Structure for the Ph.D. entrance examination and Syllabus

Himachal Pradesh Technical University, Hamirpur, Himachal Pradesh

Note: The Question Paper will include 100 questions, 20 from each section. Time duration will be 2 hours.

Syllabus

1. Pharmaceutical Chemistry and Analysis
   a. Basic Fundamentals of Chemistry; Atomic orbitals, Polarity, bonds and terms related to concentration of solution, IUPAC name, Acid base titration, Chromatography.
   b. Introduction of the following: IR, NMR and Mass Spectrometry, Optical Rotatory Dispersion and XRD. Concept of Validation, ISO, BIS, TQM.
   d. Structure Activity relationships, mechanism of action for following class of drugs: Antimicrobial and Antiviral agents, Antimalarial, Anticancer, Analgesics and Anti-inflammatory agents, Antidiabetics, Cardiovascular, antidepressant, anxiolytic, diuretic, antihistaminic, analgesic and antifertility agents.
   e. Basic concepts of drug design with reference to physicochemical parameters related to ligand and receptor design, QSAR basics like Hansch approach.
   f. Basics of stereochemistry including enantiomers, diastereomers, resolution, meso compounds, configuration and its specifications including sequence rule.

2. Pharmaceutics
   a. Properties of matter, Concept of Micromeritics, Rheology, Interfacial Phenomena
   b. Concepts of Disperse systems: Emulsion, Suspension, Colloids
   c. Concepts of Dosage form, Prescription, Posology, Isotonicity and incompatibilities and its rectification methods
   d. Concepts of Tablets, Capsules, Aerosol, Liquid orals, Ophthalmic and Parenteral preparations. Concept of chemical kinetics and Stability,
   e. Different methods of sterilization and evaluation of sterile products, sterility testing of pharmaceutical products e.g. sera, vaccines.

3. Pharmacognosy
   a. Sources and classification of Drugs: Quality control of Crude drugs
b. Basic concept of Extraction and galenicals, Classification, properties and Isolation of Phytoactives, Extraction Procedures for Plants and Herbal material and standardization.


d. Phytochemical Screening, Factors affecting variability of drugs phyto constituent’s constituents. Quality evaluation of the plant drugs on basis of organoleptic, microscopic, physical, chemical and biological methods.

e. Biological Source, cultivation, collection , chemical constituents, uses, macroscopic and microscopic characteristics of Liquorice, Turmeric, Digitalis, Aloe, Senna, Cinchona, Nuxvomica, Solanum, Arjuna, Taxol, Aswagandha, Vinca and Rauwolfia.

f. Basics of Metabolic pathway, biogenesis of Secondary metabolites viz., Glycosides, Alkaloids . Plant tissue culture; History , Types, Nutritional requirements and application

4. Pharmacology


b. Central and Autonomic Nervous system : Neurotransmitters, Parasympathomimetic, Parasympatholytics, Sympathomimetics, Hypnotics, Sedatives, Analyptics, Antidepressant , Antiepileptic, Analgesics and Antipyretics, Anaesthetics,

c. Cardiovascular System: Drugs used in CHF, Antihypertensive, Antihyperlipidemic.

d. Drugs Used in Cancer, Diabetes, Malaria, Leprosy, Tuberculosis, Asthma, Peptic ulcer, Rheumatism, and Viral/Fungal infections.

f. Drugs acting on Haemopoietic and Urinary system: Haematinics, anticoagulants, antiplateletes, diuretics.

5. Research Methodology

a. General Research Methodology: Research, objective, requirements, practical difficulties, review of literature

b. Study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

c. Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests

d. Parametric tests :students “t” test, ANOVA, Correlation coefficient, regression

e. Non-parametric tests: Wilcoxon rank tests, analysis of variance, correlation, chi square test, null hypothesis, P values, degree of freedom, interpretation of P values.
f. Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, CPCSEA guidelines