics, mydriatic and mitotic on rabbit eye
2. Screening the effects of various drugs acting in the central nervous system
3. Study of drug effects on isolated organs / tissues
4. Study of pyrogen testing on rabbit

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Study and report the local anaesthetic, mydriatic and mitotic effects of the given drug on the rabbit eye

2. Choose appropriate animal experiment model to study the effects of the given drugs acting on the central nervous system and submit the report
3. Perform the effects of given tissues (simulated) on isolated organs / tissues and interpret the results
4. Interpret the dose dependent responses of drugs in various animal experiment models

## **Practicals**

**Introduction to the following topics pertaining to the experimental pharmacology have to be discussed and documented in the practical manuals.**

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. Different routes of administration of drugs in animals
5. Types of pre-clinical experiments: In-Vivo, In-Vitro, Ex-Vivo, etc.
6. Techniques of blood collection from animals

## **Experiments**

**Note:** Animals shall not be used for doing / demonstrating any of the experiments given. The given experiments shall be carried-out / demonstrated as the case may be, ONLY with the use of software program(s).

1. Study of local anaesthetics on rabbit eye
2. Study of Mydriatic effect on rabbit eye
3. Study of Miotic effect on rabbit eye
4. Effect of analgesics using Analgesiometer
5. Study of analgesic activity by writhing test
6. Screening of anti-convulsant using Electro Convulsiometer
7. Screening of Muscle relaxants using Rota-Rod apparatus
8. Screening of CNS stimulants and depressants using Actophotometer
9. Study of anxiolytic activity using elevated plus maze method
10. Study of effect of drugs (any 2) on isolated heart
11. Effect of drugs on ciliary motility on frog's buccal cavity
12. Pyrogen testing by rabbit method

## **Assignments**

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Newer techniques in experimental pharmacology
2. Introduction to High Throughput screening
3. Introduction to ELISA test
4. Intro to Allergy Testing
5. Intro to Toxicity Studies
6. Drugs available as paediatric formulations
7. Drug Facts Labels of USFDA
8. Antimicrobial Resistance
9. Introduction to Bioassays
10. Pre-clinical studies in new drug development

### **Recommended Books (Latest Edition)**

1. Satoskar, R.S. and Bhandarkar, S.D. Pharmacology and Pharmacotherapeutics
2. B. Suresh, A Text Book of Pharmacology
3. Derasari and Gandhi's Elements of Pharmacology
4. S.K. Kulkarni, Practical Pharmacology and Clinical Pharmacy
5. H.K. Sharma. Principles of Pharmacology
6. Mary J. Mycek, Lippincott Williams and Wilkins. Lippincott's illustrated Reviews: Pharmacology
7. Tripathi, K.D. Essentials of Medical Pharmacology.
8. Various Drug Information Books like British National Formulary, MIMS, CIMS, Drug Today etc., WHO, NIH Websites

## COMMUNITY PHARMACY AND MANAGEMENT – THEORY

**Course Code: ER20-22T**

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

**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.

**Course Objectives:** This course will discuss the following

1. Establishing and running a community pharmacy and its legal requirements
2. Professional aspects of handling and filling prescriptions
3. Patient counselling on diseases, prescription and or non-prescription drugs
4. Scope for performing basic health screening in community pharmacy settings

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Describe the establishment, legal requirements and effective administration of a community pharmacy
2. Professionally handle prescriptions and dispense medications
3. Counsel patients about the disease, prescription and or non- prescription drugs
4. Perform basic health screening on patients and interpret the reports in the community pharmacy settings

Chapter	Topic	Hours
1	<b>Community Pharmacy Practice</b> – Definition, history and development of community pharmacy - International and Indian scenarios	2
2	Professional responsibilities of community pharmacists  Introduction to the concept of Good Pharmacy Practice and SOPs.	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, Good Dispensing Practices, dispensing errors and strategies to minimize them</li></ul>	7
4	<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</li></ul>	6

	<p>telephone)</p> <ul style="list-style-type: none"> <li>• Written communication skills</li> <li>• Body language</li> <li>• Patient interview techniques</li> </ul>	
<b>5</b>	<p><b>Patient counselling</b></p> <ul style="list-style-type: none"> <li>• Definition and benefits of patient counselling</li> <li>• <b>Stages of patient counselling</b> - Introduction, counselling content, counselling process and closing the counselling session</li> <li>• <b>Barriers to effective counseling</b> - Types and strategies to overcome the barriers</li> <li>• <b>Patient counselling points for chronic diseases/disorders</b> - Hypertension, Diabetes, Asthma, Tuberculosis, Chronic obstructive pulmonary disease and AIDS</li> <li>• <b>Patient Package Inserts</b> - Definition, importance and benefits, Scenarios of PPI use in India and other countries</li> <li>• <b>Patient Information leaflets</b> - Definition and uses</li> </ul>	<b>10</b>
<b>6</b>	<p><b>Medication Adherence</b></p> <p>Definition, factors influencing non adherence, strategies to overcome non-adherence</p>	<b>2</b>
<b>7</b>	<p><b>Health Screening Services in Community Pharmacy</b></p> <p>Introduction, scope and importance of various health screening services - for routine monitoring of patients, early detection and referral of undiagnosed cases</p>	<b>5</b>
<b>9</b>	<p><b>Over The Counter (OTC) Medications</b></p> <ul style="list-style-type: none"> <li>• Definition, need and role of Pharmacists in OTC medication dispensing</li> <li>• OTC medications in India, counseling for OTC products</li> <li>• Self-medication and role of pharmacists in promoting the safe practices during self-medication</li> <li>• Responding to symptoms, minor ailments and advice for self-care in conditions such as - Pain management, Cough, Cold, Diarrhea, Constipation, Vomiting, Fever, Sore throat, Skin disorders, Oral health (mouth ulcers, dental pain, gum swelling)</li> </ul>	<b>15</b>
<b>10</b>	<p><b>Community Pharmacy Management</b></p> <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</li> </ul>	<b>25</b>

	<p>management</p> <ul style="list-style-type: none"><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>• Customer Relation Management (CRM)</li><li>• Audits in Pharmacies</li><li>• SOP of Pharmacy Management</li><li>• Introduction to Digital Health, mHealth and Online pharmacies</li></ul>	
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## COMMUNITY PHARMACY AND MANAGEMENT – PRACTICAL

**Course Code: ER20-22P**

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

**Scope:** The course is designed to train the students and improve professional skills to provide various pharmaceutical care services in the simulated community pharmacy.

**Course Objectives:** This course will train the students in the following

1. Professional handling and filling prescriptions
2. Patient counselling on diseases and minor ailments
3. Patient counselling on prescription and / or non-prescription drugs
4. Preparation of counselling materials such as patient information leaflets
5. Performing basic health screening tests

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Handle and fill prescriptions in a professional manner
2. Counsel patients on various diseases and minor ailments
3. Counsel patients on prescription and or non-prescription drugs
4. Design and prepare patient information leaflets
5. Perform basic health screening tests

### Practicals

**Note:** The following practicals shall be carried out in the model community pharmacy with appropriate simulated scenarios and materials. Students shall be trained through role plays wherever necessary. The activities of the students shall be assessed / evaluated using a structured objective assessment form.

1. Handling of prescriptions with professional standards, reviewing prescriptions, checking for legal compliance and completeness (minimum 5)
2. Identification of drug-drug interactions in the prescription and follow-up actions (minimum 2)
3. Preparation of dispensing labels and auxiliary labels for the prescribed medications (minimum 5)
4. Providing the following health screening services for monitoring patients / detecting new patients (one experiment for each activity)  
Blood Pressure Recording, Capillary Blood Glucose Monitoring, Lung function assessment using Peak Flow Meter and incentive spirometer, recording capillary oxygen level using Pulse Oximeter, BMI measurement
5. Providing counselling to simulated patients for the following chronic diseases / disorders including education on the use of devices such as insulin pen,

inhalers, spacers, nebulizers, etc. where appropriate (one experiment for each disease)

Type 2 Diabetes Mellitus, Primary Hypertension, Asthma, Hyperlipidaemia, Rheumatoid Arthritis

6. Providing counselling to simulated patients for the following minor ailments (any three)

Headache, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhoea, constipation), Worm infestations, Pyrexia, Upper Respiratory Tract infections, Skin infections, Oral and dental disorders.

7. Appropriate handling of dummy dosage forms with correct administration techniques - oral liquids with measuring cup/cap/dropper, Eye Drops, Inhalers, Nasal drops, Insulin pen, nebulizers, different types of tablets, patches, enemas, suppositories

## Assignments

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. SOPs for various activities in Community Pharmacy (as discussed in Theory and Practical)
2. List out the various abbreviations, short forms used in prescriptions and their interpretation
3. Patient Information Leaflet for a given chronic disease / disorder
4. Patient Information Leaflet for prescription / non-prescription drugs
5. Preparation of window / shelf display materials for the model community pharmacy
6. Software available for retail pharmacy management including billing, inventory, etc.
7. Dosage / Medication Reminder Aids
8. Overview on the operations and marketing strategies of various online pharmacies
9. Overview on the common fixed dose combinations
10. Overview on the medications require special storage conditions
11. Roles of Community Pharmacists in preventing Antimicrobial Resistance
12. Jan Aushadhi and other Generic Medicine initiatives in India
13. Overview of various professional associations of Pharmacy / Pharmacists in India
14. Community Pharmacy Practice Standards: Global Vs. Indian Scenario
15. Overview on Pharma Marketing

## Field Visit

The students shall be taken in groups to visit community pharmacies (both retail and wholesale) to understand and witness the professional activities of the community pharmacists. Individual reports from each student on their learning experience from the field visit shall be submitted.

## Recommended Books (Latest Edition)

1. Health Education and Community Pharmacy by N.S. Parmar.
2. WHO consultative group report.
3. Drug store and Business management by Mohammed Ali and Jyoti.
4. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical Press
5. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams and 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.
9. Responsible Use of Medicines: A Layman's Handbook, [www.ipapharma.org/publications](http://www.ipapharma.org/publications)
10. Community Pharmacy Practice around the Globe: Part One: [www.ipapharma.org/publications](http://www.ipapharma.org/publications)

## BIOCHEMISTRY & CLINICAL PATHOLOGY – THEORY

**Course Code: ER20-23T**

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

**Scope:** This course is designed to impart basic knowledge on the study of structure and functions of biomolecules and the chemical processes associated with living cells in normal and abnormal states. The course also emphasizes on the clinical pathology of blood and urine.

**Course Objectives:** This course will discuss the following at the fundamental level

1. Structure and Functions of biomolecules
2. Catalytic activity, diagnostic and therapeutic importance of enzymes
3. Metabolic pathways of biomolecules in health and illness (metabolic disorders)
4. Biochemical principles of organ function tests and their clinical significance
5. Qualitative and quantitative determination of biomolecules / metabolites in the biological sample
6. Clinical pathology of blood and urine

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Describe the functions of biomolecules
2. Discuss the various functions of enzymes in the human system
3. Explain the metabolic pathways of biomolecules in both physiological and pathological conditions
4. Describe the principles of organ function tests and their clinical significances
5. Determine the biomolecules / metabolites in the given biological samples, both qualitatively and quantitatively
6. Describe 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, chemical properties</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 of carbohydrates</li></ul>	5

3	<p><b>Proteins</b></p> <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 levels of organization of protein structure)</li> <li>• Qualitative tests and biological role of proteins and amino acids</li> <li>• Diseases related to malnutrition of proteins.</li> </ul>	5
4	<p><b>Lipids</b></p> <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	<p><b>Nucleic acids</b></p> <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 and Crick model), RNA and their functions</li> </ul>	4
6	<p><b>Enzymes</b></p> <ul style="list-style-type: none"> <li>• Definition, properties and IUB and MB classification</li> <li>• Factors affecting enzyme activity</li> <li>• Mechanism of action of enzymes, Enzyme inhibitors</li> <li>• Therapeutic and pharmaceutical importance of enzymes</li> </ul>	5
7	<p><b>Vitamins</b></p> <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	<p><b>Metabolism</b> (Study of cycle/pathways without chemical structures)</p> <ul style="list-style-type: none"> <li>• Metabolism of Carbohydrates: Glycolysis, TCA cycle and glycogen metabolism, regulation of blood glucose</li> </ul>	20

	<p>level. Diseases related to abnormal metabolism of Carbohydrates</p> <ul style="list-style-type: none"> <li>• Metabolism of lipids: Lipolysis, <math>\beta</math>-oxidation of Fatty acid (Palmitic acid) ketogenesis and ketolysis. Diseases related to abnormal metabolism of lipids such as Ketoacidosis, Fatty liver, Hypercholesterolemia</li> <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>	
<b>9</b>	<b>Minerals:</b> Functions, Deficiency diseases, recommended dietary requirements of calcium, phosphorus, iron, sodium and chloride	<b>05</b>
<b>10</b>	<b>Water and Electrolytes</b> <ul style="list-style-type: none"> <li>• Distribution, functions of water in the body</li> <li>• Water turnover and balance</li> <li>• Electrolyte composition of the body fluids, Dietary intake of electrolyte and Electrolyte balance</li> <li>• Dehydration, causes of dehydration and oral rehydration therapy</li> </ul>	<b>05</b>
<b>11</b>	Introduction to Biotechnology	<b>01</b>
<b>12</b>	<b>Organ function tests</b> <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 tests to assess the functions of liver and their clinical significances</li> <li>• Lipid profile tests and its clinical significances</li> </ul>	<b>06</b>
<b>13</b>	<b>Introduction to Pathology of Blood and Urine</b> <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>

## BIOCHEMISTRY & CLINICAL PATHOLOGY – PRACTICAL

**Course Code: ER20-23P**

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

**Scope:** This course is designed to train the students in the qualitative testing of various biomolecules and testing of biological samples for determination of normal and abnormal constituents

**Course Objectives:** This course will train and provide hands-on experiences on the following

1. Qualitative determination of biomolecules / metabolites in simulated biological samples
2. Determination of normal and abnormal constituents of simulated blood and urine samples

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Qualitatively determine the biomolecules / metabolites in the given biological samples
2. Determine the normal and abnormal constituents in blood and urine samples and interpret the results of such testing

### Practicals

1. Qualitative analysis of carbohydrates (4 experiments)
2. Qualitative analysis of Proteins and 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 (simulated) (Creatine, glucose, cholesterol, Calcium, Urea, SGOT/SGPT) (5 experiments)
7. Study the hydrolysis of starch from acid and salivary amylase enzyme (1 experiment)

### Assignments

The students shall be asked to submit written assignments on Various Pathology Lab Reports (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

**Recommended Books (Latest Editions)**

1. Essentials of Biochemistry by U. Satyanarayana, 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. Bhargava.
4. Laboratory manual of Biochemistry by Pattabiraman and Sitaram Acharya

## PHARMACOTHERAPEUTICS - THEORY

**Course Code: ER20-24T**

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

**Scope:** This course is designed to impart basic knowledge on etiopathogenesis of common diseases and their management along with quality use of medicines.

**Course Objectives:** This course will discuss about

1. Etiopathogenesis of selected common diseases and evidence-based medicine therapy
2. Importance of individualized therapeutic plans based on diagnosis
3. Basic methods for assessing the clinical outcomes of drug therapy

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Help assessing the subjective and objective parameters of patients in common disease conditions
2. Assist other healthcare providers to analyse drug related problems and provide therapeutic interventions
3. Participate in planning the rational medicine therapy for common diseases
4. Design and deliver discharge counselling for patients

Chapter	Topic	Hours
1	Pharmacotherapeutics – Introduction, scope and objectives. Rational use of Medicines, Evidence Based Medicine, Essential Medicines List, Standard Treatment Guidelines (STGs)	<b>10</b>
2	<b>Definition, etiopathogenesis, clinical manifestations, non-pharmacological and pharmacological management of the diseases associated with</b>	
	<b>(a) Cardiovascular System</b> <ul style="list-style-type: none"> <li>• Hypertension</li> <li>• Angina and Myocardial infarction</li> <li>• Hyperlipidaemia</li> <li>• Congestive Heart Failure</li> </ul>	<b>8</b>
	<b>(b) Respiratory System</b> <ul style="list-style-type: none"> <li>• Asthma</li> <li>• COPD</li> </ul>	<b>4</b>
	<b>(c) Endocrine System</b> <ul style="list-style-type: none"> <li>• Diabetes</li> <li>• Thyroid disorders- Hypo and Hyperthyroidism</li> </ul>	<b>5</b>
	<b>(d) Central Nervous System</b> <ul style="list-style-type: none"> <li>• Epilepsy</li> </ul>	<b>8</b>

<ul style="list-style-type: none"> <li>• Parkinson's disease</li> <li>• Alzheimer's disease</li> <li>• Stroke</li> <li>• Migraine</li> </ul>	
<b>(e) Gastro Intestinal Disorders</b> <ul style="list-style-type: none"> <li>• Gastro oesophageal reflux disease</li> <li>• Peptic Ulcer Disease</li> <li>• Alcoholic liver disease</li> <li>• Inflammatory Bowel Diseases (Crohn's Disease and Ulcerative Colitis)</li> </ul>	<b>8</b>
<b>(f) Haematological disorders</b> <ul style="list-style-type: none"> <li>• Iron deficiency anaemia</li> <li>• Megaloblastic anaemia</li> </ul>	<b>4</b>
<b>(g) Infectious diseases</b> <ul style="list-style-type: none"> <li>• Tuberculosis</li> <li>• Pneumonia</li> <li>• Urinary tract infections</li> <li>• Hepatitis</li> <li>• Gonorrhoea and Syphilis</li> <li>• Malaria</li> <li>• HIV and Opportunistic infections</li> <li>• Viral Infections (SARS, CoV2)</li> </ul>	<b>12</b>
<b>(h) Musculoskeletal disorders</b> <ul style="list-style-type: none"> <li>• Rheumatoid arthritis</li> <li>• Osteoarthritis</li> </ul>	<b>3</b>
<b>(i) Dermatology</b> <ul style="list-style-type: none"> <li>• Psoriasis</li> <li>• Scabies</li> <li>• Eczema</li> </ul>	<b>3</b>
<b>(j) Psychiatric Disorders</b> <ul style="list-style-type: none"> <li>• Depression</li> <li>• Anxiety</li> <li>• Psychosis</li> </ul>	<b>4</b>
<b>(k) Ophthalmology</b> <ul style="list-style-type: none"> <li>• Conjunctivitis (bacterial and viral)</li> <li>• Glaucoma</li> </ul>	<b>2</b>
<b>(l) Anti-microbial Resistance</b>	<b>2</b>
<b>(m) Women's Health</b> <ul style="list-style-type: none"> <li>• Polycystic Ovary Syndrome</li> <li>• Dysmenorrhea</li> <li>• Premenstrual Syndrome</li> </ul>	<b>4</b>

## PHARMACOTHERAPEUTICS – PRACTICAL

**Course Code: ER20-24P**

**25 Hours (1 Hour/week)**

**Scope:** This course is designed to train the students in the basic skills required to support the pharmaceutical care services for selected common disease conditions.

**Course Objectives:** This course will train the students on

1. How to prepare a SOAP (Subjective, Objective, Assessment and Plan) note for clinical cases of selected common diseases
2. Patient counselling techniques/methods for common disease conditions

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Write the SOAP (Subjective, Objective, Assessment and Plan) notes for the given clinical cases of selected common diseases
2. Counsel the patients about the disease conditions, uses of drugs, methods of handling and administration of drugs, life-style modifications and monitoring parameters.

### Practicals

I. Preparation and discussion of SOAP (Subjective, Objective, Assessment and Plan) notes for at least SIX clinical cases (real / hypothetical) of the following disease conditions.

1. Hypertension
2. Angina Pectoris
3. Myocardial Infarction
4. Hyperlipidaemia
5. Rheumatoid arthritis
6. Asthma
7. COPD
8. Diabetes
9. Epilepsy
10. Stroke
11. Depression
12. Tuberculosis
13. Anaemia (any one type as covered in theory)
14. Viral infection (any one type as covered in theory)
15. Dermatological conditions (any one condition as covered in theory)

II. Patient counselling exercises using role plays based on the real / hypothetical clinical case scenarios. The students are expected to provide counselling on

disease condition, medications, life-style modifications, monitoring parameters, etc. and the same shall be documented. (Minimum 5 cases)

III. Simulated cases to enable dose calculation of selected drugs in paediatrics, and geriatrics under various pathological conditions. (Minimum 4 cases)

### **Recommended Books (Latest Editions)**

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 Lippincott, Williams and Wilkins Publication.
4. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton and Lange Publication.

## HOSPITAL AND CLINICAL PHARMACY – THEORY

**Course Code: ER20-25T**

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

**Scope:** This course is designed to impart fundamental knowledge and professional skills required for facilitating various hospital and clinical pharmacy services.

**Course Objectives:** This course will discuss and train the students in the following

1. Hospital and Hospital Pharmacy organization and set-ups
2. Basics of hospital pharmacy services including the procurement, supply chain, storage of medicines and medical supplies
3. Basics of clinical pharmacy including introduction to comprehensive pharmaceutical care services
4. Basic interpretations of common laboratory results used in clinical diagnosis towards optimizing the drug therapy

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Explain about the basic concepts of hospital pharmacy administration
2. Manage the supply chain and distribution of medicines within the hospital settings
3. Assist the other healthcare providers in monitoring drug therapy and address drug related problems
4. Interpret common lab investigation reports for optimizing drug therapy

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, Qualification and experience requirements, job specifications, work load requirements and inter professional relationships</li><li>• Good Pharmacy Practice (GPP) in hospital</li><li>• Hospital Pharmacy Standards (FIP Basel Statements, AHSP)</li><li>• Introduction to NABH Accreditation and Role of Pharmacists</li></ul>	6
2	<b>Different Committees in the Hospital</b> <ul style="list-style-type: none"><li>• Pharmacy and Therapeutics Committee - Objectives, Composition and functions</li><li>• Hospital Formulary - Definition, procedure for development and use of hospital formulary</li></ul>	4

	<ul style="list-style-type: none"> <li>• Infection Control Committee – Role of Pharmacist in preventing Antimicrobial Resistance</li> </ul>	
<b>4</b>	<p><b>Supply Chain and Inventory Control</b></p> <ul style="list-style-type: none"> <li>• Preparation of Drug lists - High Risk drugs, Emergency drugs, Schedule H1 drugs, NDPS drugs, reserved antibiotics</li> <li>• Procedures of Drug Purchases – Drug selection, short term, long term and tender/e-tender process, quotations, etc.</li> <li>• Inventory control techniques: Economic Order Quantity, Reorder Quantity Level, Inventory Turnover etc.</li> <li>• Inventory Management of Central Drug Store – Storage conditions, Methods of storage, Distribution, Maintaining Cold Chain, Devices used for cold storage (Refrigerator, ILR, Walk-in-Cold rooms)</li> <li>• FEFO, FIFO methods</li> <li>• Expiry drug removal and their disposal methods e.g., Narcotics</li> <li>• Documentation - purchase and inventory</li> </ul>	<b>14</b>
<b>5</b>	<p><b>Drug distribution</b></p> <ul style="list-style-type: none"> <li>• Drug distribution (in- patients and out - patients) – 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/NICU/Emergency wards.</li> <li>• Automated drug dispensing systems and devices</li> <li>• Distribution of Narcotic and Psychotropic substances and their storage</li> </ul>	<b>7</b>
<b>6</b>	Compounding in Hospitals. Bulk compounding, IV admixture services and incompatibilities, Total parenteral nutrition	<b>4</b>
<b>7</b>	<b>Radio Pharmaceuticals</b> - Storage, dispensing and disposal of radiopharmaceuticals	<b>2</b>
<b>8</b>	Application of computers in Hospital Pharmacy Practice, Electronic health records, Softwares used in hospital pharmacy	<b>2</b>
<b>9</b>	<p><b>Clinical Pharmacy:</b> Definition, scope and development - in India and other countries</p> <p>Technical definitions, common terminologies used in clinical settings and their significance such as Paediatrics, Geriatric, Anti-natal Care, Post-natal Care, etc.</p>	<b>12</b>

	<p><b>Daily activities of clinical pharmacists:</b> Definition, goal and procedure of</p> <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> <li>• Interprofessional collaboration</li> </ul> <p><b>Pharmaceutical care:</b> Definition, classification of drug related problems. Principles and procedure to provide pharmaceutical care</p> <p><b>Medication Therapy Management, Home Medication Review</b></p>	
<b>10</b>	<p><b>Clinical laboratory tests used in the evaluation of disease states - significance and interpretation of test results</b></p> <ul style="list-style-type: none"> <li>• Haematological, 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>11</b>	<p><b>Poisoning:</b> Types of poisoning: Clinical manifestations and Antidotes</p> <p><b>Drugs and Poison Information Centre and their services –</b> Definition, Requirements, Information resources with examples, and their advantages and disadvantages</p>	<b>6</b>
<b>12</b>	<p><b>Pharmacovigilance</b></p> <ul style="list-style-type: none"> <li>• Definition, aim and scope</li> <li>• Overview of Pharmacovigilance</li> </ul>	<b>2</b>
<b>13</b>	<p><b>Medication errors:</b> Definition, types, consequences, and strategies to minimize medication errors, LASA drugs and Tallman lettering as per ISMP</p> <p><b>Drug Interactions:</b> Definition, types, clinical significance of drug interactions</p>	<b>6</b>

## HOSPITAL AND CLINICAL PHARMACY – PRACTICAL

**Course Code: ER20-25P**

**25 Hours (1 Hour / Week)**

**Scope:** This course is designed to train the students to assist other healthcare providers in the basic services of hospital and clinical pharmacy.

**Course Objectives:** This course will train the students with hands-on experiences, simulated clinical case studies in the following

1. Methods to systematically approach and respond to drug information queries
2. How to interpret the common laboratory reports to understand the need for optimizing the dosage regimen
3. How to report the suspected adverse drug reactions to the concerned authorities
4. Uses and methods of handling various medical/surgical aids and devices
5. How to interpret the drug-drug interactions in the treatment of common diseases.

**Course Outcomes:** Upon completion of the course, the students will be able to

1. Professionally handle and answer the drug information queries
2. Interpret the common laboratory reports
3. Report suspected adverse drug reactions using standard procedures
4. Understand the uses and methods of handling various medical/surgical aids and devices
5. Interpret and report the drug-drug interactions in common diseases for optimizing the drug therapy

**Note:** Few of the experiments of Hospital and Clinical Pharmacy practical course listed here require adequate numbers of desktop computers with internet connectivity, adequate drug information resources including reference books, different types of surgical dressings and other medical devices and accessories. Various charts, models, exhibits pertaining to the experiments shall also be displayed in the laboratory.

### Practicals

1. Systematic approach to drug information queries using primary / secondary / tertiary resources of information (2 cases)
2. Interpretation of laboratory reports to optimize the drug therapy in a given clinical case (2 cases)
3. Filling up IPC's ADR Reporting Form and perform causality assessments using various scales (2 cases)
4. Demonstration / simulated / hands-on experience on the identification, types, use / application /administration of

- Orthopaedic and Surgical Aids such as knee cap, LS belts, abdominal belt, walker, walking sticks, etc.
  - Different types of bandages such as sterile gauze, cotton, crepe bandages, etc.
  - Needles, syringes, catheters, IV set, urine bag, RYLE's tube, urine pots, colostomy bags, oxygen masks, etc.
5. Case studies on drug-drug interactions (any 2 cases)
  6. Wound dressing (simulated cases and role play – any 2 cases)
  7. Vaccination and injection techniques (IV, IM, SC) using mannequins (5 activities)

### **Assignments**

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Typical profile of a drug to be included in the hospital formulary
2. Brief layout and various services of the Central Sterile Supplies Department (CSSD)
3. Various types of sterilizers and sterilization techniques used in hospitals
4. Fumigation and pesticide control in hospitals
5. Genesis and development of Drug / Poison Information centres in India
6. Role of Pharmacists in Transition of Care: Discharge cards, post hospitalization care, medicine reconciliation activities in developed countries
7. Total parenteral nutrition and IV admixtures and their compatibility issues
8. Concept of electronic health records
9. Invasive and Non-invasive diagnostic tests - HRCT, MRI, Sonography, 2DECHO, X-rays, Mammography, ECG, EMG
10. Diagnostic Kits - Pregnancy Test
11. Measures to be taken in hospitals, ICUs to minimize the Antimicrobial Resistance
12. Antimicrobial Stewardship Program

### **Field Visit**

The students shall be taken in groups to visit a Govt / private healthcare facility to understand and witness the various hospital and clinical pharmacy services provided. Individual reports from each student on their learning experience from the field visit shall be submitted.

### **Recommended Books (Latest Edition)**

1. A Textbook of Clinical Pharmacy Practice - Essential concepts and skills - Parthasarathi G, Karin Nyfort-Hansen and Milap Nahata. Orient Longman Pvt. Ltd. Hyderabad.
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. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
5. Australian drug information - Procedure manual. The Society of Hospital Pharmacists of Australia.

## PHARMACY LAW AND ETHICS – THEORY

Course Code: ER20-26T

75 Hours (3 Hours/week)

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

**Course Objectives:** This course will discuss the following

1. General perspectives, history, evolution of pharmacy law in India
2. Act and Rules regulating the profession and practice of pharmacy in India
3. Important code of ethical guidelines pertaining to various practice standards
4. Brief introduction to the patent laws and their applications in pharmacy

**Course Outcomes:** Upon successful completion of this course, the students will be able to

1. Describe the history and evolution of pharmacy law in India
2. Interpret the act and rules regulating the profession and practice of pharmacy in India
3. Discuss the various codes of ethics related to practice standards in pharmacy
4. Interpret the fundamentals of patent laws from the perspectives of pharmacy

Chapter	Topics	Hours
1	General Principals of Law, History and various Acts related to Drugs and Pharmacy profession	2
2	<b>Pharmacy Act-1948 and Rules:</b> Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils, Registration of Pharmacists, Offences and Penalties.  <b>Pharmacy Practice Regulations 2015</b>	5
3	<b>Drugs and Cosmetics Act 1940 and Rules 1945 and New Amendments</b> Objectives, Definitions, Legal definitions of schedules to the Act and Rules <b>Import of drugs</b> – Classes of drugs and cosmetics prohibited from import, Import under license or permit.  <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,	23

	<p>manufacture of new drug, loan license and repacking license.</p> <p>Study of schedule C and C1, G, H, H1, K, P, M, N, X and Y.</p> <p><b>Sale of Drugs</b> – Wholesale, Retail sale and Restricted license, Records to be kept in a pharmacy 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>	
4	<b>Medicinal and Toilet Preparations Act 1955:</b> Objectives, Definitions, Licensing, Offences and Penalties	2
5	<b>Narcotic Drugs and psychotropic substances 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 Advertisements) Act 1954</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, CPCSEA - brief overview, 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>FSSAI (Food Safety and Standards Authority of India) Act and Rules:</b> brief overview and aspects related to manufacture, storage, sale and labelling of Food Supplements	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,	5

	pharmaceutical policy 2002, National List of Essential Medicines (NLEM)	
<b>11</b>	<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.	<b>5</b>
<b>12</b>	Medical Termination of Pregnancy Act and Rules – basic understanding/salient features	<b>2</b>
<b>13</b>	Role of all the government pharma regulator bodies – Central Drugs Standards Control Organization (CDSCO), Indian Pharmacopoeia Commission (IPC)	<b>1</b>
<b>14</b>	Good Regulatory practices (documentation, licenses, renewals, e-governance) in Community Pharmacy, Hospital pharmacy, Pharma Manufacturing, Wholesale business, inspections, import, export of drugs and medical devices	<b>3</b>
<b>15</b>	Introduction to BCS system of classification, Basic concepts of Clinical Trials, ANDA, NDA, New Drug development, Schedule Y. Brand v/s Generic, Trade name concept, Introduction to Patent Law and Intellectual Property Rights, Emergency Use Authorization	<b>5</b>
<b>16</b>	Blood bank – basic requirements and functions	<b>2</b>
<b>17</b>	Clinical Establishment Act and Rules – Aspects related to Pharmacy	<b>2</b>
<b>18</b>	Biomedical Waste Management Rules 2016 – Basic aspects, and aspects related to pharma manufacture to disposal of pharma / medical waste at homes, pharmacies, and hospitals	<b>2</b>
<b>19</b>	Bioethics - Basic concepts, history and principles. Brief overview of ICMR's National Ethical Guidelines for Biomedical and Health Research involving human participants	<b>2</b>
<b>20</b>	Introduction to the Consumer Protection Act	<b>2</b>
<b>21</b>	Medical Devices – Categorization, basic aspects related to manufacture and sale	<b>2</b>

## Assignments

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period. i.e., a minimum of THREE assignments per student)

1. Requirements for Ayurvedic, Homeopathic manufacturing, sale and licensing requirements
2. Layout and contents of official websites of various agencies regulating the profession of pharmacy in India: e.g., CDSCO, SUGAM portal, PCI, etc.
3. Licenses required, application processes (online/offline), drug regulatory office website of the respective state
4. Case studies – actions taken on violation of any act / rule related to pharmacy from the literature / media
5. Schedule H1 drugs and its implementation in India
6. Counterfeit / Spurious medicines
7. Drug Testing Labs in India
8. Generic Medicines
9. Before of after food/Medicines and Meals

#### **Recommended Books (Latest Editions)**

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.
9. CDSCO Website, NPPA Website
10. Books on Drugs and Cosmetic Act by Nilesh Gandhi and Sudhir Deshpande
11. Text Book of Forensic Pharmacy by Dr Guruprasad Mohanta

## Examination Guidelines

### ***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.

- ***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.

- ***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 Make up 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.

- ***Eligibility for appearing at the Diploma in Pharmacy Part-I examination:***

Only such candidates who have attended regularly and satisfactorily 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 & II) examinations.

- ***Mode of examinations:***

- a. Each theory and practical examination in the subjects mentioned shall be of three hours duration.
- b. Practical examination shall also consist of a viva-voce (Oral) examination.

- ***Award of Sessional marks and maintenance of records:***

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.

- ***Minimum marks for passing the examination:***

A student shall not be declared to have passed Diploma in Pharmacy examination unless he /she secures at least 40% marks in each of the subject separately in the theory examinations, including sessional marks and at least 40% 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.

- ***Eligibility for promotion to Diploma in Pharmacy (Part-II):***

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 not more than two subjects would qualify for restricted carry over. The student has to clear those subjects in subsequent attempts. Diploma in Pharmacy Certificate will be issued only after clearing all subjects (both theory & practical) specified in these regulations and completion of the stipulated training.

- ***Improvement of sessional marks:***

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 cannot be improved unless he /she attends a regular course of study again.



# भारत का राजपत्र The Gazette of India

सी.जी.-डी.एल.-अ.-25022022-233753  
CG-DL-E-25022022-233753

असाधारण  
EXTRAORDINARY

भाग III—खण्ड 4  
PART III—Section 4

प्राधिकार से प्रकाशित  
PUBLISHED BY AUTHORITY

सं. 109]

नई दिल्ली, बृहस्पतिवार, फरवरी 24, 2022/फाल्गुन 5, 1943

No. 109]

NEW DELHI, THURSDAY, FEBRUARY 24, 2022/PHALGUNA 5, 1943

भारतीय भेषजी परिषद

अधिसूचना

नई दिल्ली, 24 फरवरी, 2022

डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन विनियम, २०२२

सं. 14-285/2021-भा.भे.परि.—भेषजी अधिनियम, १९४८ (१९४८ का ८) की धारा १० द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए भारतीय भेषजी परिषद, केन्द्रीय सरकार के अनुमोदन से निम्नलिखित विनियम बनाती है, अर्थात:-

१. संक्षिप्त नाम और प्रारंभ:-

- इन विनियमों को “डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन विनियम, २०२२” के नाम से जाना जाएगा।
- ये राजपत्र में प्रकाशन की तारीख से प्रवृत्त होंगे।

२. परिभाषाएँ:-

इन विनियमों में, जब तक कि संदर्भ से अन्यथा अपेक्षित न हो-

- ‘अधिनियम’ से अभिप्राय भेषजी अधिनियम, १९४८ (१९४८ का ८);
- ‘नामांकन तथा अभ्यास के लिए पात्रता प्रमाण पत्र’ का अर्थ किसी उम्मीदवार को निर्धारित प्राधिकरण द्वारा जारी किया गया प्रमाण पत्र, जिसने एग्जिट परीक्षा उत्तीर्ण की है;
- ‘भारतीय भेषजी परिषद् (पीसीआई)’ से अभिप्राय भेषजी अधिनियम, १९४८ की धारा ३ के अधीन गठित भारतीय भेषजी परिषद;

- (घ) “राज्य फार्मैसी परिषद” से अभिप्राय भेषजी अधिनियम, १९४८ की धारा १९ के तहत राज्य सरकार द्वारा गठित राज्य परिषद;
- (ङ) “अनुमोदित” से अभिप्राय भारतीय भेषजी परिषद द्वारा भेषजी अधिनियम, १९४८ की धारा १२ या धारा १४ के तहत अनुमोदित;
- (च) “डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन” से अभिप्राय निर्दिष्ट प्राधिकरण द्वारा एक पंजीकृत भेषज के रूप में नामांकन और अभ्यास हेतु डिप्लोमा इन फार्मैसी धारक को घोषित करने के लिए आयोजित की गई परीक्षा है;
- (छ) “परीक्षा प्राधिकरण”- से अभिप्राय किसी सांविधिक भारतीय विश्वविद्यालय या केंद्र या राज्य सरकार द्वारा गठित एक निकाय है और यह भेषजी अधिनियम, १९४८ की धारा १२ (२) के तहत भारतीय भेषजी परिषद द्वारा अनुमोदित होना चाहिए;
- (ज) “भेषजी रजिस्टर”- से अभिप्राय भेषजी अधिनियम, १९४८ के अध्याय IV के अधीन राज्य भेषजी परिषद द्वारा तैयार और रखा गया भेषजज्ञों का रजिस्टर है;
- (झ) “निर्धारित प्राधिकरण” से अभिप्राय पीसीआई द्वारा डिप्लोमा इन फार्मैसी धारकों के लिए एग्जिट परीक्षा आयोजित करने के प्रयोजनार्थ स्थापित प्राधिकरण है और इसमें वह प्राधिकरण शामिल है जिन्हें पीसीआई द्वारा नामोनिर्दिष्ट किया जा सकता है;
- (ञ) “पंजीकृत भेषज” से अभिप्राय ऐसा व्यक्ति है जिसका नाम उस राज्य के रजिस्टर में उस समय दर्ज है जिसमें वह उस समय निवास कर रहा है या भेषजी की अपनी वृत्ति या उसका कारोबार कर रहा है।

### ३. उद्देश्य:-

डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन विनियम (डीपीईई) का उद्देश्य यह सुनिश्चित करना है कि राज्य भेषजी परिषद के साथ भेषजी के रूप में पंजीकरण के लिए आवेदन करने वाले उम्मीदवार ने डिप्लोमा इन फार्मैसी (डी.फार्मा) पाठ्यक्रम में एक व्यापक व्यावहारिक प्रशिक्षण कार्यक्रम प्राप्त किया है जैसाकि शिक्षा विनियम, २०२० अथवा भेषजी अधिनियम, १९४८ की धारा १२ के तहत भारतीय भेषजी परिषद द्वारा अनुमोदित संस्थान में समय-समय पर लागू विनियमों में प्रावधान है और उसने दवाओं के वितरण और भेषजी अभ्यास के अन्य क्षेत्रों में तथा अपने अनुशासन, सत्यनिष्ठा, निर्णय, कौशल, ज्ञान और सीखने की इच्छा को सुदृढ़ करने के लिए आधारभूत दक्षता प्राप्त की है ताकि एग्जामिनेशन उत्तीर्ण करने के बाद, वह एक पंजीकृत भेषज बन सके जो अपने व्यावसायिक कार्यों और उत्तरदायित्वों का वहन करने के अतिरिक्त अपने व्यावसायिक कौशल का उपयोग कर सके।

### ४. आवृत्ति:-

डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन आयोजित करने की योजना और परीक्षा के पाठ्यक्रम का विवरण, उम्मीदवारों की जानकारी के लिए, भारतीय भेषजी परिषद द्वारा समय-समय पर बताया जाएगा। उम्मीदवार, प्रत्येक वर्ष दो बार आयोजित परीक्षा में या विनिर्धारित प्राधिकरण द्वारा घोषित परीक्षा कार्यक्रम के अनुसार, जितनी बार आवश्यक हो, एग्जिट एग्जामिनेशन दे सकता है। परीक्षा आयोजित करने की प्रक्रिया इस संबंध में भारतीय भेषजी परिषद द्वारा घोषित योजना के अनुसार होगी। निर्धारित प्राधिकरण द्वारा अभ्यर्थी को परीक्षा की तारीख और परीक्षा केंद्र का आवंटन, परीक्षा केंद्रों की उपलब्धता के आधार पर किया जाएगा।

### ५. उम्मीदवार का डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन के रूप में पंजीकरण:-

- (क) किसी भी व्यक्ति को उम्मीदवार के रूप में तब तक रजिस्ट्रीकृत नहीं किया जाएगा जब तक कि उसने भारतीय भेषजी परिषद द्वारा भेषजी अधिनियम, १९४८ की धारा १२ के तहत अनुमोदित किसी संस्था से भेषजी पाठ्यक्रम में डिप्लोमा उत्तीर्ण नहीं किया हो।
- (ख) उसे सभी प्रासंगिक दस्तावेजों के साथ एक निर्धारित फॉर्म में एक आवेदन करना होगा जिसमें उसके द्वारा पीसीआई द्वारा अनुमोदित परीक्षा उत्तीर्ण करने और निर्धारित परीक्षा शुल्क का प्रमाण दर्शाया गया हो।

### ६. एग्जिट एग्जामिनेशन आयोजित करने की प्रक्रिया:-

- (क) पीसीआई, एग्जिट एग्जामिनेशन आयोजित करने के प्रयोजनार्थ, निर्धारित प्राधिकरण के रूप में जाने वाला प्राधिकरण स्थापित करे या किसी प्राधिकरण को विनिर्धारित प्राधिकरण नामनिर्दिष्ट करे जो पीसीआई द्वारा समय-समय पर निर्धारित की जाने वाली परीक्षाओं का संचालन करेगा।
- (ख) फार्मास्यूटिक्स, फार्माकोलॉजी, फार्माकोग्नॉसी, फार्मास्युटिकल केमिस्ट्री, बायोकेमिस्ट्री, हास्पिटल एंड क्लिनिकल फार्मैसी, फार्मास्युटिकल ज्यूरिस्युडेंस एंड ड्रग स्टोर मैनेजमेंट में बहुविकल्पीय प्रश्नों के तीन पेपर होंगे। परीक्षा की भाषा अंग्रेजी होगी। प्रत्येक पेपर की परीक्षा तीन घंटे की अवधि की होगी।

- (ग) उम्मीदवार को केवल तभी उत्तीर्ण घोषित किया जाएगा, जब वह प्रत्येक पेपर में अलग से न्यूनतम ५० प्रतिशत अंक प्राप्त कर लेता है।
- (घ) अभ्यर्थी को तीनों पेपर एक ही प्रयास में उत्तीर्ण करने होंगे। हालांकि, परीक्षा में बैठने के प्रयासों की संख्या पर कोई प्रतिबंध नहीं होगा।
- (ङ) सफल उम्मीदवार को नामांकन और अभ्यास के लिए पात्रता का प्रमाण पत्र जारी किया जाएगा जिसे भेषजी के रूप में पंजीकरण के लिए राज्य भेषजी परिषद के समक्ष प्रस्तुत किया जाएगा।

**७. उम्मीदवार का डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन उत्तीर्ण करने के बाद भेषजी के रूप में पंजीकरण:-**

डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन उत्तीर्ण करने के बाद, उम्मीदवार, भेषजी अधिनियम, १९४८ में भेषजी के रूप में पंजीकरण का पात्र होगा अगर वह धारा ३२(२) में वर्णित शर्तों को पूरा करता है। पंजीकरण के लिए आवेदन, राज्य भेषजी परिषद के रजिस्ट्रार को संबोधित किया जाएगा और इसके साथ निर्धारित शुल्क और दस्तावेज संलग्न होंगे जैसाकि अधिनियम की धारा ४६(२)(जी) में उल्लेख किया गया है।

इन विनियमों के लागू किए जाने के बाद, फार्मैसी में डिप्लोमा का अनुमोदित पाठ्यक्रम पूरा करने वाले और डिप्लोमा इन फार्मैसी एग्जिट एग्जामिनेशन में अर्हता प्राप्त करने वाले उम्मीदवार ही भेषजी अधिनियम, १९४८ की धारा ३३ के तहत भेषज के रूप में पंजीकरण के लिए पात्र होंगे।

८. ये विनियम उन व्यक्तियों पर लागू नहीं होंगे जिनके नाम राज्य के भेषजियों के रजिस्टर में पहले से दर्ज हैं।

अर्चना मुद्गल, रजिस्ट्रार-सह-सचिव

[विज्ञापन-III/4/असा./663/2021-22]

**PHARMACY COUNCIL OF INDIA**

**NOTIFICATION**

New Delhi, the 24th February, 2022

**Diploma in Pharmacy Exit Examination Regulations, 2022**

**No. 14-285/2021-PCI.**—In exercise of the powers conferred by sections 10 and 18 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 –

**1. Short title and commencement:-**

- (i) These regulations may be called the “Diploma in Pharmacy Exit Examination Regulations, 2022”
- (ii) They shall come into force from the date of their publication in the Official Gazette.

**2. Definitions:-**

In these regulations, unless the context otherwise requires –

- (a) ‘Act’ means the Pharmacy Act, 1948 (8 of 1948);
- (b) “Certificate of eligibility for enrolment and practice” means a certificate issued by the prescribed authority to a candidate who has passed exit examination;
- (c) ‘PCI’ means the Pharmacy Council of India established under section 3 of the Pharmacy Act, 1948;
- (d) “State Pharmacy Council” means the State Council constituted by the State Government under section 19 of the Pharmacy Act, 1948;
- (e) “Approved” means approved by the Pharmacy Council of India under section 12 or section 14 of the Pharmacy Act, 1948;
- (f) ‘Diploma in Pharmacy Exit Examination’ means an examination held by the prescribed authority to declare a Diploma in Pharmacy holder eligible for enrolment and practice as a registered pharmacist;

- (g) “Examining Authority”- means a statutory Indian University or a body constituted by the Central or State Government and shall be approved by the Pharmacy Council of India u/s 12(2) of the Pharmacy Act, 1948;
- (h) “Pharmacy Register” - means a register of pharmacists prepared and maintained by the State Pharmacy Council under Chapter IV of the Pharmacy Act, 1948;
- (i) “Prescribed Authority” means an authority established by the PCI for the purpose of conducting exit examination for Diploma in Pharmacy holders and includes an authority which may be designated so by the PCI;
- (j) “Registered Pharmacist” means a person whose name is for the time being entered in the register of the State in which he is for the time being residing or carrying on his profession or business of pharmacy.

### 3. Objective:-

The objective of the Diploma in Pharmacy Exit Examination (DPEE) is to ensure that a candidate applying for registration as pharmacist with the State Pharmacy Council has undergone pharmacy education and a comprehensive practical training programme in Diploma in Pharmacy (D.Pharm) course as provided in the Education Regulations, 2020 or the regulations that may be in force from time to time in an institution approved by Pharmacy Council of India under section 12 of the Pharmacy Act, 1948 and acquired core competencies in dispensing of medicines and other areas of pharmacy practice and to reinforce his discipline, integrity, judgement, skills, knowledge and quest for learning so that after having passed the examination he is able to become a registered pharmacist who is able to exercise his professional skills in addition to carrying his duty and responsibilities professionally.

### 4. Frequency:-

The details regarding the scheme for conducting the Diploma in Pharmacy Exit Examination and the syllabus of the test shall be announced by the Pharmacy Council of India from time to time for the information of the candidates. The candidates may appear for the exit examination conducted twice every year or as frequently as may be required as per the schedule of examination announced by the Prescribed Authority. The procedure of conducting the test shall be in accordance with the scheme announced by the Pharmacy Council of India in this regard. The date of examination and the examination centre will be allotted to the candidate by the Prescribed Authority based on the availability of the examination centres.

### 5. Registration as a Diploma in Pharmacy Exit Examination candidate:-

- (a) No person shall be registered as a Diploma in Pharmacy Exit Examination candidate unless he has passed Diploma in Pharmacy course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act, 1948.
- (b) He shall be required to make an application in a prescribed form together with all relevant documents showing the proof of his passing the approved examination and the examination fee as may be prescribed by the PCI.

### 6. Procedure of conducting Exit Examination:-

- (a) The PCI may, for the purposes of conducting exit examination, establish an authority *to be known as the Prescribed Authority* or designate an authority *as the Prescribed Authority* that shall conduct the examinations as may be decided by the PCI from time-to-time.
- (b) There shall be three papers of multiple choice questions in Pharmaceutics, Pharmacology, Pharmacognosy, Pharmaceutical Chemistry, Biochemistry, Hospital and Clinical Pharmacy, Pharmaceutical Jurisprudence and Drug Store Management. The language of the examination shall be english. The test for each paper shall be of three hours' duration.
- (c) A candidate shall be declared as having passed only, if he obtains a minimum of 50% marks in each paper separately.
- (d) A candidate shall have to pass all the three papers in the same attempt. However, there shall be no restriction on the number of attempts to appear in the examination.
- (e) A certificate of eligibility for enrolment and practice shall be issued to the successful candidate which will be presented before the State Pharmacy Council for registration as a pharmacist.

**7. Registration of the candidate as pharmacist after passing Diploma in Pharmacy Exit Examination:-**

After having passed the Diploma in Pharmacy Exit Examination, a candidate shall be entitled to registration as a pharmacist subject to fulfilment of the conditions enumerated in section 32(2) of the Pharmacy Act, 1948. The applications for registration shall be addressed to the Registrar of the State Pharmacy Council and shall be accompanied by the prescribed fee and the documents as referred to in section 46(2)(g) of the Act.

After coming into force of these regulations, the candidates who have completed the approved course of Diploma in Pharmacy and having qualified in the Diploma in Pharmacy Exit Examination only will be eligible for registration as pharmacists under section 33 of the Pharmacy Act 1948.

8. These regulation shall not apply to the persons whose names are already entered in the register of pharmacists for the state.

ARCHNA MUDGAL, Registrar-cum-Secy.

[ADVT.-III/4/Exty./663/2021-22]