GALGOTIAS UNIVERSITY

# Syllabus of

## DIPLOMA IN PHARMACY

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**Name of School:** School of Medical and Allied Sciences

**Department:** Pharmacy

**Year:** 2021-23

**Program Educational Objectives:**

D. Pharmacy students shall be able:

PEO 1: To undertake the responsibilities of Pharmacist with adequate comprehension of health care system.

PEO 2: To integrate the knowledge base of Pharmaceuticals for better design of drugs and dosage regimen

PEO 3: To reflect as professional with technical and ethical values, providing services for environment and social awareness.

**Program Outcomes:**

**1.Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; Pharmaceutical sciences; behavioural, social, and administrative Pharmacy sciences, manufacturing practices and sales and marketing.

**2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines**.**

**3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**6. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**7. Pharmaceutical Ethics:** Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**8. Communication:** Communicate effectively with the pharmacy community and with society, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**9. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**10. Environment and sustainability:** understand the impact of the professional pharmacy solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development.

**11. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self access and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

## Program Structure

| First Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Name of the Course | | | | | Assessment Pattern | |
| | | | L | T | P | C | Sessional | ETE |
| 1 | DPHT1001 | Pharmaceutics – I | 3 | 0 | 0 | 3 | 20 | 80 |
| 2 | DPHT1002 | Pharmaceutical Chemistry - I | 3 | 0 | 0 | 3 | 20 | 80 |
| 3 | DPHT1003 | Pharmacognosy | 3 | 0 | 0 | 3 | 20 | 80 |
| 4 | DPHT1004 | Biochemistry & Clinical Pathology | 2 | 0 | 0 | 2 | 20 | 80 |
| 5 | DPHT1005 | Human Anatomy & Physiology | 3 | 0 | 0 | 3 | 20 | 80 |
| 6 | DPHT1006 | Health Education & Community Pharmacy | 2 | 0 | 0 | 2 | 20 | 80 |
| 7 | DPHP1051 | Pharmaceutics - I (P) | 0 | 0 | 4 | 2 | 20 | 80 |
| 8 | DPHP1052 | Pharmaceutical Chemistry - I(P) | 0 | 0 | 4 | 2 | 20 | 80 |
| 9 | DPHP1053 | Pharmacognosy (P) | 0 | 0 | 4 | 2 | 20 | 80 |
| 10 | DPHP1054 | Biochemistry & Clinical Pathology (P) | 0 | 0 | 4 | 2 | 20 | 80 |
| 11 | DPHP1055 | Human Anatomy & Physiology (P) | 0 | 0 | 2 | 1 | 20 | 80 |
| | | Total | 16 | 0 | 18 | 25 | 220 | 880 |

| Second Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sl No | Course Codee | Name of the Course | | | | | Assessment Pattern | | |
| | | | L | T | P | C | Sessional | | ETE |
| 1 | DPHT2001 | Pharmaceutics - II | 3 | 0 | 0 | 3 | | 20 | 80 |
| 2 | DPHT2002 | Pharmaceutical Chemistry - II | 4 | 0 | 0 | 4 | | 20 | 80 |
| 3 | DPHT2003 | Pharmacology & Toxicology | 3 | 0 | 0 | 3 | | 20 | 80 |
| 4 | DPHT2004 | Pharmaceutical Jurisprudence | 2 | 0 | 0 | 2 | | 20 | 80 |
| 5 | DPHT2005 | Drug Store & Business Management | 3 | 0 | 0 | 3 | | 20 | 80 |
| 6 | DPHT2006 | Hospital & Clinical Pharmacy | 3 | 0 | 0 | 3 | | 20 | 80 |
| 7 | DPHT2007 | Medical Sales Representative | 3 | 0 | 0 | 3 | | 20 | 80 |
| 8 | DPHP2051 | Pharmaceutics - II (P) | 0 | 0 | 4 | 2 | | 20 | 80 |
| 9 | DPHP2052 | Pharmaceutical Chemistry - II (P) | 0 | 0 | 4 | 2 | | 20 | 80 |
| 10 | DPHP2053 | Pharmacology & Toxicology (P) | 0 | 0 | 2 | 1 | | 20 | 80 |
| 11 | DPHP2054 | Hospital & Clinical Pharmacy (P) | 0 | 0 | 2 | 1 | | 20 | 80 |
| 12 | DPHP2055 | Medical Sales Representative (P) | 0 | 0 | 2 | 1 | | 20 | 80 |
| | | Total | 21 | 0 | 14 | 28 | | 240 | 960 |

# Detailed Syllabus

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|---|---|---|---|---|---|
| **Name of The Course** | Pharmaceutics-I | | | | |
| **Course Code** | DPHT1001 | | | | |
| **Prerequisite** | | | | | |
| **Co-requisite** | | | | | |
| **Anti-requisite** | | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives**

**1. The student shall be able to understand the requirements for manufacturing and processing of pharmaceutical products.**

**2. The student shall be able to understand the pharmacopoeial standards for the evaluation of different pharmaceutical products.**

**Course Outcomes**

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|---|---|
| **CO1** | Students will be able to understand different pharmacopoeial guidelines for therapeutic substances and pharmaceutical calculations. |
| **CO2** | Students will be able to understand the packaging requirements for pharmaceutical products and different techniques for size reduction and size separation. |
| **CO3** | Students will be able to understand the techniques of mixing, filtrations and extraction. |
| **CO4** | Students will be able to understand the techniques of distillation and sterilization of different materials/products. |
| **CO5** | Students will be able to understand the process of tablet, capsule and immunological product manufacturing and their evaluation. |
| **CO6** | Student will be acknowledge about how to design and use different advanced medical devices and technologies |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Exam** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

**Course Content:**

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|---|
| **Unit I: Introduction of different dosage forms 6 Hours** |
| Their classification with examples-their relative applications.Familiarization with new drug delivery systems.Introduction to Pharmacopoeias with special reference tothe Indian Pharmacopoeia. |
| **Unit II: Metrology** **7 Hours** |
| System of weights and measures. Calculations including conversion from one to anothersystem. Percentage calculations and adjustment of products. Use of alligation method in calculations. Isotonic solutions. |
| **Unit III: Packaging of pharmaceuticals** **8 Hours** |
| Desirable features of a container and types of containers. Study of glass &plastics as materials for containers and rubber as a material for closure-their merits and demerits. Introduction to aerosol packaging. |
| **Unit IV : Size reduction and Size separation 8 Hours** |
| Objectives and factors affecting size reduction, methods of size reduction- study of Hammer mill, ball mill, Fluid energy mill and Disintegrator.<br>Size separation by sifting. Official standards for powders. Sedimentation methods of size separation. Construction and working of Cyclone separator. |
| **Unit V: Mixing and Homogenization 8 Hours** |
| Liquid mixing and powder mixing, Mixing of semisolids. Study of silverson Mixer-Homogenizer, planetary Mixer; Agitated powder mixer; Triple Roller Mill; Propeller Mixer, colloidal Mill and Hand Homogeniser. Double cone mixer. |
| **Unit VI: Clarification, Filtration and Extraction and Galenicals 8Hours** |
| Theory of filtration, Filter media; Filter aids and selection of filters. Study of the following filtration equipments-Filter Press, sintered filters, Filter candles, Metafilter.<br>Extraction and Galenicals-<br>(a) Study of percolation and maceration and their modification, continuous hot extraction-Application inthe preparation of tinctures and extracts.<br>(b) Introduction to Ayurvedic dosage forms.<br>Heat process-Evaporation-Definition-Factors affecting evaporation-study of evaporating still and Evaporating |

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| pan. |
| **Unit VI: Clarification, Filtration and Extraction and Galenicals 8 Hours** |
| Theory of filtration, Filter media; Filter aids and selection of filters. Study ofthe following filtration equipments-Filter Press, sintered filters, Filter candles, Metafilter.<br>Extraction and Galenicals-<br>(a) Study of percolation and maceration and their modification, continuous hot extraction-Application inthe preparation of tinctures and extracts.<br>(b) Introduction to Ayurvedic dosage forms.<br>Heat process-Evaporation-Definition-Factors affecting evaporation-study of evaporating still and Evaporating pan. |
| **Unit VII: Distillation and Introduction to drying process 8 Hours** |
| Introduction of distillation, methods of distillation, Simple distillation, Fractional distillation, Steam distillation, Distillation under reduced pressure, Destructive distillation. |
| **Unit VIII: Sterilization and Aseptic techniques 8 Hours** |
| Concept of sterilization and its differences from disinfection-Thermal resistance ofmicroorganisms.Detailed study of the following sterilization process. Sterilization with moist heat, Dry heat sterilization, Sterilization by radiation, Sterilization by filtration andGaseous sterilization.<br>Aseptic techniques-Applications of sterilization process in hospitals particularly with reference to surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment. |
| **Unit IX: Processing of Tablets 8 Hours** |
| Definition; different type of compressed tables and their properties. Processes involved in the production of tablets; Tablets excipients; Defects in tablets; Evaluation of Tablets; Physical standards including Disintegration and Dissolution. Tablet coating-sugar coating; films coating, enteric coating and micro-encapsulation (Tablet coating may be de.. in an elementary manner). |
| **Unit IX: Processing of Capsules and study of Immunological Products 6 Hours** |
| Hard and soft gelatin capsules; different sizes of capsules; filling of capsules; handling and storage of capsules. Special applications of capsules.<br>Study of immunological products like sera, vaccines, toxoids & their preparations. |
| **Unit XI: Advance medical Technology for Variant diseases treatment 8 Hours** |
| Introduction of advance medical technologies and its application, Study of various medical techniques like: Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) Process, Telehealth techniques, Precision medicine and Health wearable devices, 3D printing or Bio printing technique, wireless brain sensors, Robotic surgery technique and Smart inhalers etc. |

**Suggested Reading**

**1.** LachmanL,Liberman H.A and Kanig J.L., "Theory and Practice of Industrial Pharmacy", Lea and Febiger.

**2.** Remington – "The science and practice of pharmacy" Vol. I & II. Mack Publishing Co., Pennsylvania.

**3.** Pharmacopoeia of India, the Controller of Publications, Delhi.

**4.** S.B. Gokhale, M. S. Tare, Advance drug delivery system, Nirali prakashan

**5.** Jorge Coelho, Drug delivery system:Advanced technology potentially applicable in personalized treatment, EPMR publisher(Spinger)

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|---|---|---|---|---|---|
| **Name of The Course** | Pharmaceutical Chemistry-II | | | | |
| **Course Code** | DPHT1002 | | | | |
| **Prerequisite** | | | | | |
| **Co-requisite** | | | | | |
| **Anti-requisite** | | | | | |
| | | **L** | **T** | **P** | **C** |
| | | 3 | 0 | 0 | 3 |

**Course Objectives**

**1. The student shall be able to understand different acids, bases, antioxidants, inorganic drugs and Pharmaceuticals.**

**2. The student shall be able to understand the medicinal and Pharmaceutical importance of compounds.**

**Course Outcomes**

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| **CO1** | Students will be able to understand properties and medicinal uses of antioxidants and Gastrointestinal agents. |
| **CO2** | Students will be able to understand the chemistry of topical agents, antimicrobials, astringents and dental products. |
| **CO3** | Students will be able to understand the chemistry of respiratory stimulants, expectorants, emetics, andidotes and electrolytes |
| **CO4** | Students will be able to understand the chemistry of some official compounds and radiopharmaceuticals |
| **CO5** | Students will be able to apply chemical tests for quality control of drugs and identification tests of cations and anions. |
| **CO6** | Students will be able to apply the knowledge on WHO and radiopharmaceutical guideline. |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| | 20 | 80 | 100 |

**Course Content:**

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| **Unit I: General discussion**<br>**8 Hours** |
| General discussion on the following inorganic compounds including important physical and chemical Properties, medicinal and pharmaceutical uses, storage conditions and chemical incompatibility.<br>Acids, bases and buffers-Boric acid, Hydrochloric acid, Strong Ammonium hydroxide, Sodium hydroxideand official buffers.<br>Antioxidants- Hypophosphorous acid, Sulphur dioxide, Sodium bisulphite, Sodium meta-bisulphite, Sodium thiosulphate, Nitrogen and Sodium nitrite. |
| **Unit II: Gastrointestinal agents**<br>**10 Hours** |
| Acidifying agents- Dilute Hydrochloric acid.<br>Antacids- Sodium bicarbonate, Aluminum hydroxide gel, Aluminum phosphate, Calcium carbonate,Magnesium carbonate, Magnesium trisilicate, Magnesium oxide, Combinations of antacid preparations.Protective and Adsorbents- Bismuth sub carbonate and Kaolin.<br>Saline cathartics- Sodium potassium tartrate and Magnesium sulphate. |
| **Unit III: Topical Agents**<br>**8 Hours** |
| Protective- Talc, Zinc Oxide, Calamine, Zinc stearate, Titanium dioxide, silicone polymers.<br>Antimicrobials and Astringents- Hydrogen peroxide*, Potassium permanganate, Chlorinated lime,Iodine, Solutions of Iodine, Povidone-iodine, Boric acid, Borax, Silver nitrate, Mild silver protein, Mercuryyellow, Mercuric oxide, Ammoniated mercury.Sulphur and its compounds- Sublimed sulphur, Percipitatedsulphur, Selenium sulphide.<br>Astringents- Alum and Zinc Sulphate. |
| **Unit IV: DentalProduct**<br>**8 Hours** |
| Dental Products- Sodium fluoride, Stannous fluoride, Calcium carbonate, Sodium meta phosphate, Dicalciumphosphate ,Strontium chloride, Zinc chloride.<br>Inhalants- Oxygen, Carbon dioxide, Nitrous oxide. |
| **Unit V:**<br>**7 Hours** |
| Respiratory stimulants- Ammonium carbonate.<br>Expectorants and Emetics-Ammonium chloride*, Potassium iodide, Antimony potassium tartrate.<br>Antidotes- Sodium nitrite. |
| **Unit VI: Major Intra and Extra cellular electrolytes**<br>**8 Hours** |
| Major Intra and Extra cellular electrolytes-<br>Electrolytes used for replacement therapy- Sodium chloride and its preparations, Potassium chloride andits preparations.<br>Physiological acid-base balance and electrolytes used- |

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| Sodium acetate, Potassium Acetate, Sodiumbicarbonate Inj., Sodium citrate, Potassium citrate, Sodium lactate injection, Ammonium chloride and itsinjection, Combination of oral electrolyte powders and solutions. |
| **Unit VII:** Inorganic official compounds<br><br>**7 Hours** |
| Inorganic official compounds of Iron, Iodine and Calcium, Ferrous Sulphate and Calcium Gluconate. |
| **Unit VIII: Radio pharmaceuticals and contrast media**<br>**7 Hours** |
| Radio activity-Alpha; Beta and Gamma Radiations,Biological effects of radiations, Measurement of radio activity, G.M. Counter, Radio isotopes-their uses, Storage and precautions with special reference to the official preparations. Radio opaque contrast media-Barium sulfate. |
| **Unit IX:Quality control of Drugs and Pharmaceuticals**<br>**7 Hours** |
| Importance of quality control, significant errors, methodsused for quality control, sources of impurities in pharmaceuticals. Limit tests for Arsenic, Chloride, Sulfate,Iron and Heavy metals. |
| **Unit X:** Identification tests<br>**5 Hours** |
| Identification tests for cations and anions as per Indian Pharmacopoeia. |
| **Unit XI:**<br>**Hours** |
| Advances in Pharmaceutical Chemistry-I<br><br>• Radiopharmaceuticals used for drug discovery and development.<br>• Inorganic compounds used in pharmaceutical preparations.<br>• Mettalic compounds used in pharmaceutical preparations. |
| 1. https://www.drugs.com/pro/water-for-injection.html<br><br>2.WHO Guidelines.. https://www.who.int/medicines/ areas/quality_safety/quality_ assurance/QAS19_786<br><br>3. Radiopharmaceuticals: Drug Development and Regulatory Issues. https://link.springer.com/chapter/10.1007/978-3-540-76735-0_20<br><br>4. Radioactive Drugs in Clinical Medicine. https://www.iaea.org/sites/default/files/15205681319.pdf |

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| 5. https://www.researchgate.net/publication/267961271_Metal_Based_Drugs_Current_Use_and_Future_Potential Introduction to pharmaceutical inorganic chemistry.<br>6. http://www.bspublications.net/downloads/059c4987a9551e_Ch-1_Pharmaceutical%20In-organic%20Chemistry_2nd%20Ed._Algarsamy.pdf<br><br>7. Medicinal Uses of Inorganic Compounds - 1.https://www.ias.ac.in/article/fulltext/reso/011/04/0075-0090.<br>https://images.static-collegedunia.com/public/college_data/images/entrance/entrance_brochure/1476547755x.pdf |

**Suggested Reading**

**1.**

**2.**

**3.**

**4.**

| Name of The Course | Pharmacognosy | | | |
|---|---|---|---|---|
| **Course Code** | DPHT 1003 | | | |
| **Prerequisite** | | | | |
| **Co-requisite** | | | | |
| **Anti-requisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives**

The basic objective of this course is to get familiar with Phamacognosy, active constituents, phytochemical screening etc.

**Course Outcomes**

The student shall be able to

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| **CO1** | Demonstrate and interpret the different indigenous system of medicines, related drugs and also able to analyze the adulteration and quality control parameters as per Pharmacopoeia standards. |
| **CO2** | Apply the different tests and techniques for identification and isolation of therapeutic important category of compounds. |
| **CO3** | Relate and generalize the importance of Pharmaceutical aids. |
| **CO4** | Apply the knowledge of occurrence, distribution, organoleptic evaluation, chemical tests and therapeutic efficacy of various categories of drugs. |
| **CO5** | Apply the knowledge of identification, preparation and gross anatomical studies of various drugs. |
| **CO6** | Evaluate the Ayurvedic Preparation methods & Crude drug monograph and justify their importance in registration of drugs. |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Mid Term Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 20 | - | 80 | 100 |

**Course Content:**

**Unit I 15 Hour**

Definition, history and scope of Pharmacogonosy including indigenous system of medicine. Various systems of classification of drugs and natural origin. Adulteration and drug evaluation; significance of Pharmacopoeial standards.

**Unit II 15 Hours**

Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical application of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.

**Unit III 7 Hours**

**Pharmaceutical aids**

Honey, Arachis oil, starch, kaolin, pectin, olive oil. Lanolin, Beeswax, Acacia, Tragacanth, sodium Alginate, Agar, Guar gum, gelatin.

**Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.**

**(a) Laxatives-** Aloes, Rhubarb, Castor oil, Ispaghula, Senna.

**(b) Cardiotonics-** Digitalis, Arjuna.

**(c) Carminatives & G.I. regulators-** Umbelliferous fruits, Coriander, Fennel, Ajowan, Cardamom**,**Ginger, Black pepper , Asafoetida, Nutmeg, Cinnamon, Clove.

**Unit IV 1 5 Hours**

**Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.**

**(d) Astringents-** Catecheu.

**(e) Drugs acting on nervous system-** Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nux -vominca.

**(f) Antihypertensive-** Rauwolfia.

**(g) Antitussives-** Vasaka, Tolu balsam, Tulsi.

**(h) Antirheumatics-** Guggal, Colchicum.

**(i) Antitumour-** Vinca**.**

**(j) Antileprotics-** Chaulmoogra oil**.**

**(k) Antidiabetics-** Pterocarpus, Gymnema sylvestro**.**

**(l) Diuretics-** Gokhru, Punarnava**.**

**(m) Antidysenterics-** Ipecacuanha**.**

**(n) Antiseptics and disinfectants-** Benzoin, Myrrh, Neem, Curcuma.

**(o) Antimalarials-** Cinchona**.**

**(p) Oxytocics-** Ergot**.**

**(q) Vitamins-** Shark liver oil and Amla**.**

**(r) Enzymes-** Papaya, Diastase, Yeast.

**(s) Perfumes and flavoring agents-** peppermint oil, Lemon oil, Orange oil, lemon grass oil, sandal wood.

**Unit V** **15 Hours**

**Miscellaneous-** Liquorice, Garlic, picrorhiza, Dirscorea, Linseed, shatavari, shankhpushpi, pyrethrum, Tobacco.

**Collection and preparation of crude drugs for the market as exemplified by** Ergot, opium, Rauwalfia, Digitalis, senna.

**Study of source, preparation and identification of fibers used in sutures and surgical dressings-**cotton, silk, wool and regenerated fibers.

**Gross anatomical studies of-**senna, Datura, cinnamon, cinchona, fennal, clove, Ginger, Nuxvomica & Ipecacuanha.

**Unit VI: 8 Hours**

**Ayurvedic Pharmacy:** Introduction , Market Potential, Ayurvedic preparations: Arishta, Asava, Gutika, Tailas, Churnas, Bhasma, Lehyas.

**Introduction to crude drug monograph and its importance in registration of herbal drug.**

**Suggested Reading**

**Text Book**

1. Kokate C.K., Gokhale AS, Gokhale SB, Cultivation of Medicinal Plants, Nirali Prakashan.
2. Kokate C.K., et al, Pharmacognosy, Nirali Prakashan, Pune.
3. Wallis. T.E., Text Book of Pharmacognosy, J&A Churchill Ltd. London.
4. Tyler V.E. et al, Pharmacognosy, Lea &Febiger,Philadelphia.
5. Shah B, Seth AK. Pharmacognosy & Phytochemistry. CBS Publishers & Distributors Pvt. Ltd.

**Reference Books**

1. Indian Herbal Pharmacopoeia, Vol. I&II, ICMR & RRL., Jammu.
2. Nadkarni A.K., Indian Materia Medica 1-2, Popular Prakashan (P) Ltd. Bombay.
3. Medicinal Plants of India I&II, Indian council of Medical Reasearch, New Delhi.

| | L | T | P | C |
|---|---|---|---|---|
| | 3 | 1 | 0 | 4 |

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| **CO1** | The student will be able to understandfundamental biochemical principles of proteins and their importance to maintain healthy life |
| **CO2** | The student will be able to understand the basics of carbohydrates biomolecules and analyze the presence of carbohydrates, metabolic pathway and disease |
| **CO3** | The student will be able to understand basicsof lipids, their identification and metabolites causing disease |
| **CO4** | The student will be able to understand importance of vitamins, minerals and chemistry involved in enzyme action with various factors affecting their activity. |
| **CO5** | The student will able to understandpathogenesis of diseases due to presence of unwanted metabolites, abnormal cells and their cell count in biological samples. |

**Course Objectives**

Upon completion ofthecourse, thestudentshallbeable to understand:

1.Apply fundamental biochemical principles of proteins and their importance to maintain healthy life
2. Illustrate the basics of carbohydrates biomolecules and analyze the presence of carbohydrates, metabolic pathway and disease
3. Illustratethebasicsof lipids, their identification and metabolites causing disease
4.Analyze the importance of vitamins, minerals and chemistry involved in enzyme action with various factors affecting their activity.
5. 5.Analyze the pathogenesis of diseases due to presence of unwanted metabolites, abnormal cells and their cell count in biological samples.

**Course Outcomes**

**Course Content:**

| **Name of The Course** | **Biocgemistry and clinical Pathology(Theory)** |
|---|---|
| **Course Code** | DPHT1004 |
| **Prerequisite** | |
| **Co-requisite** | |
| **Anti-requisite** | |

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| **Unit I: 10 Hours**<br>**Proteins** |
| Brief chemistry and role of proteins, polypeptides and amino acids, classification, Qualitative tests, Biological value, Deficiency diseases. |
| **Unit II: 10 Hours**<br>**Carbohydrates** |
| Brief chemistry and role of carbohydrates, classification, qualitative tests, Diseasesrelated to carbohydrate metabolism. |
| **Unit III:**<br>**10Hours**<br>**Lipids**<br><br>Brief chemistry and role of lipids, classification andqualitative tests. Diseases related to lipids metabolism |
| **Unit IV 10 Hours**<br>**Vitamins** |
| Vitamins: Brief chemistry and role of vitamins and |

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| coenzymes. Role of minerals and water in lifeprocesses.Enzymes: Brief concept of enzymatic action. factors affecting it |
| **Unit V: 10 Hours**<br>**Therapeutics**<br>Introduction to pathology of blood and urine. Lymphocytes and platelets, their role in healthanddisease.Erythrocytes-Abnormal cells and their significance.Abnormal constituents of urine and theirsignificance in diseases. |

| **Name of The Course** | Human Anatomy and Physiology | | | |
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| **Course Code** | DPHT1005 | | | |
| **Prerequisite** | | | | |
| **Co-requisite** | | | | |
| **Anti-requisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives**

**1. Identify different types of cells and organelles describe their functions.**

**2. Identify the three types of muscle and describe the muscular system's functions.**

**3. Identify the major components of the nervous system and describe their functions.**

**4. Identify the major components of the endocrine system and describe their functions.**

**5. Identify the major components of the circulatory system and describe their functions.**

**Course Outcomes**

| | |
|---|---|
| **CO1** | Illustrate the basic concepts of anatomy and physiology to identify cell, tissues and cardiovascular functions and its diseases. |
| **CO2** | Interpret the elements of respiratory and urinary system. |
| **CO3** | Demonstrate the anatomy and functions of muscular and central nervous system. |
| **CO4** | Illustrate anatomy and physiology of sensory and digestive system. |
| **CO5** | Interpret the structure, and physiology of reproductive and endocrine system |
| **CO6** | Illustrate the role of kidney in Blood Pressure and pH. |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Exam ()** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

**Course Content:**

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| **Unit I:** Scope of Anatomy and physiology.<br>**10 Hours** |
| Scope of Anatomy and physiology. Definition of various terms used in Anatomy. Structure of cell,function of its components with special reference to mitochondria and microsomes.<br>Elementary tissues: Elementary tissues of the body, i.e. epithelial tissue, muscular tissue, connectivetissue and nervous tissue.<br>Skeltal System: Structure and function of Skelton .Classification of joints and their function. Jointdisorders. |
| **Unit II: Cardiovascular System 10 Hours** |
| Composition of blood, functions of blood elements. Blood group and coagulationofblood.Brief information regarding disorders of blood.Name and functions of |

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| lymph glands.Structure and functions of various parts of the heart .Arterial and venous system with special reference to the names and positions of main arteries and veins.Blood pressure and its recording. Brief information about cardiovascular disorders. |
| **Unit III: Respiratory system 07Hours** |
| Various parts of respiratory system and their functions, physiology of respiration. |
| **Unit IV**: Urinary System **07 Hours** |
| Various parts of urinary system and their functions, structure and functions of kidney. Physiology of urine formation.Patho-physiology of renal diseases and edema |
| **Unit V: Muscular System 07 Hours** |
| Structure of skeletal muscle, physiology of muscle contraction. Names, positions,attachments and functions of various skeletal muscles.physiology of neuromuscular junction. |
| **Unit VI: Central Nervous System 07 Hours** |
| Various parts of central nervous system, brain and its parts, functions and reflexaction. Anatomy and physiology of automatic nervous system. |
| **Unit VII: Sensory Organs 07 Hours** |
| Elementary knowledge of structure and functions of the organs of taste, smell, ear, eyeand skin. Physiology of pain |
| **Unit VIII: Digestive System 07 Hours** |
| Names of various parts of digestive system and their functions. structure and functionsof liver, physiology of digestion and absorption. |
| **Unit IX: Endocrine System 07 Hours** |
| Endocrine glands and Hormones. Location of glands, their hormones and functions.pituitary, thyroid. Adrenal and pancreas |
| **Unit X: Reproductive system 06 Hours** |
| Physiology and Anatomy of Reproductive system |
| **Unit XI: Role of Kidney in Blood pH and Blood Pressure** |
| Itroduction, physiology, pathophysiology, Drug used in hypertention |

**Suggested Reading**


1. **Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA.**
2. **Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.**
3. **Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata.**
4. **Difore S.H. "Atlas of Normal Histology" – Lea &Febiger Philadelphia.**


| | | | | | |
|---|---|---|---|---|---|
| **Name of The Course** | Health Education & Community Pharmacy | | | | |
| **Course Code** | DPHT1006 | | | | |
| **Prerequisite** | | | | | |
| **Co-requisite** | | | | | |
| **Anti-requisite** | | | | | |
| | **L** | **T** | **P** | **C** | |
| | 4 | 0 | 0 | 3 | |

**Course Objectives**

**1. To understand concept of health and nutrition**

**2. To understand environmental health sciences.**

**3. To understand fundamental principles of microbiology**

**4 To understand signs and Symptoms, causative organism, mode of transmission, pathogenesis of communicable and non – communicable diseases.**

**Course Outcomes**

| | |
|---|---|
| **CO1** | Analyze the concept of health and nutrition for the prevention and control of diseases as well as they will analyze the concept of family planning |
| **CO2** | Apply the knowledge of first aid to come over the emergencies situation as well as they will also apply the knowledge of environmental |

| | |
|---|---|
| | health science to prevent and control of air, soil and water borne diseases. . |
| **CO3** | Understand the fundamental principle of microbiology and causative agents, mode of transmission and prevention of communicable diseases. |
| **CO4** | Apply the concept to prevent and control of Intestinal infection, arthropod borne infections, surface infection and sexually transmitted diseases |
| **CO5** | The stApply knowledge of causative agents, prevention, care and control of communicable and infectious diseases. |
| **CO6** | The students will be able to Apply knowledge of causative agents, prevention, care and control of communicable and infectious diseases of moden erra e |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Sessional Exam () | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

**Course Content:**

| |
|---|
| **Unit I:** Concept of health and Demography and family planning **10 Hours** |
| Definition of physical health, mental health, social health, spiritual health determinantsof health, indicatory of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases.<br>Nutrition & Health<br>Classification of foods, requirements, diseases induced due to deficiency ofproteins, vitamins and minerals-treatment and prevention.<br>Demography and family planning: Demography cycle, fertility, family planning, contraceptive methods, behavioral methods, natural family planning methods, chemical methods, mechanical methods, hormonal contraceptives, population problem of India. |
| **Unit II: First aid and Environment and health**<br>**10 Hours** |
| Emergency treatment in shock, snake-bite, burns, poisoning, heart disease, fractures andresuscitation methods, Elements of minor surgery and dressings. Source of water supply, water pollution, purification of water, health and air,noise, light-solid waste disposal and control-medical entomology, arthropod borne diseases and their control. rodents, animals and diseases , . |
| **Unit III: Fundamental principles of microbiology and diseases**<br>**10 Hours** |
| Classification of microbes, isolation, staining techniques oforganisms of common diseases<br>Communicable diseases<br>Causative agents, mode of transmission and prevention. Respiratory infections-chicken pox, measles, influenza, diphtheria, whooping cough and tuberculosis. |
| **Unit IV** : Intestinal infection and Arthropod borne infections **10 Hours** |
| Poliomyelitis, Hepatitis, cholera, Typhoid, food poisoning, Hookworm infection,<br>plague, Malaria, filariases.<br>Surface infection- Rabies, Tranchoma, Tetanus, Leprosy.<br>Sexually transmitted diseases-Syphilis, Gonorrhoea, AIDS |
| **Unit V: Non-communicable diseases**<br>**13 Hours** |

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|---|
| causative agents, prevention, care and control, cancer, diabetes, blindness , cardiovascular diseases.<br>Epidemiology:<br>Its scope, methods, uses, dynamics of disease transmission. Immunity and immunization:Immunological products and their dose schedule. Principles of disease control and prevention, hospital acquired infection, prevention and control. Disinfection, types of disinfection procedures, for-faces, urine, sputum, room linen, dead-bodies, instruments |
| Unit VI : 8 **Hours** |
| Introduction to covid 19. |
| References: Social Pharmacy: Tayler, Geoffery. Pharmaceutical Press. London<br>S. Khurana, P Suresh and R Kalsi. Health Education & Community Pharmacy. S Vikas & Co<br>Community Pharmacy Handbook- Jonathan Waterfield |

**Suggested Reading**

**1. 1. Innovation and development Ltd. 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**

| Name of The Course | Pharmaceutics -I Practical | | | |
|---|---|---|---|---|
| Course Code | DPHP1051 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | **0** | **0** | **4** | **2** |

List of Experiments:

1 To perform size reduction of given sample by ball mill.

2 To perform the size separation of given sample by sieving method

3 To prepare and submit calcium carbonate granules by wet granulation technique.

4 To evaluate the granules of calcium carbonate for flow properties.

5 To study the effect of additives on the flow properties of calcium carbonate granules.

6 To prepare and evaluate calcium carbonate tablets.

7 To evaluate the given marketed tablets.

8 To prepare and evaluate sodium chloride tablets by direct compression technique.

9 To perform the mixing of given powder by double cone blender.

10 To perform the simple distillation.

11 To perform the separation of two miscible liquids by simple distillation.

12 To perform the sterilization by dry heat method.

13 To perform sterilization by moist heat.

14 To evaluate the packaging materials and containers.

15 To perform the aseptic transfer of microbiological samples in lamminar flow bench.

16 To study the operation of manual capsule filling machine.

17 To study the effect of concentration on the rate of filtration.

18 To study the effect of filter media on the rate of filtration.

19 To study the effect of filter aid on the rate of filtration.

Continuous Assessment Pattern

| Internal Assessment (IA) | Sessional Test | End Term Test (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

| **Name of The Course** | Pharmaceutical Chemistry-II | | | |
|---|---|---|---|---|
| **Course Code** | DPHP1052 | | | |
| **Prerequisite** | | | | |
| **Co-requisite** | | | | |
| **Anti-requisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 0 | 0 | 4 | 2 |

**Course Objectives**

**1** Students should understand different acids, bases, antioxidants, inorganic drugs and Pharmaceuticals

2 Students should understand the medicinal and Pharmaceutical importance of compounds.

3 Students should know the methods of assay of pharmaceuticals.

4 Students should know the methods to check limits of impurities in pharmaceuticals.

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Course Outcomes

| | |
|---|---|
| CO1 | Students will be able to prepare & analyze the drug samples for identification. |
| CO2 | Students will be able to analyze the drug samples to check the limits of important ions. |
| CO3 | Students will be able to analyze the purity of drug samples by acid-base & redox titrations. |
| CO4 | Students will be able to analyze the purity of drug samples by precipitation titrations. |
| CO5 | Students will be able to apply chemical tests for quality control of drugs and identification tests of cations and anions. |

Continuous Assessment Pattern

| Internal Assessment (IA) | Sessional Exam (MTE) | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

Course Content:

| Unit I: General discussion<br>8 Hours |
|---|
| 1. To perform the Limit Test for Chloride of the given sample<br>2. To perform the Limit Test for Sulphate of the given sample.<br>3. To perform the Limit Test for Iron of the given sample.<br>4. To perform the Limit Test for Lead of the given sample.<br>5. To perform the Limit Test for Heavy metals of the given sample.<br>6. To perform the Limit Test for Arsenic of the given sample.<br>7. To prepare and submit Calcium carbonate and calculate its percentage yield.<br>8. To prepare and standardize 0.1 N HCl using Sodium hydroxide.<br>9. To prepare and standardize 0.1 N Oxalic acid using Sodium hydroxide.<br>10. To prepare and standardize 0.1 N NaOH.<br>11. To prepare and submit Zinc sulphate and calculate its percentage yield.<br>12. To prepare and submit Alum and calculate its percentage yield.<br>13. To perform iodometric determination of available chlorine in a sample of bleaching powder.<br>14. To determine the amount of chloride in given sample using Mohr's method.<br>15. To determine the amount of chloride in given sample using Mohr's method.<br>16. To determine calcium by standardized EDTA solution.<br>17. To determine magnesium by standardized EDTA solution.<br>18. To carry out identification tests with the given sample of caffeine.<br>19. To prepare and standardize 0.1 M Iodine Solution by the aid of Sodium Thiosulphate.<br>20. To determine the volume strength of hydrogen peroxide solution.<br>21. To determine calcium by standardized EDTA solution.<br>22. To determine magnesium by standardized EDTA solution.<br>23. To carry out identification tests with the given sample of caffeine.<br>24. To prepare and standardize 0.1 M Iodine Solution by the aid of Sodium Thiosulphate.<br>25. To determine the volume strength of hydrogen peroxide solution. |

Suggested Reading

1. United States Pharmacopoeia (National Formulary).

2.Remington – "The science and practice of pharmacy" Vol. I & II. Mack Publishing Co., Pennsylvania

Beckett, A.H., and Stenlake, J.B., Practical Pharmaceutical Chemistry, Vol. I&II. The Atherden Press of the University

| **Name of The Course** | **PHARMACOGNOSY Practical** | | | |
|---|---|---|---|---|
| **Course Code** | **DPHP1053** | | | |
| **Prerequisite** | | | | |
| **Corequisite** | | | | |
| **Antirequisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 0 | 0 | 4 | 2 |

**LIST OF EXPERIMENTS:**

**1** To study the compound microscope.

2 To study the morphological characteristics of Datura and Clove.

3 To study the morphological characteristics of Garlic, Aloe

4 To study the morphological characteristics of Lemon peel, Bitter orange peel.

5 To study the morphological characteristics of Coriander and Fennel.

6 To study the morphological characteristics of Caraway, Black Pepper.

7 To study the morphological characteristics of Liquorice and Cardamom.

8 To prepare different types of starch from the given samples.

9 To study the morphological characteristics of potato, rice starch.

10 To perform microscopic measurement of the potato and rice starch grains in the given samples.

11 To determine the Stomatal number of the given samples.

12 To determine the Stomatal Index of the given samples.

13 To determine the Palisade ratio in the given samples.

14 To determine the Vein-islet number in the given samples.

15 To determine the vein termination number in the given samples.

16 To perform different chemical test in the given samples.

17 To determine the swelling factor of the given samples.

18 To study the fibres absorbent: Cotton, and wool along with their chemical tests.

19 To study the microscopy of Clove.

20 To study the transverse section of Nux-vomica seed.

21 To study the transverse section of Senna leaf.

22 To study the microscopy, powder microscopy, and chemical test of Fennel.

23 To study the microscopy, powder microscopy and chemical test of Caraway.

24 To study the microscopy, powder microscopy, and chemical test of Clove.

25 To study the microscopy, powder microscopy and chemical test of Cinnamon.

26 To study the microscopy, powder microscopy and chemical test of Zinger.

27 To perform the chemical test of Alkaloids.

28 To perform the chemical test of Glycosides

29 To perform the chemical test of Tannins.

30 To perform the chemical test of Saponins.

31 To perform Thin Layer Chromatography and to determine the Rf value of the given sample.

32 To perform the chemical test of Glycosides.

33 Determination of Loss on drying of the given samples.

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Test** | **End Term Test (ETE)** | **Total Marks** |
|---|---|---|---|
| **0** | **20** | **80** | **100** |

| **Name of The Course** | **Clinical Biochemistry & Pathology Practical** |
|---|---|
| **Course Code** | **DPHT1054** |
| **Prerequisite** | |
| **Corequisite** | |

| Antirequisite | | | | |
|---|---|---|---|---|
| | **L** | **T** | **P** | **C** |
| | 0 | 0 | 2 | 1 |

**LIST OF EXPERIMENTS**

1 Qualitative analysis of Glucose and Fructose

2 Qualitative analysis of Lactose and Maltose

3 Qualitative analysis of Sucrose and starch

4 Identification tests for Proteins albumin and casein

5 Identification test for Lipids

6 To perform TLC for amino acids

7 To perform paper chromatography for amino acids

8 Qualitative analysis of urine for presence of glucose, urea, creatine

9 Determination of blood creatinine

10 Determination of blood sugar and serum total cholesterol

11 Preparation of acid buffer solution and measurement of pH

12 Preparation of basic buffer solution and measurement of pH

13 Examination of sputum and faeces by microscope

14 Practice in injecting drugs by intramuscular, subcutaneous

15 Practice in injecting drugs by intravenous routes and withdrawal of blood samples.

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Test** | **End Term Test (ETE)** | **Total Marks** |
|---|---|---|---|
| **0** | **20** | **80** | **100** |

| Name of The Course | Human Anatomy and Physiology Practical | | | |
|---|---|---|---|---|
| Course Code | DPHT1055 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | **0** | **0** | **2** | **1** |

List of Experiments

1 To study the compound microscope

2 To study the human appendicular skeletan

3 To study the bones of human skull

4 To study the bones of thoracic cage of human body

5 To study the integumentary and special senses using specimen models.

6 To study the nervous system using specimen and models

7 To study the endocrine system using specimens and models

8 To demonstrate the function of olafactory nerve.

9 To examine the different types of taste

10 To study the structure and function of digestive system

11 To study the structure and function of cardiovascular system

12 To study the structure and function of urinary system

13 To study the structure and function of reproductive system

14 To study the microscopic examination of skeletal and smooth muscle.

15 To study the microscopic examination of epithelial tissue.

16 To study the microscopic examination of connective tissue.

17 To study the microscopic examination of nervous tissue and cardiac muscle.

18 To determine the amount of haemoglobinin human blood sample.

19 To find out the bleeding time of our own blood sample.

20 To find out the clotting time of our own blood sample.

21 To estimate the RBC count in our blood by hemocytometer.

22 To estimate the WBC count in our blood by hemocytometer

23 Determination of erythrocyte sedimentation rate (ESR)

24 To determine the blood pressure of your body by sphygmomanometer

25 To record the self body temperature

26 To record the pulse rate.

Continuous Assessment Pattern

| Internal Assessment (IA) | Sessional Test | End Term Test (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

| **Name of The Course** | Pharmaceutics-II | | | |
|---|---|---|---|---|
| **Course Code** | DPHT2001 | | | |
| **Prerequisite** | | | | |
| **Co-requisite** | | | | |
| **Anti-requisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 3 | 0 | 0 | 3 |

**Course Objectives**

1. **Students will be exposed to different methods for dose calculation of various dosage forms..**
2. **Students also able to know about various applications according to the prescriptions, formulation and manufacturing aspects of different dosage forms, evaluation of pharmaceutical dosage**

**Course Outcomes**

| | |
|---|---|
| **CO1** | The student will be able to Read and understand prescriptions and dose calculations for different age groups. |
| **CO2** | The student will be able to understand the formulation and manufacturing aspects of powders and monophasic liquids. |
| **CO3** | The student will be able to understand the formulation and manufacturing aspects of biphasic liquids e.g. suspensions and emulsions. |
| **CO4** | The student will be able to understand formulation and manufacturing aspects of semisolid dosage forms e.g. ointments, pastes, jellies, suppositories and pessaries. |
| **CO5** | The student will be able to understand formulation and manufacturing aspects of dental and sterile dosage forms. |
| **CO6** | The student will be acknowledge about how to design and make up different oral controlled and sustained drug delivery system |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| | 20 | 80 | 100 |

**Course Content:**

| |
|---|
| **Unit I:** Prescriptions, Incompatibilities in prescriptions, Posology<br>**12 Hours** |
| Prescriptions-Reading and understanding of prescriptions; Latin terms commonly used (Detailed study is not necessary), Modern methods of prescribing, adoption of metric system. Calculations involved in dispensing.<br>Incompatibilities in prescriptions- study of various types of incompatibilities-physical, chemical and therapeutic.<br>Posology- Dose and dosage of drugs, factors influencing dose, calculations of doses on the basis of age, sex, surface area and veterinary doses. |
| **Unit II: Dispensed Medications, Powders, Liquid oral Dosage forms 15 Hours** |
| Dispensed Medications: (Note: A detailed study of the following dispensed medication is necessary. Methods of preparation with theoretical and practical aspects, use of appropriate containers and closures. Special labeling requirements and storage conditions should be high-lighted).<br>Powders-Type of powders-Advantages and disadvantages of powders, Granules, cachets and tablet triturates. Preparation of different types of powders encountered in prescriptions. Weighing methods, possible errors in weighing, minimum weighable amounts and weighing of a material below the minimum weighable amount, geometric dilution and proper usage and care of dispensing balance. Monophasic-Theoretical aspects including commonly used vehicles, essential adjuvant like stabilizers, colorants and flavors, with examples.<br>Review of the following monophasic liquids with details of formulation and practical methods. Liquids for internal administration Liquids for external administration or used on mucous membranes<br>Mixtures and concentrates, Gargles<br>Syrups, Mouth washes Throat-paints, Elixirs<br>Douches, Ear Drops, Nasal drops<br>Sprays, Liniments, Lotions. |
| **Unit III: Emulsion and Biphasic liquid dosages form**<br>**14Hours** |

Suspensions (elementary study)-Suspensions containing diffusible solids and liquids and their preparations. Study of the adjuvant used like thickening agents, wetting agents, their necessity and quantity to be incorporated, suspensions of precipitate forming liquids like tinctures, their preparations and stability. suspensions produced by chemical reaction. An introduction to flocculated /non-flocculated suspension system.
Emulsions-Types of emulsions, identification of emulsion system, formulation of emulsions, selection of emulsifying agent. Instabilities in emulsions, preservation of emulsions.

**Unit IV: Semi-Solid Dosage Form, Trituration fusion chemical reaction Emulsification, Suppositories**

**18 Hours**

Ointments: Types of ointments, classification and selection of dermatological vehicles. Preparation and stability of ointments by the following processes:
Trituration fusion chemical reaction Emulsification.
Pastes: Differences between ointments and pastes, Bases of pastes. Preparation of pastes and their preservation.
Jellies: An introduction to the different types of jellies and their preparation. An elementary study of poultice.
Suppositories and passaeries-Their relative merits and demerits, types of suppositories, suppository bases, classification, properties. Preparation and packing of suppositories. Use of suppositories of drug absorption..

**Unit V: Dental and cosmetic preparations, Sterile Dosage form, Sterility testing**

**7 Hours**

Dental and cosmetic preparations: Introduction to Dentifrices, facial cosmetics, Deodorants. Antiperspirants, shampoo, Hair dressings and Hair removers.
Sterile Dosage forms:
Parenteral dosage forms-Definition, General requirements for parenteral dosage forms. Types of parenteral formulations, vehicles, adjuvant, processing and parenterals, Facilities and quality control. Preparation of Intravenous fluids and admixtures-Total parenteral nutrition, Dialysis fluids.
Sterility testing: particulate matter monitoring- Faculty seal packaging.
Ophthalmic products: 1 Formulation: additives, special precautions in handling and storage of ophthalmic products.

**Unit VI: Controlled, delayed or sustained release drug delivery system**
**8 Hours**

Introduction to modified ideal drug delivery system with special reference to controlled and sustained type system, About Modified dosages form, Detail on controlled release drug delivery system, Classification of controlled drug delivery system: Sustain release, Extended release and delayed release formulation, Detail on sustain release drug delivery system, Preparation Methodology of modified drug delivery system, Equipment used for controlled and sustained drug delivery system, Different marketed formulation of controlled and sustained type drug delivery system, Application in pharmacy of modified drug delivery system

**Suggested Reading**

**1.** Carter S.J., “Cooper and Gunn’s Tutorial Pharmacy”, CBS Publishers, Delhi.

**2.** LachmanL,Liberman H.A and Kanig J.L., “Theory and Practice of Industrial Pharmacy”, Lea and Febiger.

**3.** Remington - “The science and practice of pharmacy” Vol. I & II. Mack Publishing Co., Pennsylvania.

**4.** S.P. Vyas, R. K. Khar, Targetted and controlled drug delivery, CBS Publisher & Distributors.

**5**. Aulton, M.E, Text Book of Pharmaceutics, Vol., I & II. Churchill Livingstone.

**6.** Loyd V. Elen, Pharmaceutical dosages form and drug delivery system, Seventh edition, Wolters

Kulwer publizing house.

| | |
|---|---|
| **Name of The Course** | Pharmaceutical Chemistry-II |
| **Course Code** | DPHT2002 |
| **Prerequisite** | |
| **Co-requisite** | |

| **Anti-requisite** | | | | |
|---|---|---|---|---|
| | **L** | **T** | **P** | **C** |
| | 4 | 0 | 0 | 3 |

**Course Objectives**

**1. To apply knowledge in basic Clinical Laboratory Practice**

**2. To get knowledge of laboratory setup and organization**

**3. To follow the laboartorty ethics and giving accurate results.**

**Course Outcomes**

| | |
|---|---|
| **CO1** | The students will be able to understand properties and medicinal uses of antiseptics, disinfectants, sulfonamides and antimycotic drugs. |
| **CO2** | The students will be able to understand the chemistry of steroids, antiamoebics, anthelmintics, analgesics and antibiotics. |
| **CO3** | The students will be able to understand the chemistry of drugs acting on CNS, adrenergic and cholinergic system. |
| **CO4** | The students will be able to understand the chemistry of drugs acting on CVS, urinary system blood coagulation and histamine receptors. |
| **CO5** | The students will be able to understand the chemistry of drugs acting on CNS, CVS and cancer cells |
| **CO6** | The students will be able to understand about computer added drug design. |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Sessional Exam () | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

**Course Content:**

| |
|---|
| **Unit I: Antiseptics and Disinfectants, Antileprotic Drugs 16 Hours** |
| Proflavine*, Benzalkonium chloride, Cetrimide, Phenol, chloroxylenol,Formaldehyde solution, Hexachlophene, Nitrofurantoin. Sulphonamides- Sulphadiazine, Sulphaguanidine, Phthalylsulphathaizole, Succinylsulphathiazole,Sulphadimethoxine, Sulphamethoxypyridazine, Co-trimoxazole, sulfacetamide* Antileprotic drugs- Clofazimine ,Thiambutosine, Dapsone*, solapsone, Anti-tubercular Drugs- Isoniazid*, PAS*, Streptomycin, Rifampicin, Ethambutol*, Thiacetazone,Ethionamide, cycloserine, pyrazinamide*. |
| **Unit II: Steroidal Drugs, Analgesics and Anti-pyretics- 14 Hours** |
| Betamethasone, Cortisone, Hydrocortisone, Prednisolone, Progesterone, Testosterone,Oestradiol, Nandrolone. Antimoebic and Anthelmintic Drugs- Emetine, Metronidazole, Halogenated hydroxyquinolines,Diloxanidefuroate, Paromomycin ,Piperazine*, Mebendazole, D.E.C.* Analgesics and Anti-pyretics-Morphine, Pethidine, Codeine, Mathadone, Aspirin*, Paracetamol, Analgin,Dextropropoxphene, Pentazocine. Antibiotics- Benzyl penicillin*, Phenoxy methyl penicillin*, Benzathine penicillin, Ampicillin*, Cloxacillin, Carbencicillin, Gentamicin, Neomycin, Erythromycin, Tetracycline, Cephalexin, Cephaloridine, Cephalothin, Griseofulvin, Chloramphenicol. |
| **Unit III: Tranquilizers, Hypnotics- 18 Hours** |
| Tranquilizers-Chlorpromazine*, Prochlorperazine, Trifluoperazine, Thiothixene, Haloperiodol*,Triperiodol, Oxypertine, Chlordizepoxide, Diazepam*, Lorazepam, Meprobamate. Hypnotics- Phenobarbitone*, Butobarbitone, Cylobarbitone, Nitrazepam, Glutethimide*, Methyprylon,Paraldehyde, Triclofosodium. General Anaesthetics-Halothane*, Cyclopropane*, Diethyl ether*, Methohexital sodium, Thiopecalsodium, Trichloroethylene . Antidepressant Drugs- Amitriptyline, Nortryptyline, Imperamine*, Phepelzine, Tranylcypromine. Analeptics- Theophylline, Caffeine*, Coramine*, Dextro-amphetamine. Adrenergic drugs- Adrenaline*, Noradrenaline, Isoprenaline*, Phenylephrine, Salbutamol, Terbutaline,Ephedrne*, Pseudoephedrine. Adrenergic antagonist- Tolazoline, Propranolol*, Practolol. Cholinergic Drugs- Neostigmine*, Pyridostigmine, Pralidoxime, Pilocarpine, Physostigmine*. Cholinergic Antagonists- Atropine*, Hyoscine, Homatropine, Propantheline*, Benztropine, Tropicamide,Biperiden*. |
| **Unit IV** : Diuretic Drugs, Cardiovascular Drugs **14 Hours** |
| Diuretic Drugs- Furosemide*, Chlorothiazide, Hydrochlorothiazidc*, Benzthiazide, Urea*, Mannitol*,Ethacrynic Acid. Cardiovascular Drugs- Ethylnitrite*, Glyceryltrinitrate, Alpha methyldopa, Guanethidine, Clofibrate,Quinidine. Hypoglycemic Agents- Insulin, Chlorpropamide*, Tolbutamide, Glibenclamide, Phenformin*, Metformin. Coagulants and Anti coagulants- Heparin, Thrombin, Menadione*, Bisphydroxy-coumarin, Warfarinsodium. Local Anaesthetics- Lignocaine*, Procaine*, Benzocaine, Histamine and anti Histaminic Agents- Histamine, Diphenhydramine*, Promethazine, Cyproheptadine,Mepyramine*, Pheniramine, Chlorpheniramine*, |

| **Unit V: Structures**<br><br>**13 Hours** |
|---|
| Non-steriodal anti-inflammatory agents- Indomethacin*, Phenylbutazone*, Oxyphenbutazone,<br>Ibuprofen. Thyroxine and Antithyroids- Thyroxine*, Methimazole, Methyl thiouracil, Propylthiouracil.<br>Diagnostic Agents- Lopanoic Acid, Propyliodone, Sulfobromopthalein-sodium, Indigotindisulfonate,Indigo Carmine, Evans blue, Congo Red, Fluorescein sodium. Anticonvulsants, cardiac glycosides, Antiarrhythmic, Antihypertensives& Vitamins. Anti-Neoplastic Drugs- Actinomycin, Azathioprie, Busulphan, Chloramubucil, Cisplatin, Cyclophosphamide, DaunorubicinHydrochoride, Fluorouracil, Mercaptopurine, Methotrexate, Mytomycin |
| Unit VI : 8 **Hours** |
| Introduction to computer added Drug Design: QSAR, 3D-QSAR, Molecular docking study, Ligands etc. |
| References: **Madsen U, Krogsgaard-Larsen P, Liljefors T (2002).** ***Textbook of Drug Design and Discovery*****. Washington, DC: Taylor & Francis. ISBN 978-0-415-28288-8.**<br>**Wu-Pong S, Rojanasakul Y (2008).** ***Biopharmaceutical drug design and development*** **(2nd ed.). Totowa, NJ Humana Press: Humana Press. ISBN 978-1-59745-532-9** |

**Suggested Reading**

**1.** Medicinal and Pharmaceutical Chemistry by V K Kapoor & Harkishan Singh

**2.** Pharmaceutical Chemistry-2 by S G Wadodkar and A V Kasture

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|---|---|---|---|---|---|
| **Name of The Course** | Pharmacology and Toxicology | | | | |
| **Course Code** | DPHT2003 | | | | |
| **Prerequisite** | | | | | |
| **Co-requisite** | | | | | |
| **Anti-requisite** | | | | | |
| | **L** | **T** | **P** | **C** | |
| | 4 | 0 | 0 | 3 | |

**Course Objectives**

**1. To apply knowledge in basic Clinical Laboratory Practice**

**2. To get knowledge of laboratory setup and organization**

**3. To follow the laboratory ethics and giving accurate results.**

**Course Outcomes**

| | |
|---|---|
| **CO1** | Illustrate the scope of Pharmacology and general mechanism of drugs acting on CNS. |
| **CO2** | Interpret the mechanism of action and pharmacological actions of centrally acting muscle relaxants drugs, local anesthetics and drugs acting on ANS. |
| **CO3** | Illustrate the pharmacological actions of drugs acting on respiratory system, autacoids, cardiovascular system. |
| **CO4** | Illustrate the pharmacological actions of drugs acting on kidney, digestive system, hormones and hormonal antagonists. |
| **CO5** | Interpret the mechanism of action, pharmacological actions of chemotherapeutic agents, disinfectants and antiseptics. |
| **CO6** | Illustrate the CPCSEA Guidelines and Principles of animal toxicology Acute, sub acute and chronic toxicity. |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Exam ()** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

**Course Content:**

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|---|
| **Unit I:** Pharmacology and general mechanism of drugs acting on CNS.<br>**16 Hours** |
| Introduction to Pharmacology, scope of Pharmacology.<br>Routes of administration of drugs, their advantages and disadvantages. Various processes of absorption of drugs and the factors affecting them, Metabolism, distribution and excretion of drugs.General mechanism of drugs action and the factors which modify drug action. Pharmacological classification of drugs. The discussion of drugs should emphasize the following aspect:<br>Drugs acting on the Central Nervous System:<br>General anaesthetics, adjunction to anaesthesia, intravenuous anasesthetics.<br>Analgesic antipyretics and non-steroidal anti-inflammatory drugs, Narcotic analgesics, Antirheumatic and antigout remedies, Sedatives and Hypnotics, Psychopharmacological agents, anti convulsants, analeptics. |
| **Unit II:** Autonomic Nervous system **14 Hours** |
| General mechanism of drugs action and the factors which modify drug action. Pharmacological classification of drugs. The discussion of drugs should emphasize the following aspect:<br>Centrally acting muscle relaxants and anti parkinsonism agents<br>Local anaesthetics. Drug acting on autonomic nervous system.<br>Cholinergic drug, Anticholinergic drugs, anti cholinesterase drugs.<br>Adrenergic drugs and adrenergic recepter blockers.<br>Neurones blockers and ganglion blockers.<br>Neuromuscular blockers, drugs used in myasthenia gravis.<br>Drugs acting on eye, mydriatics, drugs used in glaucoma. |
| **Unit III:** pharmacological actions of drugs acting on respiratory system, autacoids, cardiovascular system.<br>**15 Hours** |
| Drugs acting on respiratory system- Respiratory stimulants, Bronchodilators, Nasal decongestants, Expectorants and Antitussive agents.<br>Autocoids- Physiological role of histamine and serotonin, Histamine and Antihistamines, Prostaglandins.<br>Drugs acting on respiratory system- Respiratory stimulants, Bronchodilators, Nasal decongestants, Expectorants and Antitussive agents.<br>Autocoids- Physiological role of histamine and |

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| serotonin, Histamine and Antihistamines, Prostaglandins. Cardio Vascular drugs, Cardiotonics, Antiarrhythmic agents, Antianginal agents, Antihypertensive agents, Peripheral Vasodilators and drugs used in atherosclerosis.<br>Drugs acting on the blood and blood forming organs. Haematinics, Coagulants and anti Coagulants, Haemostatics, Blood substitutes and plasma expanders. Propantheline*, Benztropine, Tropicamide,Biperiden*. |
| **Unit IV**: The pharmacological actions of drugs acting on kidney, digestive system, hormones and hormonal antagonists.<br>**13 Hours** |
| Drugs affecting renal function-Diuretics and antidiuretics.<br>Hormones and hormone antagonists-hypoglycemic agents, Antithyroid drugs, sex hormones and oral contraceptives, corticosteroids.<br>Drugs acting on digestive system-Carminatives, digestants Bitters, Antacids and drugs used in Peptic ulcer, purgatives, and laxatives, Antidiarrhoeals, Emetics, Antiemetics, Anti-spasmodics.<br>Hormones and hormone antagonists-hypoglycemic agents, Antithyroid drugs, sex hormones and oral contraceptives, corticosteroids. |
| **Unit V:** Mechanism of action, pharmacological actions of chemotherapeutic agents, disinfectants and antiseptics.<br>**17 Hours** |
| Chemotherapy of microbial disease; Urinary antiseptics, Sulphonamides, Penicillins, Streptomycin, Tetracylines and other antibiotics, Antitubercular agents, Antifungal agents, antiviral drugs, antileprotic drugs.<br>Chemotherapy of protozoal diseases Anthelmintic drugs.<br>Chemotherapy of cancer. Disinfectants and antiseptics. |
| Unit VI: Introduction to CPCSEA Guidelines and animal Toxicology. **8 Hours** |
| Introduction to CPCSEA Guidelines. Principles of Animal toxicology Acute, sub acute and chronic toxicity |

**Suggested Reading**

**1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology,.Churchil Livingstone Elsevier**

**2. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins**

**3. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.**

**4. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata McGraw-Hill**

**5. Goodman and Gilman's, The Pharmacological Basis of Therapeutics.**

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|---|---|---|---|---|
| **Name of The Course** | Pharmaceutical Jurisprudence | | | |
| **Course Code** | DPHT2004 | | | |
| **Prerequisite** | | | | |
| **Co-requisite** | | | | |
| **Anti-requisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 2 | 0 | 0 | 2 |

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand about Origin and nature of pharmaceutical legislation in India. |
| **CO2** | Understand the Principles and significance of professional Ethics. |
| **CO3** | Understand about the different provisions under Pharmacy Act, 1948. |
| **CO4** | Understand about the different provisions under Drugs and Cosmetics Act, 1940 |
| **CO5** | Understand about the different provisions under The Drugs and Magic Remedies (objectionable Advertisement) Act, 1954 |
| **CO6** | The students will be able to understand about Telepharmacy and epidemiological studies. |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Sessional Exam () | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

**Course Content:**

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|---|
| **Unit I: Origin and nature of pharmaceutical legislation in India 10 Hours** |
| Origin and nature of pharmaceutical legislation in India, its scope and objectives, Evolution of the concept of pharmacy, Health care system, Latest Drugs (price control) order in force,<br>Medicinal and Toilet preparations (excise Duties) Act, 1955 (as amended to date). |
| **Unit II: Principles and significance of professional** |

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|---|
| **Ethics.**<br>**10 Hours** |
| Principles and significance of professional Ethics. Critical study of the code of pharmaceutical Ethics drafted by pharmacy council of India, Medical Termination of Pregnancy Act, 1971(as amended to date).<br>General study of the schedules with special reference to schedules C,C1,F,G,J,H,P and X and salient features of labeling and storage conditions of drugs. |
| **Unit III: Pharmacy Act,1948**<br>**10 Hours** |
| Pharmacy Act,1948-The General study of the pharmacy Act with special reference to Education<br>Regulations ,Working of state and central councils, constitution of these councils and functions,<br>Registration procedures under the Act ,Poisons Act 1919(as amended to date) |
| **Unit IV** : The Drugs and Cosmetics Act,1940 **10 Hours** |
| The Drugs and Cosmetics Act,1940-General study of the Drugs and cosmetics Act and the Rules there under ,Definitions and salient features related to retail and whole sale distribution of drugs, The powers of Inspectors, the sampling procedures and the procedure and formalities in obtaining licenses under the rule, |

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|---|---|---|---|---|
| **Name of The Course** | Drug Store & Business Management | | | |
| **Course Code** | DPHT2005 | | | |
| **Prerequisite** | | | | |
| **Co-requisite** | | | | |
| **Anti-requisite** | | | | |
| | **L** | **T** | **P** | **C** |
| | 4 | 0 | 0 | 3 |

**Course Objectives**

**1.** Students will be exposed to Trade, Industry and commerce, Importance of purchasing, tenders, contracts,

**2.** Students will be exposed to Inventory management and its techniques, Sales promotion, market research.

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| Facilities to be provided for running a pharmacy effectively. |
| |
| **Unit V: The Drugs and Magic Remedies (objectionable Advertisement)Act, 1954**<br>**10 Hours** |
| The Drugs and Magic Remedies (objectionable Advertisement)Act, 1954-General study of the Act, objectives , special reference to be laid on Advertisements, magic remedies and objections1 and permitted advertisements -diseases which cannot be claimed to be cured.<br><br>Narcotic Drugs and psychotropic substances Act, 1985-A brief study of the act with special reference to its objectives, offences and punishment. |
| Unit VI : 5 **Hours** |
| Introduction: Recent laws in Pharmaceutical Sciences. |
| References: **Remington – "The science and practice of pharmacy" Vol. I & II. Mack Publishing Co., Pennsylvania.** Pharmacopoeia of India, The Controller of Publications, Delhi. |

**3.** Students will be exposed to advertising, accounting concepts.

**4** Students will be exposed to double entry book keeping, accounts, cash book, budgeting.

**Course Outcomes**

| | |
|---|---|
| **CO1** | **Student will be able to understand about Trade, Industry and commerce** |
| **CO2** | **Student will be able to understand about Importance of purchasing, tenders, contracts.** . |
| **CO3** | **Student will be able to understand about Inventory management and its techniques.** |
| **CO4** | **Student will be able to understand about Sales promotion, market research, advertising** |

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|---|---|
| **CO5** | T<br>**Student will be able to understand about Accounting concepts, double entry book keeping, accounts, cash book, budgeting.** |
| **CO6** | **Students will be exposed to modern techniques of double entry book keeping, accounts, cash book, budgeting.** |

**Continuous Assessment Pattern**

| Internal Assessment (IA) | Sessional Exam () | End Term Exam (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

**Course Content:**

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|---|
| **Unit I:** Introduction **10 Hours** |
| Trade, Industry and commerce, Functions and subdivision of commerce, Introduction to Elements for Economics and Management. Forms of Business Organizations. Channels of Distribution methods, hormonal contraceptives, population problem of India |
| **Unit II: Drug House Management** **15 Hours** |
| Selection of site, space Lay-out and legal requirements. Importance and objectives of purchasing, selection of suppliers, credit information, tenders, contracts and price determination and legal requirements. Codification, handling of drug stores and other hospital supplies. . |
| **Unit III: Inventory management 20 Hours** |
| Inventory Control-objects and importance, modern techniques like ABC,VED analysis, the lead time, inventory carrying cost, safety stock, minimum and maximum stock levels, economic order quantity, scrap and surplus disposal |
| **Unit IV** : Sales promotion, Recruitment, training, Banking and Finance- **20 Hours** |
| Sales promotion, - Market Research, Salesmanship, qualities of a salesman, Advertising and Window Display.<br><br>Recruitment, training, evaluation and compensation of the pharmacist.<br><br>Banking and Finance-Service and functions of bank, Finance planning and sources of finance |
| **Unit V: Accountancy 20 Hours** |
| Introduction to the accounting concepts and conventions. Double entry Book Keeping, Different kinds of accounts. Cash Book. General Ledger and Trial Balance.<br>Profit and Loss Account and Balance Sheet. Simple techniques of analyzing financial statements. Introduction to Budgeting |
| Unit VI : 8 **Hours** |
| Introduction to the accounting concepts and conventions. Double entry Book Keeping, Different kinds of accounts. Cash Book. General Ledger and Trial Balance.<br>Profit and Loss Account and Balance Sheet. Simple techniques of analyzing financial statements. Introduction to Budgeting |
| References<br>1. S.N. Maheshwari and Mittal "Financial accounting & corporate accounting" Vikas Publishers, Publishers, Delhi.<br><br>2.Khan& Jain, "Financial accounting & corporate accounting" Vikas Publishers, Publishers, Delhi. |

**Suggested Reading**

**1.S.N. Maheshwari and Mittal "Financial accounting & corporate accounting" Vikas Publishers, Publishers, Delhi.**

**2.Khan & Jain, "Financial accounting & corporate accounting" Vikas Publishers, Publishers, Delhi.**

**3.Francis chernaulim " Trade documentation" , Excel Publishers, delhi**

**4.Lachman L,Liberman H.A and Kanig J.L., "Theory and Practice of Industrial Pharmacy", Lea and Febiger.**

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|---|---|---|---|---|---|
| **Name of The Course** | Hospital and Clinical Pharmacy | | | | |
| **Course Code** | DPHT2006 | | | | |
| **Prerequisite** | | | | | |
| **Co-requisite** | | | | | |
| **Anti-requisite** | | | | | |
| | **L** | **T** | **P** | **C** | |
| | 0 | 0 | 4 | 2 | |

**Course Objectives**

**1. To apply knowledge in basic Clinical Laboratory Practice**

**2. To get knowledge of laboratory setup and organization**

**3. To follow the laboratory ethics and giving accurate results.**

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand about the functions and objectives of hospital system and drug distribution system. |
| **CO2** | Understand about the pharmacy therapeutic committee, Hospital formulary system and manufacturing of sterile, non-sterile formulations |
| **CO3** | Understand about the drug information service, surgical dressing and applications of computers. |
| **CO4** | Understand about the modern dispensing aspects and common daily terminology used in practice of medicines |
| **CO5** | Understand about the drug interactions, adverse drug reactions, drugs in clinical toxicity, drug dependences and bioavailability of drugs. |
| **CO6** | Understand about essential drugs and its concept, Fixed Dose Drug combination (FDDC) and its concept,rational Drug Therapy Role of community pharmacist. |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Exam (MTE)** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| | 20 | 80 | 100 |

**Course Content:**

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|---|
| **Unit I: Hospital Pharmacy & Drug Distribution system in Hospitals. 17 Hours** |
| Hospital-Definition, Function, classifications based on various criteria, organization, Management and health delivery system in India. Hospital Pharmacy: Definition Functions and objectives of Hospital pharmaceutical services. Location, Layout, Flow chart of materials and men. Personnel and facilities requirements including equipments based on individual and basic needs. Requirements and abilities required for Hospital pharmacists.<br>Drug Distribution system in Hospitals. Out-patient service, In-patient services- types of services detailed discussion of unit Dose system, Floor ward stock system, satellite pharmacy services, central sterile services, Bed side pharmacy. |
| **Unit II: Sterile manufacture & P.T.C. (Pharmacy Therapeutic Committee)**<br>**17 Hours** |
| Manufacturing: Economical considerations, estimation of demand.<br>Sterile manufacture-Large and small volume parenterals, facilities, requirements, layout production planning, man-power requirements.Non-sterile manufacture-Liquid orals, externals, Bulk concentrates. Procurement of stores and testing of raw materials. Nomenclature and uses of surgical instruments and Hospital Equipments and health accessories.<br>P.T.C. (Pharmacy Therapeutic Committee) Hospital Formulary system and their organization, functioning, composition.<br>Drug Information service and Drug Information Bulletin. |
| **Unit III: Surgical dressing &Application of computers**<br>**14 Hours** |
| Understand about the drug information service, surgical dressing and applications of computers. |
| **Unit IV: Clinical pharmacy practice 11 Hours** |
| Introduction to Clinical pharmacy practice- Definition, scope.<br>Modern dispensing aspects- Pharmacists and patient counseling and advice for the use of common drugs, medication history.<br>Common daily terminology used in the practice of Medicine.<br>Disease, manifestation and Patho-physiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardio-vascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension. |
| **Unit V: Physiological parameters with their significance**<br>**16 Hours** |

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| Drug Interactions: Definition and introduction. Mechanism of Drug Interaction. Drug-drug interaction with reference to analgesics, diuretics, cardiovascular drugs, Gastro-intestinal agents. Vitamins and Hypoglycemic agents. Drug-food interaction.<br>Adverse Drug Reaction: Definition and significance. Drug-Induced diseases and Teratogenicity.<br>Drugs in Clinical Toxicity- Introduction, general treatment of poisoning, systemic antidotes, Treatment of insecticide poisoning, heavy metal poison, Narcotic drugs, Barbiturate, Organo-phosphorus poisons.<br>Drug dependences, drug abuse, addictive drugs and their treatment, complications.<br>Bio-availability of drugs, including factors affecting it. |
| **Unit XI:Essential Drugs and its rational uses.** **08 Hours** |
| Introduction to Essential Drugs and its concept. Introduction to Fixed Dose Drug combination (FDDC) and its concept.<br>Rational Drug Therapy Role of community pharmacist. |

**Suggested Reading:**

**1. Merchant S.H. and Dr. J.S.Quadry. A textbook of hospital pharmacy, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.**

**2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. A textbook of Clinical Pharmacy Practice-essential concepts and skills, 1st ed. Chennai: Orient Longman Private Limited; 2004.**

**3. Tipnis Bajaj. Hospital Pharmacy, 1st ed. Maharashtra: Career Publications; 2008.**

**4. Scott LT. Basic skills in interpreting laboratory data, 4thed. American Society of Health System Pharmacists Inc; 2009.**

**5. Parmar N.S. Health Education and Community Pharmacy, 18th ed. India: CBS Publishers & Distributers; 2008.**

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|---|---|---|---|---|---|
| **Name of The Course** | Medical Sales Representative | | | | |
| **Course Code** | DPHT2007 | | | | |
| **Prerequisite** | | | | | |
| **Co-requisite** | | | | | |
| **Anti-requisite** | | | | | |
| | **L** | **T** | **P** | **C** | |
| | 3 | 0 | 0 | 3 | |

**Course Objectives**

**1. To apply knowledge in basic English grammer.**

**2. To get knowledge of marketing research and healthcare ecosystem.**

**3. To get knowledge to maintain the coordination in market place.**

**Course Outcomes**

| | |
|---|---|
| **CO1** | Apply the knowledge of basic english grammar and basic of communication for English Speaking and Personality Development. |
| **CO2** | Apply Public speaking english for everday communication to sell and promote medical products, pharmaceutical products and deliver presentations to doctors. |
| **CO3** | Apply the marketing and Healthcare Ecosystem knowledge to Perform the occupations effectively as per company's standard guidelines as well as know the MCI Code of Conduct guidelines for MSR and UCP-MP Act. |
| **CO4** | Apply knowledge to ensure ensure smooth coordination among distribution system, marketing research, scientific data publication, and to establish establish contact with maximum people within and outside the company to gather inputs on arranging the conference. |
| **CO5** | Analyze the therapeutic drug classes and categories to prepare a suitable drug formulary and conduct orientation on pharmaceutical advancements. |
| **CO6** | Apply the knowledge of Employability and Entrepreneurship. |

**Continuous Assessment Pattern**

| **Internal Assessment (IA)** | **Sessional Exam ()** | **End Term Exam (ETE)** | **Total Marks** |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

**Course Content:**

**Unit I:** English Speaking and Personality Development. Basics of communication and Personality Development.
**15 Hours**

English Speaking and Personality Development
Basics of communication
- Introduction to communication
- Building Vocabulary.
- Sentence construction.
Basic English Grammar
- Noun, pronoun, Adjective, Verb, Tenses,
- Preposition, Articles, Conjunction, Punctuation.
- Grammar usage in sentences. Personality Development.
- Manners & Etiquettes.
- Building confidence and Personality developing presentation skills.
- Dress code and color pattern.
Interview skills
Resume writing.
- Interview question and answers.
- Mock sessions.
Core skills and professional skills related to gathering information about product and competitor
To effectively gather information about the product and competitors know the required skill set and learn application of related Core Skills and Professional Skills like Reading, writing, listening and speaking, Critical thinking, problem solving, decision making, customer centricity, plan and organizing, Analytical thinking
Pharmaceutical marketing
To develop strategies to increase opportunities to meet and connect with contacts in the medical and healthcare sector; understand Role of Marketing across Product lifecycle; gain knowledge about trends in Pharmaceutical Marketing and implications of changing marketplace on promotional activities in Pharma and gain knowledge about Patient-Physician relationship and Physician-MSR relationship.

**Unit II: Public speaking skills and Orientation with presales activities** **15 Hours**

Public speaking skills
- Extempore and Group discussion.
- Email drafting, Business correspondence.
- Avoiding spelling mistakes and mispronunciations. Letter writing practice.
Speaking English for the real world
- Everyday communication - Introduction, Shopping Meeting friends, Traveling, Visiting a doctor Telephonic communication, Negotiation, At the movie Theatre, at the office, Meeting relatives etc. Orientation with presales activities
To sell and promote medical products and services and to arrange appointments with medical professionals gain orientation with Pre-Sales Activity in reference to Communication strategies for products
To• deliver presentations to doctors, pharmacists and other potential customers , learn basics of effective business communication and learn how to conduct effective business meetings
Sales in life sciences
To sell and promote medical and pharmaceutical products and

services learn basics of Selling Process.
To develop strategies to increase opportunities to meet and connect with contacts in the medical and healthcare sector understand different Sales Approaches in Pharma
To engage the potential customers using various methods, tolls and approaches to convince him/her to prescribe your products learn how to effectively handle Objections, basics of Emotional Quotient (EQ)

**Unit III:**
Orientation to reach sales and collection and Understand Role of MSR and code of conduct guidelines for MSR.

**15 Hours**

Maintain knowledge of key persons at hospitals, pharmacies and dealers, gain knowledge about the Overview of Healthcare Ecosystem including relevant Govt. Scheme, social security benefits, ESI, CGHS and Overview about Life Sciences Industry in Indian and Global Context which would enable him/her
• Stay informed about health and other relevant standards and the possible company's tie up with various regulatory bodies and authorities, know basic knowledge about Regulatory Authorities and Government Policies, rules and Regulations (CDSCO/NPPA/ MRTP Act) and their impact on business dynamics, relevant to Life Sciences Industry
Perform the occupations effectively as per company's standard guidelines; gain orientation with Existing Organisation in Life Sciences Industry (in context of Large/Medium/ Small Enterprises): Their Organization Structure, Benefits and typical sales function in a Life Sciences organization and understand the Role of a MSR and required skills and knowledge (As per Qualification Pack) and its Career Path as well as know the MCI Code of Conduct guidelines for MSR and UCP-MP Act .

**Unit IV**:

Distribution system of pharmaceutical products and Organizing medical conferences and promotional events

**15 Hours**

Distribution system of pharmaceutical products.Maintain knowledge of key persons at hospitals, pharmacies and dealers and to ensure smooth coordination with product distribution related stakeholders; gain the understanding of Distribution System of Pharmaceutical Products and role of various stakeholders involved like CFA, Distributor, Stockist, and Liasoning Agents. Market research and Analysis and RCPA
Monitor competitor's products and selling and promotional activities and gather current market information on pricing, new products, delivery schedules, promoting techniques, etc, know the techniques of Market Research
• Conduct the retail chemist prescription audit effectively and to identify needs of potential customers by going through the prescriptions given by the doctors in the defined geography to their patients, know how to conduct and analyse retail call audits and how to use IT to Capture Market information and also gain the orientation with Physician and Pharmacist needs and working environment
Understanding of human body: Anatomy and physiology
Understand technical/ scientific data presentations and briefings about product and market, know the basics of general Anatomy and general Physiology, and learn various systems of the Human body in tandem with physiology of that organ and system as whole and Familiarise with medical specialities and their common diseases
Basic of pharmacology
Understand technical/ scientific data presentations and briefings and to understand and interpret clinical data supplied by company, learn fundamentals of pharmacology; understand related terms and their significance and understand basics of Drug metabolism
Overview of drug administration
Understand technical/ scientific data presentations and briefings and to understand and interpret clinical data supplied by company, know what is drug administration, How drug is transported within the Human Body, Mechanism of drug absorption mechanism in the Human body and know Methods of drug administration and various routes of drug administration .
To establish contact with maximum people within and outside the company to gather inputs on arranging the conference/ promotional event (CMEs) learn techniques for Collaborating with Other Groups and Divisions, understand the importance of collaboration for MSR
To• gain and spread knowledge from the event related to business/ brand/ company learn how to Identify Partnering Opportunities during meetings/ seminars
To• manage arrangements within the approved budget learn how to achieve Resource Optimisation at work
To• cover all important aspects related to the topic of the conference in the agenda/ theme of promotional event and to plan and complete all logistical arrangements to execution learn the application of Planning & Organizing Skills at work and learn how to effectively use Information Technology in organising conferences and events (CMEs).

**Unit V:** Therapeutics drug classes and catagories and Core skill professional skills related to organizing medical conferences and promotional events.

**15Hours**

Therapeutics drug classes and catagories
Understand technical/ scientific data presentations and briefings, know about the Therapeutic Drug Classes & Categories and their use in understanding the Product
Drug formularies ad their relevance for MSR
Understand technical/ scientific data presentations and briefings and to deliver convincing presentations to doctors, pharmacists and other potential customers gain knowledge about Drug Formularies and their relevance for MSR

Orientation on pharmacovigilance
Follow company's legal guidelines and pharmacovigilance process, know that what comprise the field of pharmacovigilance and its related fields, understand its relevance & potential for MSR's role, know common terms used and their reference, understand the scope of Pharmacovigilance as a system, know about National & International pharmacovigilance regulatory

Authorities and learn basic processing of a typical pharmacovigilance case" through case studies.
Orientation of disease management
Understand technical/ scientific data presentations and briefings about product and market and to monitor the activities of health services in a specific area, learn the concept of disease management & Its Importance, know about process & factors influencing the disease management processes at gross level, gain knowledge for Disease management for common diseases and various projects being run Nationally and internationally
Organization policy and internal processes at work
Follow the company's guidelines, process and standard gain the orientation with generic Organizational Policy & various internal Process relevant for MSR

Organize Medical Conferences and promotional events (CMEs), by applying Core Skills and Professional Skills like Reading, writing, listening, speaking Analytical thinking, problem solving, decision making, customer centricity.

Information technology skills
Compile and analyse the reports and deliver presentations using Basic Computer operating Skills like Ms Office (Word, Excel, Power point and Outlook); know to work on Internet i.e. searching information on search engine, mail writing
To• communicate on email learn how to write mails
To• analyse the reports and deliver presentations how to compile office presentations, How to make the online sales reporting and facilitate the online product surveys

**Unit VI:** Employability and Entrepreneurship

**Hours:8**

Introduction, Types of Business Activities, Values of an Entrepreneur, Attitude of an Entrepreneur, Coming up with a Business Idea, Understanding the Market, Business Planning

**Suggested Reading**

1. **Mastering the Complex Sale Second Edition by Jeff Thull.**
2. **How to Master the Art of Selling by Tommy Hopkins.**
3. **How to Win Friends and Influence People by Dale Carnegie.**
4. **Secrets of Closing the Sale by Zig Ziglar.**

| | |
|---|---|
| Name of The Course | PHARMACEUTICS-II Practical |
| Course Code | DPHT2051 |
| Prerequisite | |
| Corequisite | |
| Antirequisite | |

| | L | T | P | C |
|---|---|---|---|---|
| | 0 | 0 | 4 | 2 |

List of Experiments

1 Preparation and evaluation of topical emuslion.

2 Preparation and evaluation of topical suspension.

3 Preparation and evaluation of oinltments.

4 Preparation and evaluation of sampoo.

5 Preparation of syrup solution Indian Pharmacopoiea.

6 Preparation of suppositories formulation.

7 Preparation and evaluation of topical emuslion.

8 Preparation of liniments.

9 Preparation of ear drop.

10 Preparation of eye drops solution.

11 Preparation of effervasent power.

12 Preparation of paste.

13 Preparation and mouth wash.

14 Preparation nasal drop.

15 Incompatible prescriptions and chiled dose calculation

Continuous Assessment Pattern

| Internal Assessment (IA) | Sessional Test | End Term Test (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

| Name of The Course | PHARMACEUTICAL CHEMISTRY-II Practical | | | |
|---|---|---|---|---|
| Course Code | DPHT2052 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | 0 | 0 | 4 | 2 |

List of Experiments:

1. Solubility determination of Paracetamol
2. Solubility determination of Aspirin
3. Melting point determination of hippuric acid
4. Melting point determination of Metronidazole
5. Boiling point determination of organic compound
6. Detection of elements
7. Functional groups determination
8. To detect the presence of functional groups in the given sample
9. Identification tests of barbiturates
10. Identification tests of sulfonamides,
11. Identification tests of Phenothiazine's
12. Identification tests of Antibiotics like Erythromycin, Tetracycline, Cephalexin etc.
13. To prepare and submit aspirin from salicylic acid
14. To prepare and submit picric acid from phenol.

Continuous Assessment Pattern

| Internal Assessment (IA) | Sessional Test | End Term Test (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

| Name of The Course | Pharmacology and Toxicology Practical | | | |
|---|---|---|---|---|
| Course Code | DPHT2053 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | 0 | 0 | 2 | 1 |

List of Experiments:

1. Effect of K+, Ca++, acetylcholine and adrenaline on frog's heart.
2. Effect of Ca++ on frog's heart.

Effect of adrenaline on frog's heart.
Effect of acetylcholine on frog's heart.
Effect of acetylcholine on rectus abdominis muscle of Frog and guinea pig ileum.
Effect on spasmogens and relaxants on rabbits intestine
Effect of local anaesthetics on rabbit cornea.
Effect of miotics on rabbits eye.

Effect of mydriatics on rabbits eye.

To study the action of strychnine on frog.

Effect of digitalis on frog's heart.

Effect of hypnotics in mice.

Effect of convulsants and anticonvulsant in mice or rats.

Test for pyrogen.

Taming and hypnosis potentiating effect of chlorpromazine in mice/rats.

Effect of diphenhydramine in experimentally produced asthma in guinea pigs.

Continuous Assessment Pattern

| Internal Assessment (IA) | Sessional Test | End Term Test (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

| Name of The Course | Hospital and Clinical Pharmacy Practical | | | |
|---|---|---|---|---|
| Course Code | DPHT2054 | | | |
| Prerequisite | | | | |
| Corequisite | | | | |
| Antirequisite | | | | |
| | L | T | P | C |
| | 0 | 0 | 2 | 1 |

List of Experiments:

1. Categorization and storage of Pharmaceutical products based on legal requirements of labeling and storag
2. Project report on visit to the nearby Community for Counseling on the rational use of drugs and aspects of health care.
3. Prescription handling and identification of drug interactions, incompatibilities.
4. "Health screening services and study of equipments for:-Blood glucose determination (Glucometer Health screening services and study of equipments for Blood pressure (BP apparatus)
5. Health screening services and study of equipments for Lung function test (Peak flow meter)
6. Design of community pharmacy to incorporate all pharmaceutical care services (as per schedule N).
7. Study of OTC medications List & Available brands
8. Interpretation of various pathological report of blood.
9. Interpretation of various pathological report of urine.

Continuous Assessment Pattern

| Internal Assessment (IA) | Sessional Test | End Term Test (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |

| Name of The Course | Medical Sales Representative |
|---|---|
| Course Code | DPHT2055 |

| | | | | | |
|---|---|---|---|---|---|
| Prerequisite | | | | | |
| Corequisite | | | | | |
| Antirequisite | | | | | |
| | | L | T | P | C |
| | | 0 | 0 | 2 | 1 |

List of Experiments:

1. Deliver presentations to doctors, pharmacists and other potential customers.
2. Introduction to develop strategies to increase opportunities to meet and connect with contacts in the medical and healthcare sector.
3. Organizing medical conferences and promotional events.
4. Core skill professional skills related to organizing medical conferences and promotional events
5. Introduction to MCI Code of Conduct guidelines for MSR and UCP-MP Act.
6. Introduction to analyse the reports and deliver presentations.
7. Introduction to Organization Structure, Benefits and typical sales function in a Life Sciences organization.
8. Role of various stakeholders involved like CFA, Distributor, Stockist, and Liasoning Agent.
9. Introduction to products and selling and promotional activities.
10. Introduction to various systems of the Human body in tandem with physiology of that organ and system.
11. Introduction to scientific data presentations and briefings.
12. Introduction to hospitals, pharmacies and dealers.
13. Introduction to Therapeutics drug classes and catagories.
14. Role of various stakeholders involved like CFA, Distributor, Stockist, and Liasoning Agents.

Introduction to scientific data presentations and briefings.

Continuous

Assessment Pattern

| Internal Assessment (IA) | Sessional Test | End Term Test (ETE) | Total Marks |
|---|---|---|---|
| 0 | 20 | 80 | 100 |