

Shri Rawatpura Sarkar University, Raipur



Examination Scheme & Syllabus

For

DIPLOMA IN PHARMACY

1st YEAR

(Effective from the session: 2022-23)



SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR CHHATISGARH

DIPLOMA IN PHARMACY 1ST YEAR

Examination Scheme

S.N.	Course Code	Th/ Pr	Subject	Type of Course	Teaching hours per week			T C	Examination Scheme						Total Marks
					L	T	P		Theory		Practical				
									EX	IN	EX	IN	Assign ment	Field marks	
1	ER20-11T	Th	Pharmaceutics-I	Core	3	1		4	80	20					100
2	ER20-11P	Pr	Pharmaceutics-I(practical)	Core			3	2			80	10	05	05	100
3	ER20-12T	Th	Pharmaceutical Chemistry-I	Core	3	1		4	80	20					100
4	ER20-12P	Pr	Pharmaceutical Chemistry-I(Practical)	Core			3	2			80	10	05	05	100
5	ER20-13T	Th	Pharmacognosy	Core	3	1		4	80	20					100
6	ER20-13P	Pr	Pharmacognosy(Practical)	Core			3	2			80	10	05	05	100
7	ER20-14T	Th	Human Anatomy & Physiology	Core	3	1		4	80	20					100
8	ER20-14P	Pr	Human Anatomy & Physiology(Practical)	Core			3	2			80	10	05	05	100
9	ER20-15T	Th	Social Pharmacy	Core	3	1		4	80	20					100
10	ER20-15P	Pr	Social Pharmacy (Practical)				3	2			80	10	05	05	100



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Total Contact hr per week:	Total Credit 30				1000
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Guidelines for the conduct of theory examinations

Sessional Examinations

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) $3 \times 5 = 15$

II. Short Answers (Answer 5 out of 6) $5 \times 3 = 15$

III. Objective type Answers (Answer all 10 out of 10) $10 \times 1 = 10$

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(Multiple Choice Questions / Fill-in the Blanks /
One word OR one Sentence questions)

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 Examinations

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) = $6 \times 5 = 30$

II. Short Answers (Answer 10 out of 11) = $10 \times 3 = 30$

III. Objective type Answers (Answer all 20) = $20 \times 1 = 20$

(Multiple Choice Questions / Fill-in the Blanks /

One word OR one Sentence questions)

Total = 80 marks

Guidelines for the conduct of practical examinations

Sessional Examinations

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

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Total = 80 marks

* The marks for the experiments shall be divided into various categories, viz. majorexperiment, 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.

Course Title	Pharmaceutics-I				
Course Code	ER20-11T				
Course Credits	L	T	P	Credits	
	3	1		4	
Prerequisites	Basic common fundamental aspects studied in higher secondary education system				

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<p>Course objectives</p>	<p>This course will discuss the following aspects of pharmaceutical dosage forms</p> <ol style="list-style-type: none"> 1. Basic concepts, types and need 2. Advantages and disadvantages, methods of preparation / formulation 3. Packaging and labeling requirements 4. Basic quality control tests, concepts of quality assurance and good manufacturing practices.
<p>Course Contents</p>	<p style="text-align: center;">Unit I 7 Hour</p> <ul style="list-style-type: none"> ▪ History of the profession of Pharmacy in India in relation to Pharmacy education, industry, pharmacy practice, and various professional associations. ▪ Pharmacy as a career. ▪ Pharmacopoeia: Introduction to IP, BP, USP, NF and Extra Pharmacopoeia. Salient features of Indian Pharmacopoeia. <p style="text-align: center;">Unit II 5 Hour</p> <p>Packaging materials: Types, selection criteria, advantages and disadvantages of glass, plastic, metal, rubber as packaging materials.</p> <p style="text-align: center;">Unit III 3 Hour</p> <p>Pharmaceutical aids: Organoleptic (Colouring, flavouring, and sweetening) agents. Preservatives: Definition, types with examples and uses</p> <p style="text-align: center;">Unit IV 9 Hour</p> <p>Unit operations: Definition, objectives/applications, principles, construction, and workings of: Size reduction: hammer mill and ball mill</p> <p>Size separation: Classification of powders according to IP, Cyclone separator, Sieves and standards of sieves Mixing: Double cone blender, Turbine mixer, Triple roller mill and Silverson mixer homogenizer Filtration: Theory of filtration, membrane filter and sintered glass filter Drying: working of fluidized bed dryer and process of freeze drying Extraction: Definition, Classification, method, and applications.</p> <p style="text-align: center;">Unit V 8 Hour</p> <p>Tablets – coated and uncoated, various modified tablets (sustained release, extended-release, fast dissolving, multilayered, etc.) Capsules - hard and soft gelatine capsules,</p>

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	<p>Liquid oral preparations - solution, syrup, elixir, emulsion, suspension, dry powder for reconstitution</p> <p>Topical preparations - ointments, creams, pastes, gels, liniments and lotions, suppositories, and pessaries Nasal preparations, Ear preparations 2</p> <p>Powders and granules - Insufflations, dusting powders, effervescent powders, and effervescent granules.</p> <p>Sterile formulations –Injectables, eye drops and eye ointments</p> <p>Immunological products: Sera, vaccines, toxoids, and their manufacturing methods.</p> <p style="text-align: center;">Unit VI 5 Hour</p> <p>Basic structure, layout, sections, and activities of pharmaceutical manufacturing plants</p> <p>Quality control and quality assurance: Definition and concepts of quality control and quality assurance, current good manufacturing practice (cGMP), Introduction to the concept of calibration and validation.</p> <p style="text-align: center;">Unit VII 5 Hour</p> <p>Novel drug delivery systems: Introduction, Classification with examples, advantages, and challenges</p>
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Describe about the different dosage forms and their formulation aspects2. Explain the advantages, disadvantages, and quality control tests of different dosage forms3. Discuss the importance of quality assurance and good manufacturing practices
Text Books	<ol style="list-style-type: none">1. A Text book of Pharmaceuticals Formulation by B.M. Mithal, Vallabh Prakashan.2. Bentley's Text book of Pharmaceutics, 8th Edition, editor E.A. Rawlins, published by Elsevier Int.,3. A text book of pharmaceutics-I Dr. P.V. Kasture, Dr. S.R. Parakh, S.A. Hasan, S.B. Gokhle.4. Dilip M Parikh: hand book of pharmaceutical granulation technology, Marcel Dekker, INC new York5. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
Reference Books	<ol style="list-style-type: none">1. Remington's Pharmaceutical Sciences.2. The Extra Pharmacopoeia-Martindale3. Indian pharmacopoeia

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4. British pharmacopoeia

5. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, LippincottWilliams and Walkins, New Delhi.

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Course Title	Pharmaceutics-I(practical)				
Course Code	ER20-11P				
Course Credits	L	T	P	Credits	
			3	2	
Prerequisites	Basic common fundamental aspects studied in higher secondary education system				
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 Contents	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 and labelling <ul style="list-style-type: none">▪ Liquid Oral: Simple syrup, Piperazine citrate elixir, Aqueous Iodine solution▪ Emulsion: Castor oil emulsion, Cod liver oil emulsion▪ Suspension: Calamine lotion, Magnesium hydroxide mixture▪ Ointment: Simple ointment base, Sulphur ointment▪ Cream: Cetrinide cream▪ Gel: Sodium alginate gel▪ Liniment: Turpentine liniment, White liniment BPC▪ Dry powder: Effervescent powder granules, Dusting powder▪ Sterile Injection: Normal Saline, Calcium gluconate Injection▪ Hard Gelatine Capsule: Tetracycline capsules▪ Tablet: Paracetamol tablets				

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	<ol style="list-style-type: none">3. Formulation of at least five commonly used cosmetic preparations – e.g. coldcream, shampoo, lotion, toothpaste etc4. Demonstration on various stages of tablet manufacturing processes5. Appropriate methods of usage and storage of all dosage forms including specialdosage such as different types of inhalers, spacers, insulin pens6. Demonstration of quality control tests and evaluation of common dosage formsviz. tablets, capsules, emulsion, sterile injections as per the monographs
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Calculate the working formula from the given master formula2. Formulate the dosage form and dispense in an appropriate container3. Design the label with the necessary product and patient information4. Perform the basic quality control tests for the common dosage forms
Text books	<ol style="list-style-type: none">1. A Text book of Pharmaceuticals Formulation by B.M. Mithal, VallabhPrakashan.2. Bentleys' Text book of Pharmaceutics, 8th Edition, editor E.A. Rawlins, published by Elsevier Int.,3. A text book of pharmaceutics-I Dr. P.V. Kasture, Dr. S.R. Parakh, S.A. Hasan, S.B. Gokhle.4. DilipM parikh: hand book of pharmaceutical granulation technology, Marcel Dekker, INC new York5. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
Reference books	<ol style="list-style-type: none">1. Remington's Pharmaceutical Sciences.2. The Extra Pharmacopoeia-Martindale3. Indian pharmacopoeia4. British pharmacopoeia5. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, LippincottWilliams and Walkins, New Delhi.

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Course Title	Pharmaceutical Chemistry-I				
Course Code	ER20-12T				
Course Credits	L	T	P	Credits	
	3	1		4	
Prerequisites	Basic common fundamental aspects studied in chemistry higher secondary education				
Course objectives	<p>This course will discuss the following aspects of the chemical substances used as drugs and pharmaceuticals for various disease conditions</p> <ol style="list-style-type: none"> 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 Contents	<p style="text-align: right;">Unit I 8 Hour</p> <p>Introduction to Pharmaceutical chemistry: Scope and objectives Sources and types of errors: Accuracy, precision, significant figures Impurities in Pharmaceuticals: 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..</p> <p style="text-align: right;">Unit II 8 Hour</p> <p>Volumetric analysis: Fundamentals of volumetric analysis, Acid-base titration, non-aqueous titration, precipitation titration, complexometric titration, redox titration Gravimetric analysis: Principle and method.</p> <p style="text-align: right;">Unit III 7 Hour</p> <p>Inorganic Pharmaceuticals: Pharmaceutical formulations, market preparations, storage conditions and uses of</p> <ul style="list-style-type: none"> • Haematinics: Ferrous sulphate, Ferrous fumarate, Ferric ammonium citrate, Ferrous ascorbate, Carbonyl iron • Gastro-intestinal Agents: Antacids :Aluminiumhydroxide gel, Magnesium hydroxide, Magaldrate, Sodium 				

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bicarbonate, Calcium Carbonate, Acidifying agents, Adsorbents, Protectives, Cathartics

- **Topical agents:** Silver Nitrate, Ionic Silver, ChlorhexidineGluconate, Hydrogen peroxide, Boric acid, Bleaching powder, Potassium permanganate
- **Dental products:** Calcium carbonate, Sodium fluoride, Denture cleaners, Denture adhesives, Mouth washes
- **Medicinal gases:** Carbon dioxide, nitrous oxide.

Unit IV

2 Hour

Introduction to nomenclature of organic chemical systems with particular reference to heterocyclic compounds containing up to Three rings.

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.

Unit V

9 Hour

Drugs Acting on Central Nervous System

- **Anaesthetics:** Thiopental Sodium*, KetamineHydrochloride*, Propofol
- **Sedatives and Hypnotics:** Diazepam*, Alprazolam*,Nitrazepam, Phenobarbital*
- **Antipsychotics:** Chlorpromazine Hydrochloride*,Haloperidol*, Risperidone*, Sulpiride*, Olanzapine,Quetiapine, Lurasidone
- **Anticonvulsants:** Phenytoin*, Carbamazepine*,Clonazepam, Valproic Acid*, Gabapentin*,Topiramate, Vigabatrin, Lamotrigine
- **Anti-Depressants:** Amitriptyline Hydrochloride*,Imipramine Hydrochloride*, Fluoxetine*, Venlafaxine,Duloxetine, Sertraline, Citalopram, Escitalopram,Fluvoxamine, Paroxetine

Unit VI

9 Hour

Drugs Acting on Autonomic Nervous System

- **Sympathomimetic Agents:** Direct Acting: Nor-Epinephrine*, Epinephrine, Phenylephrine, Dopamine*, Terbutaline, Salbutamol (Albuterol),Naphazoline*, Tetrahydrozoline. **Indirect Acting Agents:**Hydroxy Amphetamine, Pseudoephedrine.Agents With Mixed Mechanism: Ephedrine,Metaraminol
- **Adrenergic Antagonists:** Alpha Adrenergic Blockers:Tolazoline, Phentolamine
- Phenoxybenzamine, Prazosin. Beta AdrenergicBlockers: Propranolol*, Atenolol*, Carvedilol

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- **Cholinergic Drugs and Related Agents:** Direct Acting Agents: Acetylcholine*, Carbachol, and Pilocarpine. Cholinesterase Inhibitors: Neostigmine*, Edrophonium Chloride, Tacrine Hydrochloride, Pralidoxime Chloride, Echothiopate Iodide
- **Cholinergic Blocking Agents:** Atropine Sulphate*, Ipratropium Bromide
- **Synthetic Cholinergic Blocking Agents:** Tropicamide, Cyclopentolate Hydrochloride, Clidinium Bromide, Dicyclomine Hydrochloride

Unit VII

5 Hour

Drugs Acting on Cardiovascular System

- **Anti-Arrhythmic Drugs:** Quinidine Sulphate, Procainamide Hydrochloride, Verapamil, Phenytoin Sodium*, Lidocaine Hydrochloride, Lorcainide Hydrochloride, Amiodarone and Sotalol
- **Anti-Hypertensive Agents:** Propranolol*, Captopril*, Ramipril, Methyldopate Hydrochloride, Clonidine Hydrochloride, Hydralazine Hydrochloride, Nifedipine,
- **Antianginal Agents:** Isosorbide Dinitrate

Unit VIII

2 Hour

Diuretics: Acetazolamide, Furosemide*, Bumetanide, Chlorthalidone, Benzthiazide, Metolazone, Xipamide, Spironolactone

Unit IX

3 Hour

Hypoglycemic Agents: Insulin and Its Preparations, Metformin*, Glibenclamide*, Glimepiride, Pioglitazone, Repaglinide, Gliflozins, Gliptins

Unit X

3 Hour

Analgesic And Anti-Inflammatory Agents: Morphine Analogues, Narcotic Antagonists; Nonsteroidal Anti-Inflammatory Agents (NSAIDs) - Aspirin*, Diclofenac, Ibuprofen*, Piroxicam, Celecoxib, Mefenamic Acid, Paracetamol*, Aceclofenac

Unit XI

8 Hour

Anti-Infective Agents

- **Antifungal Agents:** Amphotericin-B, Griseofulvin, Miconazole Ketoconazole*, Itraconazole, Fluconazole*, Naftifine Hydrochloride Ciprofloxacin, Ofloxacin*, Moxifloxacin,
- **Anti-Tubercular Agents:** INH*, Ethambutol, Para Amino Salicylic Acid, Pyrazinamide, Rifampicin, Bedaquiline, Delamanid, Pretomanid*

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	<ul style="list-style-type: none">• Antiviral Agents: Amantadine Hydrochloride, Idoxuridine, Acyclovir*, Foscarnet, Zidovudine, Ribavirin, Remdesivir, Favipiravir• Antimalarials: Quinine Sulphate, Chloroquine Phosphate*Primaquine Phosphate, Mefloquine*, Cycloguanil, Pyrimethamine, Artemisinin• Sulfonamides: Sulfanilamide, Sulfadiazine, Sulfamethoxazole, Sulfacetamide*, Mafenide Acetate, Cotrimoxazole, Dapsone* <p style="text-align: center;">Unit XII 8 Hour</p> <p>Antibiotics: Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin, Tetracyclines: Doxycycline, Minocycline. Macrolides: Erythromycin, Azithromycin, Miscellaneous:Chloramphenicol* Clindamycin</p> <p style="text-align: center;">Unit XIII 3 Hour</p> <p>Anti-Neoplastic Agents: Cyclophosphamide*, Busulfan, Mercaptopurine, Fluorouracil*, Methotrexate,Dactinomycin, Doxorubicin Hydrochloride, VinblastineSulphate, Cisplatin*, Dromostanolone Propionate</p>
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Describe the chemical class, structure and chemical name of the commonly used drugs and pharmaceuticals of both organic and inorganic nature2. Discuss the pharmacological uses, dosage regimen, stability issues and storage conditions of all such chemical substances commonly used as drugs3. Describe the quantitative and qualitative analysis, impurity testing of the chemical substances given in the official monographs4. Identify the dosage form & the brand names of the drugs and pharmaceuticals popular in the marketplace
Text books	<ol style="list-style-type: none">1. Wilson and Gisvold's Text book of Organic Medicinal and pharmaceutical Chemistry2. Bentley and Driver's Textbook of Pharmaceutical Chemistry

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	3. Anand&Chatwal, Inorganic Pharmaceutical Chemistry
Reference books	<ol style="list-style-type: none">1. Indianpharmacopoeia.4. Medicinal & Pharmaceutical chemistry by Harikishan Singh and VK Kapoor2. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition3. M.L Schroff, Inorganic Pharmaceutical Chemistry

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Course Title	Pharmaceutical Chemistry-I(Practical)			
Course Code	ER20-12P			
Course Credits	L	T	P	Credits
			3	2
Prerequisites	Basic common fundamental aspects studied in chemistry higher secondary education			
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 Contents	1. Limit test for: Chlorides; sulphate; Iron; heavy metals 2. Identification tests for Anions and Cations as per Indian Pharmacopoeia 3. Fundamentals of Volumetric analysis: Preparation of standard solution and standardization of Sodium Hydroxide, Potassium Permanganate 4. Assay of the following compounds <ul style="list-style-type: none">• Ferrous sulphate- by redox titration• Calcium gluconate-by complexometric• Sodium chloride-by Modified Volhard's method• Ascorbic acid by iodometry• Ibuprofen by alkalimetry 4. Fundamentals of preparative organic chemistry: Determination of Melting point and boiling point of organic compounds 5. Preparation of organic compounds			

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	<ul style="list-style-type: none">• Benzoic acid from Benzamide• Picric acid from Phenol <p>6. Identification and test for purity of pharmaceuticals: Aspirin, Caffeine, Paracetamol, Sulfanilamide</p> <p>7. Systematic Qualitative analysis experiments (4 substances)</p>
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Perform the limit tests for various inorganic elements and report2. Prepare standard solutions using the principles of volumetric analysis3. Test the purity of the selected inorganic and organic compounds against the monograph standards4. Synthesize the selected chemical substances as per the standard synthetic scheme5. Perform qualitative tests to systematically identify the unknown chemicalsubstances
Text books	<ol style="list-style-type: none">1. Practical Pharmaceutical Chemistry, Volume- I & II by Beckett and J. B. Stanlake2. Vogel's text book of Practical Organic Chemistry
Reference Books	<ol style="list-style-type: none">1. Indianpharmacopoeia.2. British pharmacopoeia3. United stat pharmacopoeia4. Practical Organic Chemistry by Mann and Saunders.

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Course Title	Pharmacognosy				
Course Code	ER20-13T				
Course Credits	L	T	P	Credits	
	3	1		4	
Prerequisites	Basic common fundamental aspects studied in botany higher secondary education				
Course objectives	<p>This course will discuss the following aspects of drugs substances derived from natural resources.</p> <ol style="list-style-type: none">1. Occurrence, distribution, isolation, identification tests of common phytoconstituents2. Therapeutic activity and pharmaceutical applications of various natural drugs substances and phytoconstituents3. Biological source, chemical constituents of selected crude drugs and their therapeutic efficacy in common diseases and ailments4. Basic concepts in quality control of crude drugs and various systems of medicines5. Applications of herbs in health foods and cosmetics				
Course Contents	<p style="text-align: right;">Unit I 2 Hour</p> <p>Definition, history, present status and scope of Pharmacognosy</p> <p style="text-align: right;">Unit II 4 Hour</p> <p>Classification of drugs:</p> <ul style="list-style-type: none">● Alphabetical● Taxonomical● Morphological● Pharmacological● Chemical● Chemo-taxonomical				

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	<p style="text-align: right;">Unit III 6 Hour</p> <p>Quality control of crude drugs:</p> <ul style="list-style-type: none">• Different methods of adulteration of crude drugs• Evaluation of crude drugs
	<p style="text-align: right;">Unit IV 6 Hour</p> <p>Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.</p>
	<p style="text-align: right;">Unit V 30 Hour</p> <p>Biological source, chemical constituents and therapeutic efficacy of the following categories of crude drugs.</p> <ul style="list-style-type: none">• 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, Pale 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, Ashwagandha, Tulsi, Guggul

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	<p style="text-align: center;">Unit VI 3 Hour</p> <p>Plant fibres used as surgical dressings: Cotton, silk, wooland regenerated fibres Sutures – Surgical Catgut and Ligatures</p> <p style="text-align: center;">Unit VII 8 Hour</p> <p>Basic principles involved in the traditional systems of medicine like: Ayurveda, Siddha, Unani and Homeopathy Method of preparation of Ayurvedic formulations like: Arista, Asava, Gutika, Taila, Churna, Lehya and Bhasma</p> <p style="text-align: center;">Unit VIII 2 Hour</p> <p>Role of medicinal and aromatic plants in national economy and their export potential Herbs as health food:</p> <p style="text-align: center;">Unit IX 4 Hour</p> <p>Herbs as health food: Brief introduction and therapeutic applications of: Nutraceuticals, Antioxidants, Pro-biotics, Pre-biotics, Dietary fibres, Omega-3-fatty acids, Spirulina, Carotenoids, Soya and Garlic, Spirulina, Carotenoids, Soya and Garlic</p> <p style="text-align: center;">Unit X 4 Hour</p> <p>Introduction to herbal formulations</p> <p style="text-align: center;">Unit XI 4 Hour</p> <p>Herbal cosmetics: Sources, chemical constituents, commercial preparations, therapeutic and cosmetic uses of: Aloe vera gel, Almond oil, Lavender oil, Olive oil, Rosemary oil, Sandal Wood oil</p> <p style="text-align: center;">Unit XII 2 Hour</p> <p>Phytochemical investigation of drugs</p>
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Identify the important/common crude drugs of natural origin2. Describe the uses of herbs in nutraceuticals and cosmeceuticals3. Discuss the principles of alternative system of medicines

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	4. Describe the importance of quality control of drugs of natural origin
Text Books	<ol style="list-style-type: none">1. Text book of Pharmacognosy by C. K. Kokate, S. B. Gokhale, A.P. Purohith, NiraliPrakashan2. Text book of Pharmacognosy by C.S. Shah and J. S. Quadry, CBS Publishers & Distributors Pvt. Ltd.3. Text Book of Pharmacognosy by T. E. Wallis. CBS Publishers & Distributors Pvt. Ltd.
Reference Books	<ol style="list-style-type: none">1. Study of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal2. Powder crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal.

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Course Title	Pharmacognosy (Practical)				
Course Code	ER20-13P				
Course Credits	L	T	P	Credits	
			3	2	
Prerequisites	Basic common fundamental aspects studied in botany higher secondary education				
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 Contents	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, Nux vomica, 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.				
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				

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Text Books	<ol style="list-style-type: none">1. Text book of Pharmacognosy by C. K. Kokate, S. B. Gokhale, A.P. Purohith, NiraliPrakashan2. Text book of Pharmacognosy by C.S. Shah and J. S. Quadry, CBS Publishers & Distributors Pvt. Ltd.3. Text Book of Pharmacognosy by T. E. Wallis. CBS Publishers & Distributors Pvt. Ltd.
Reference Books	<ol style="list-style-type: none">1 Study of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal2. Powder crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal3. Anatomy of crude drugs by M. A. Iyengar, Manipal Press Ltd, Manipal4. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae5. indian pharmacopoeia latest edition

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Course Title	Human Anatomy & Physiology			
Course Code	ER20-14T			
Course Credits	L	T	P	Credits
	3	1		4
Prerequisites	Basic common fundamental aspects studied in biology in higher secondary education			
Course objectives	<p>This course will discuss the following:</p> <ol style="list-style-type: none"> 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 Contents	<p style="text-align: center;">Unit I 2 Hour</p> <p>Scope of Anatomy and Physiology Definition of various terminologies</p> <p style="text-align: center;">Unit II 2 Hour</p> <p>Structure of Cell: Components and its functions</p> <p>.</p> <p style="text-align: center;">Unit III 4 Hour</p> <p>Tissues of the human body: Epithelial, Connective, Muscular and Nervous tissues – their sub-types and characteristics</p> <p style="text-align: center;">Unit IV 3 Hour</p> <p>Osseous system: structure and functions of bones of axial and appendicular skeleton Classification, types and movements of joints, disorders of joints</p> <p style="text-align: center;">Unit V 8 Hour</p> <p>Haemopoietic system</p> <ul style="list-style-type: none"> • Composition and functions of blood • Process of Hemopoiesis • Characteristics and functions of RBCs, WBCs, and platelets • Mechanism of Blood Clotting 			

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	<ul style="list-style-type: none">● Importance of Blood groups	Unit VI	3 Hour
	Lymphatic system		
	<ul style="list-style-type: none">● Lymph and lymphatic system, composition, function and its formation.● Structure and functions of spleen and lymph node.	Unit VII	20 Hour
	Cardiovascular system		
	<ul style="list-style-type: none">● Anatomy and Physiology of heart● Blood vessels and circulation (Pulmonary, coronary and systemic circulation)● Cardiac cycle and Heart sounds, Basics of ECG● Blood pressure and its regulation	Unit VIII	4 Hour
	Respiratory system		
	<ul style="list-style-type: none">● Anatomy of respiratory organs and their functions.● Regulation, and Mechanism of respiration.● Respiratory volumes and capacities – definitions	Unit IX	8 Hour
	Digestive system		
	<ul style="list-style-type: none">● Anatomy and Physiology of the GIT● Anatomy and functions of accessory glands● Physiology of digestion and absorption	Unit X	2 Hour
	Skeletal muscles		
	<ul style="list-style-type: none">● Histology● Physiology of muscle contraction● Disorder of skeletal muscles	Unit XI	8 Hour
	Nervous system		
	<ul style="list-style-type: none">● Classification of nervous system● Anatomy and physiology of cerebrum, cerebellum, midbrain		

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	<ul style="list-style-type: none">● Function of hypothalamus, medulla oblongata and basalganglia● Spinal cord-structure and reflexes● Names and functions of cranial nerves.● Anatomy and physiology of sympathetic andparasympathetic nervous system (ANS)
	Unit XII 6 Hour
	Sense organs - Anatomy and physiology of
	<ul style="list-style-type: none">● Eye● Ear● Skin● Tongue● Nose
	Unit XIII 4 Hour
	Urinary system
	<ul style="list-style-type: none">● Anatomy and physiology of urinary system● Physiology of urine formation● Renin - angiotensin system● Clearance tests and micturition
	Unit XIV 6 Hour
	Endocrine system (Hormones and their functions)
	<ul style="list-style-type: none">● Pituitary gland● Adrenal gland● Thyroid and parathyroid gland● Pancreas and gonads
	Unit XV 4 Hour
	Reproductive system
	<ul style="list-style-type: none">● Anatomy of male and female reproductive system● Physiology of menstruation● Spermatogenesis and Oogenesis

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	<ul style="list-style-type: none">● Pregnancy and parturition
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Describe the various organ systems of the human body2. Discuss the anatomical features of the important human organs and tissues3. Explain the homeostatic mechanisms regulating the normal physiology in the human system4. Discuss the significance of various vital physiological parameters of the human body
Text books	<ol style="list-style-type: none">1. Human Physiology by C. C. Chatterjee2. Human Anatomy and Physiology by S. Chaudhary and A. Chaudhary3. Derasari and Gandhi's elements of Human Anatomy, Physiology and Health Education.4. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.5. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.6. Text book of Medical Physiology- Arthur C. Guyton and John E. Hall. Miamisburg, OH, U.S.A.
Reference books	<ol style="list-style-type: none">1. Ross and Wilson Anatomy and Physiology in Health and illness2. Human Anatomy and Physiology by Tortora Gerard J3. Fundamentals of medical Physiology by K. Sambulingam and Prana Sambulingam

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Course Title	Human Anatomy & Physiology(Practical)			
Course Code	ER20-14P			
Course Credits	L	T	P	Credits
			3	2
Prerequisites	Basic common fundamental aspects studied in biology in higher secondary education			
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 organsystems of the body using models, charts, and other teaching aids			
Course Contents	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. Determination of a. Blood group b. ESR c. Haemoglobin content of blood d. Bleeding time and Clotting time 6. Determination of WBC count of blood			

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	<ol style="list-style-type: none">7. Determination of RBC count of blood8. Determination of Differential count of blood9. Recording of Blood Pressure in various postures, different arms, before and after exertion and interpreting the results10. 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 Rate11. Recording Pulse Oxygen (before and after exertion)12. Recording force of air expelled using Peak Flow Meter13. Measurement of height, weight, and BMI14. Study of various systems and organs with the help of chart, models, and specimens<ol style="list-style-type: none">a) Cardiovascular systemb) Respiratory systemc) Digestive systemd) Urinary systeme) Endocrine systemf) Reproductive systemg) Nervous systemh) Eyei) Earj) Skin
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Perform the haematological tests in human subjects and interpret the results2. Record, monitor and document the vital physiological parameters of human subjects and interpret the results3. Describe the anatomical features of the important human tissues under the microscopical conditions4. Discuss the significance of various anatomical and physiological characteristics of the human body

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Text Books	<ol style="list-style-type: none">1. S.R. Kale and R.R. Kale, Textbook of Practical Anatomy and Physiology.2. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.3. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.4. Text book of Medical Physiology- Arthur C, Guyton and John.E. Hall. Miamisburg, OH, U.S.A.
References Books	<ol style="list-style-type: none">1. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

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Course Title	Social Pharmacy				
Course Code	ER20-15T				
Course Credits	L	T	P	Credits	
	3	1		4	
Prerequisites	Basic common fundamental aspects studied in biology in higher secondary education				
Course objectives	<p>This course will discuss about basic concepts of</p> <ol style="list-style-type: none"> 1. Public health and national health programs 2. Preventive healthcare 3. Food and nutrition related health issues 4. Health education and health promotion 5. General roles and responsibilities of pharmacists in public health 				
Course Contents	Unit I				09 Hour
	<p>Introduction to Social Pharmacy</p> <ul style="list-style-type: none"> • Definition and Scope. Social Pharmacy as a discipline and its scope in improving the public health. Role of Pharmacists in Public Health. (2) • Concept of Health -WHO Definition, various dimensions, determinants, and health indicators. (3) • National Health Policy – Indian perspective (1) • Public and Private Health System in India, National Health Mission (2) • Introduction to Millennium Development Goals, Sustainable Development Goals, FIP Development Goals (1) 				
	Unit II				18 Hour
	<p>Preventive healthcare – Role of Pharmacists in the following</p> <ul style="list-style-type: none"> • Demography and Family Planning (3) • Mother and child health, importance of breastfeeding, ill effects of infant milk substitutes and bottle feeding (2) 				

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- Overview of Vaccines, types of immunity and immunization (4)
- 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 (7)
- 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)

Unit III

10 Hour

Nutrition and Health

- Basics of nutrition – Macronutrients and Micronutrients (3)
- Importance of water and fibres in diet (1)
- Balanced diet, Malnutrition, nutrition deficiency diseases, ill effects of junk foods, calorific and nutritive values of various foods, fortification of food (3)
- Introduction to food safety, adulteration of foods, effects of artificial ripening, use of pesticides, genetically modified foods (1)
- Dietary supplements, nutraceuticals, food supplements – indications, benefits, Drug-Food Interactions (2)

Unit IV

28 Hour

Introduction to Microbiology and common microorganisms (3)

Epidemiology: Introduction to epidemiology, and its applications. Understanding of terms such as epidemic, pandemic, endemic, mode of transmission, outbreak, quarantine, isolation, incubation period, contact tracing, morbidity, mortality, . (2)
Causative agents, epidemiology and clinical presentations and Role of Pharmacists in educating the public in prevention of the following communicable diseases:

- 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 (7)
- Intestinal infections – poliomyelitis, viral hepatitis, cholera, acute diarrheal diseases, typhoid, amebiasis, worm infestations, food poisoning (7)
- Arthropod-borne infections - dengue, malaria, filariasis and, chikungunya (4)
- Surface infections – trachoma, tetanus, leprosy (2)
- STDs, HIV/AIDS (3)

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	<p style="text-align: center;">Unit V 8 Hour</p> <p>Introduction to health systems and all ongoing National Health programs in India, their objectives, functioning, outcome, and the role of pharmacists.</p> <p style="text-align: center;">Unit VI 2 Hour</p> <p>Pharmacoeconomics– Introduction, basic terminologies, importance of pharmacoeconomics</p>
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Discuss about roles of pharmacists in the various national health programs2. Describe various sources of health hazards and disease preventive measures3. Discuss the healthcare issues associated with food and nutritional substances4. Describe the general roles and responsibilities of pharmacists in public health
Text Books	<ol style="list-style-type: none">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].
Reference Books	<ol style="list-style-type: none">1. Parmar N.S. Health Education And Community Pharmacy.2. Raje V.N. Health Education And Community Pharmacy.3. Gupta K. Ashok health education community pharmacy.

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Course Title	Social Pharmacy (Practical)			
Course Code	ER20-15P			
Course Credits	L	T	P	Credits
			3	2
Prerequisites	Basic common fundamental aspects studied in biology in higher secondary education			
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 Contents	1. National immunization schedule for children, adult vaccine schedule, Vaccines which are not included in the National Immunization Program. 2. RCH – reproductive and child health – nutritional aspects, relevant national health programmes. 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. 7. Various types of masks, PPE gear, wearing/using them, and disposal. 8. Menstrual hygiene, products used 9. First Aid – Theory, basics, demonstration, hands on training, audio-visuals, and practice, BSL (Basic Life Support) Systems [SCA - Sudden Cardiac Arrest, FBAO - Foreign Body Airway Obstruction, CPR, Defibrillation (using AED) (Includes CPR techniques, First Responder).			

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	<p>10. Emergency treatment for all medical emergency cases viz. snake bite, dogbite, insecticide poisoning, fractures, burns, epilepsy etc.</p> <p>11. Role of Pharmacist in Disaster Management.</p> <p>12. Marketed preparations of disinfectants, antiseptics, fumigating agents, antilarval agents, mosquito repellents, etc.</p> <p>13. 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.</p> <p>14. Water purification techniques, use of water testing kit, calculation of Content/percentage of $KMnO_4$, bleaching powder to be used for wells/tanks</p> <p>15. Counselling children on junk foods, balanced diets – using Information, Education and Communication (IEC), counselling, etc. (Simulation Experiments).</p> <p>16. 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.</p> <p>17. Tobacco cessation, counselling, identifying various tobacco containing products through charts/pictures</p>
Course outcomes	<p>Upon successful completion of this course, the students will be able to</p> <ol style="list-style-type: none">1. Describe the roles and responsibilities of pharmacists in various National health programs2. Design promotional materials for public health awareness3. Describe various health hazards including microbial sources4. Advice on preventive measures for various diseases5. Provide first aid for various emergency conditions
Text books	<ol style="list-style-type: none">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].
Reference books	<ol style="list-style-type: none">1. Parmar N.S. Health Education And Community Pharmacy.2. Raje V.N. Health Education And Community Pharmacy.3. Gupta K. Ashok health education community pharmacy.

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