Ph.D. ADMISSION TEST 2019 - FACULTY OF PHARMACY
[Full Time and Part Time]

Candidates seeking admission into Ph.D. programme in Pharmacy are required to appear for an Entrance examination which comprises of a written tests and Interview.

The written test consists of two papers. Paper 1 is based on Research Methodology for 70 marks and is of Essay type, 2 hours duration. Paper 2 is based on specialization in pharmacy and is of multiple choice questions and is for 2 hours duration and carries 70 marks.

The Interview is for 60 Marks.

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SYLLABUS FOR Ph.D. ADMISSION TEST- 2019
(FULL TIME / PART TIME)

Paper 1: Research Methodology [Marks 70]

Unit I: Introduction
Meaning and objectives of research, motivation and dedication in research, criteria of good research, ethics in research, plagiarism, scientific integrity, selecting a topic, importance of planning, planning experimentation, field work and accessing advanced facilities. Ethics concerning studies on animals and human volunteers, CPCSEA, ICMR and CDSCO guidelines on ethics in research.

Unit II: Types of Research
Descriptive studies: Case report; *Analytical studies*: Ecology study, cross-sectional study, case-control study, cohort study. *Experimental studies:* Interventional trial studies: Randomized Control Studies, Uncontrolled trial studies; Qualitative study design: Case study, observations, in-depth interview.
Sampling and Randomization, Size of sample, Bias, Single Blind Design, Double blind design, Open Design, Completely Randomised Design, Randomised Block Design and Latin Square Design.

Unit III: Literature review
Journals: Standard journals in Pharmaceutical Sciences, Impact factor, Citations, web based journals, writing a research paper, popular websites for scientific literature, choosing a journal for sending research publications, styles of writing references. Search Engines like Google Scholar and Science Direct.
Patents: Importance of patenting, Steps in patenting process, accessing patent literature.

Unit IV: **Testing of hypothesis**
Theory, calculation and applications of t-test, z-test, Chi square test, one way ANOVA, two way ANOVA and three way ANOVA, Duncan's test and Tukey's test.

Unit V: Preparation of Thesis
Structure of thesis, background of the work, importance of language, grammar, scientific and systematic way of presentation, statistical analysis, use of graphical representation, proper preparation of graphs and tables, discussion, comparison with previous work, interpretation of *in vitro* and *in vivo* results, summary and conclusion.

Paper 2: Pharmacy (Question paper based on specializations)

[Marks 70]

PHARMACEUTICS

1. (a) Professional Pharmacy: Professional Pharmacy, Pharmaceutical jurisprudence including Drugs and Cosmetics Act 1940 and rules 1945. Pharmacy Act 1948, Code of Pharmaceutical ethics. Prescription: definition, various parts of prescription and their functions, handling of prescription, sources of errors, care required in dispensing procedures including labeling of dispensed products, preliminary knowledge of important Latin terms used in the prescriptions and their translation in to English. Posology: Definition, Factors affecting dose selection. Calculation of children and infant doses. Drug regulatory agencies. Concepts on ICH, WHO, FDA, TGA, ISO, GMP, SOP, QBD, Patents etc.

(b) Physical Pharmaceutics: States of mater, Physical properties of drug molecules, pH, buffers and isotonic solution, solubility phenomena, surface tension, interfacial phenomenon, Kinetics, Rheology, Micromeretics & powder flow, Diffusion and dissolution, Colloids, Complexation and protein binding

2. Pharmaceutical Technology: Principles, Formulation, Ingredients, method of manufacture, evaluation, quality control tests, labeling and packaging of following class of product:
Solid dosage forms- Tablets, coating, capsules, microcapsules, powders, granules etc.
Liquid dosage forms- solutions, suspensions, emulsions,
Semisolid dosage forms- ointment, creams, gels, suppositories,
Parenterals- injections small volume, large volume, ophthalmic preparations and
Pre-formulation studies, Stability studies and Pharmacopoeal specifications for various formulations.
Formulation of cosmetics preparation like lipstick, shampoo, creams, nail preparations and dentifrices, powers etc.

3. Biopharmaceutics and Pharmacokinetics and their importance in formulation.
Introduction to biopharmaceutics: Drug absorption, distribution, metabolism and elimination. Compartment model- Definition and Scope. Pharmacokinetics of drug absorption - Zero order and first order absorption rate constant. Determination of pharmacokinetic parameters.
Bioavailability and bioequivalence: Measures of bioavailability, Cmax, tmax, K_{el} and Area Under the Curve (AUC); Review of regulatory requirements for conducting bioequivalent studies. Biopharmaceutical Classification System (BCS) of drugs.

PHARMACEUTICAL CHEMISTRY

1. Pharmaceutical Organic Chemistry: Structure, nomenclature and Stereochemistry of drug molecules.

2. Medicinal Chemistry: Structure, nomenclature, classification, synthesis, SAR and metabolism of the following category of drugs- Hypnotics and sedatives, analgesics, NSAIDs, neuroleptics, antidepressants, anxiolytics, anticonvulsants, antihistaminics, local anaesthetics, cardio vascular drugs, Antianginal agents vasodilators, adrenergic & cholinergic drugs, cardiotonic agents, diuretics, antihypertensive drugs, hypoglycemic agents, antilipedmic agents, coagulants, anticoagulants, antiplatelet agents, Chemotherapeutic agents, Antibiotics, antibacterials, sulphadrugs. Antiproliozoal drugs, antiviral, antitubercular, antimalarial, anticancer, antiamoebic drugs.

3. Biochemistry: Biochemical role of hormones, vitamins, enzymes, nucleic acids, bioenergetics. General principles of immunology. Immunological. Metabolism of carbohydrate, lipids, proteins. Methods to determine, kidney & liver function. Lipid profiles.

PHARMACEUTICAL ANALYSIS

1.**Chromatographic methods of pharmaceutical analysis:** Principles of separation, theory, instrumentation and applications of Column chromatography, Paper chromatography, Ion Exchange chromatography, TLC and HPTLC, HPLC, Gas chromatography

2.**Instrumental methods of pharmaceutical analysis:**
Theoretical aspects, instrumentation, elements of interpretation of spectra, and applications of Ultraviolet and Visible spectrophotometry, Spectrofluorimetry, Infrared spectrophotometry, Nuclear Magnetic Resonance spectroscopy, Mass Spectrometry, Flame Photometry, Atomic Absorption Spectroscopy, X-ray Diffraction Analysis, Thermal methods (TGA, DSC, DTA)

3. **Quality assurance:** GLP, ISO 9000, TQM, Validation, quality audit, quality of equipment, validation of equipment and validation of analytical procedures.

PHARMACOGNOSY AND PHYTOCHEMISTRY

1. Systematic pharmacognostic study of the followings: Carbohydrates and derived products: Agar, guar gum, acacia, Honey, Isabagol, pectin and Tragacanth. Lipids: Bees wax, Castor oil, Codliver oil, Shark liver oil and Wool fat. Resins: Colophony, podophyllum, jalap, cannabis, capsicum, myrrh, asafoetida, balsam of Tolu, balsam of Peru, benzoin, turmeric, ginger. Volatile oils: Mentha, Coriander, Cinnamon, Cassia, Lemon peel, Orange peel, Lemon grass, Citronella, Caraway, Dill, Clove, Fennel, Nutmeg, Eucalyptus, Chenopodium, Cardamom, Sandal wood.

2. Study of the biological sources, cultivation, collection, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests of following groups of drugs.- Cardioactive glycosides: Digitalis, squill, strophanthus and thevetia, Anthraquinones: Aloe, senna, rhubarb and cascara, Alkaloid containing drugs: Pyridine-piperidine: Tobacco, areca and lobelia. Tropane: Belladonna, hyoscyamus, datura, duboisia, coca and withania. Quinoline and Isoquinoline: Cinchona, ipecac, opium. Indole: Vinca alkaloids, Ergot, rauwolfia, catharanthus, nux-vomica and physostigma. Steroidal: kurchi. Purines: Coffee, tea and cola.

3. Selection of plant materials, claims of folklore on traditional systems, Authentication of plant materials by various organizations. Extraction methods of plant materials, isolation techniques of plant constituents, characterization of the isolates by spectroscopy techniques (UV, IR, NMR and Mass). Methods of isolation of volatile oils and their identification & Chemical identification of plant constituents

PHARMACOLOGY

1. (a) Fundamentals of general pharmacology: Dosage forms and routes of administration, mechanism of action, combined effect of drugs, factors modifying drug action, tolerance and dependence; Pharmacogenetics; Principles of Basic and Clinical pharmacokinetics, absorption, Distribution, Metabolism and Excretion of drugs, Adverse Drug Reactions; Bioassay of Drugs and Biological Standardization; Discovery and development of new drugs, Bioavailability and bioequivalence studies.

(b) Pharmacology of Peripheral Nervous System: Neurohumoral transmission (autonomic and somatic), Parasympathomimetics, Parasympatholytics, Sympathomimetics, Adrenergic

receptor and neuron blocking agents, Ganglion stimulants and blocking agents, Neuromuscular blocking Agents, Local anesthetic Agents.

(c) Pharmacology of Central Nervous System: Neurohumoral transmission in the C.N.S., General Anesthetics, Alcohols and disulfiram, Sedatives, Hypnotics, Anti-anxiety agents and Centrally acting muscle relaxants, Psychopharmacological agents (anti-psychotics), anti-maniacs, and hallucinogens, Antidepressants, Anti-epileptics drugs, Anti-Parkinsonism drugs, Analgesics, Antipyretics, Narcotic analgesics and antagonists, C.N.S. stimulants, Drug Addiction and Drug Abuse.

2. (a) Pharmacology of Cardiovascular System: Drugs used in the management of congestive cardiac failure, Antihypertensive drugs, Anti-angina drugs and Vasodilator drugs, including calcium channel blockers and beta adrenergic antagonists, Anti arrhythmic drugs, Anti-hyperlipidemic drugs, drugs used in the therapy of shock.

(b) Drugs acting on urinary system: Fluid and electrolyte balance, Diuretics. Anti-diuretics; Drugs Acting on the Respiratory System: Anti-asthmatic drugs including bronchodilators, Anti-tussives and expectorants, Respiratory stimulants.

(c) Drugs acting on the Gastrointestinal Tract: Antacids, Anti-secretory and Anti-ulcer drugs, Laxatives and anti-diarrhoeal drugs, Appetite Stimulants and Suppressants, Emetics and anti-emetics, Miscellaneous: Carminatives, demulcents, protectives, adsorbents, astringents, digestants, enzymes and mucolytics.

3. (a) Pharmacology of Endocrine System: Hypothalamic and pituitary hormones, Thyroid hormones and anti-thyroid drugs, parathormone, calcitonin and Vitamin D, Insulin, glucagons, incretins, oral hypoglycemic agents and insulin analogs, ACTH and corticosteroids, Androgens and anabolic steroids, Estrogens, progesterone and oral contraceptives, Drugs acting on the uterus.

(b) Chemotherapy: General Principles of Chemotherapy, Bacterial resistance; Sulfonamides and cotrimoxazole, Antibiotics- Penicillins, Cephalosporins, Aminoglycosides, Chloramphenicol, Macrolides, Tetracyclines, Quinolones, fluoroquinolones and Miscellaneous antibiotics; Chemotherapy of tuberculosis, leprosy, fungal diseases, viral diseases, HIV and AIDS.

MODEL QUESTION PAPER FOR Ph.D ADMISSION TEST-2019

PAPER 1: RESEARCH METHODOLOGY [Marks 70]

Answer Any Five Questions [5 X14 = 70 Marks]

1. Discuss on the importance of ethics and planning in research in pharmaceutical sciences.
2. Write notes on any four important journals in the field of Pharmaceutical sciences and discuss the criteria based on which you would choose a journal for sending your work.
3. Explain the theory, applications and analysis of Completely Randomised Design
4. Explain about ANOVA and t test.
5. Explain how presentation of results and discussion of results is to be carried out.
6. Discuss on the applications of statistics in biological screening
7. Write notes on importance of patenting and accessing patent literature.

PAPER 2: PHARMACY

(Question paper based on specialization)

Answer All Questions **70 X1= 70 Marks]**

1) Select the drug, which is not belonging to glycoside class? [ ]

a) Digitalis b) senna c) Nux vomica d) Cascara

2) Drug not belonging to volatile oil class: [ ]

a) Peppermint b) Clove c) Castor oil d) Garlic

3) Drug do not used as anticancer : [ ]

a) Podophyllum b) Curare c) Camptotheca d) Taxus

4) The characteristic not associated with alkaloids: [ ]

a) They all contain nitrogen

b) Most of non-volatile alkaloids are solid

c) All the alkaloid contains sulphur

d) They are physiologically active

5) What happens in a dehydration reaction? [ ]

a) Molecules are broken apart

b) Monomers are bonded together and a water molecule is released

c) Atoms are joined

d) It depends on what molecule it is

6) In what category of organic molecules are sugars placed? [ ]

a) Proteins

b) Lipids

c) Hormones

d) Carbohydrates

7) Which one of the formulation will give higher bioavailability? [ ]

a) Nanosuspensions b) Immediate Release Tablets

c) Immediate Release Capsules d) Solutions

8) Low soluble high permeable drug comes under [ ]

a) BCS Class I b) BCS Class II c) BCS Class III d) BCS Class IV

9) Capping of tablets happens due to [ ]

a) Entrapment of air during compression b) Plastic deformation

c) Faulty compression machine d) All of the above

10) _____ grams of water is required to prepare 2 kg of 10 %w/w solution of sucrose in purified water at 25 °C. [ ]

a) 100 b) 200 c) 300 d) 2000

11) Which of the following visible radiation has the longest wave length? [ ]

a) Violet b) Red c) Orange d) Blue

12) What is the wavelength range of Mid Infra-Red region? [ ]

a) 180-380nm b) 2.5-15µ c) 0.8-2.5µ d) 380-780nm

13) Identify the thermal method based on the changes in energy input of the system [ ]

a) DTA b) DSC c) TGA d) DRS

14) A 15 year old female is brought to the emergency department. She is breathing 30 times per minute, is unable to speak in full sentences, and has a peak expiratory flow rate <50% predicted .The preferred first line therapy for her asthma exacerbation is [ ]

a) Theophylline b) β-agonist c) corticosteroids d) both a and b

15) Which of the following agents are used in prinzmetals angina has spasmolytic action and increases coronary blood flow? [ ]

a) Nitroglycerine b) Diltiazem c) Timolol d) Propranolol