

Syllabus for the Qualifying Exam for the Ph.D. Programme in Natural Resources

Syllabus for VERT

Section I : Research Methodology

Unit 1: Fundamentals of Research

Aims and objectives of research, Types of research – basic, novel and applied research. Tools for searching research topic – books, journals, internet, discussions etc. Research hypothesis, Steps in research design. Problems encountered by researchers. Review of literature, concept of bibliography and reference, software of literature search, types of report.

Unit 2: Research Aptitude

Qualities of a researcher, Logical reasoning, Test for intelligence, Basic mathematics. Ethics in research – plagiarism Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs: Randomized block, Complete randomized block, Latin square and split plot designs. Sampling Design, Implications of a Sample Design, Criteria of Selecting a Sampling Procedure, Different Types of Sample Designs

Unit 3 : Data Collection, Processing And Analysis:

Types of data, Various methods of data collection- Observation, Schedule and Questionnaires, Survey, Case study, Data sources. Measurement, scaling and surveying techniques. Processing and analysis of data. Determination of the sample size, sampling and non-sampling tests.

Unit 4 : Hypothesis

Introduction to Hypothesis, Procedure for Hypothesis testing, Parametric and nonparametric Hypothesis test, Testing of hypothesis using various tests like Analysis of Variance and Covariance (ANOVA and ANOCOVA), Chi square test, Multivariate analysis.

Unit 5 : Interpretation And Report Writing

Scientific communication- Basics of communication skills, Writing- research reports, research papers, research proposals and review articles. Importance of research proposal and research papers. Methods of research presentations. Communication with editors. Handling referee's comments, Galley proof. Citation & Acknowledgements.

VRET 2018-19

Section II (Subject specific Syllabus: Pharmacy)

(50% shall be based on Subject Specific as mentioned below)

Unit 1: Pharmaceutics :

Classification and manufacturing of conventional dosage forms like solids, semisolids, liquids. Industrial scale manufacturing of tablets and capsules. Need, design, and development of various type of novel drug delivery systems. Principles underlying design of novel drug delivery systems. Prospects and comparison of sustained and controlled release formulations. Biopharmaceutics and Pharmacokinetics of drug/s and importance in formulation design (conventional and novel). Factors affecting bioavailability enhancement of drug/s from oral dosage forms. Pharmacopoeial and noncompendial standards/limits for development of sterile (parenterals and ophthalmics) and non sterile dosage forms, during their life cycle. Pharmaceutical calculations. Drugs and cosmetics Act and rules with respect to manufacture, sales and storage. Pharmacy Act.

Unit 2: Pharmacology :

General pharmacological principles including Toxicology. Drug-drug interaction, drug disease interactions, drug-food interactions. Pharmacology of drugs acting on Central nervous system, Cardiovascular system, Autonomic nervous system, Gastro intestinal system and Respiratory system. Pharmacology of Autacoids, Hormones, Hormone antagonists, Diuretics. Adverse Drug reactions and side effects. Bioassay development methodologies

Unit 3: Pharmaceutical Chemistry:

A detailed study of the following classes with respect to drug nomenclature, classification, physicochemical properties, mode of action [MOA], structure activity relationships [SAR], wherever applicable, synthesis of simple & prototype molecules, drug metabolism, therapeutic uses & side effects. Drug resistance, wherever applicable, should be covered in respective classes of drugs: Antiamoebic agents, Anthelmintic agents, Antibacterial sulpha drugs [only], Quinolone antibacterials, Antimycobacterial drugs, Antifungal agents, Antiviral agents including HIV & anti-HIV drugs, Thyroid & anti thyroid drugs, Antiallergic agents, Antiulcer agents & Proton Pump Inhibitors, Hypoglycemic agents, Antimalarials, Sedative-hypnotics, Antiepileptic agents, Neuroleptics, Anti-anxiety drugs, Diuretics, Antibiotics , Steroids. Corticosteroids [gluco- & mineralocorticoids] & anti-inflammatory steroids. Sex steroids. Male & female contraceptive agents. Anabolic steroids, Anticancer agents, Narcotic analgesics, Morphine & all its structural modifications [peripheral & nuclear]. Narcotic agonists & antagonists. Non-narcotic analgesics [NSAIDS]. Adrenergic drugs. Neurotransmitters & their role. General & specific adrenergic agonists & antagonists [up to alpha-2 & beta-2 only], Cholinergic agents. Muscarinic & nicotinic cholinergic agonists & antagonists, Neuronal [transmission] blockers, Drugs used in neuromuscular disorders. Drugs used in the treatment of Parkinson's disease. Central & peripheral muscle relaxants, Hypertensive, antihypertensive & antianginal agents.

Unit 4: Pharmacognosy:

Introduction to pharmacognosy, Classification of crude drugs, Factor influencing quality of crude Drugs, Evaluation, Quality control and standardization of crude drugs, Carbohydrate containing drugs, Glycoside containing drugs, Tannins containing Drugs, Volatile oil containing drugs, Resins containing drugs, Alkaloid containing drugs, Protein and enzyme containing crude

drugs herbal pesticides, Extraction and isolation techniques, Identification and estimation of phytopharmaceuticals, Plant tissue culture, herbal cosmetics, Plant nutraceuticals.

Unit 5: Pharmaceutical Analysis and Biotechnology:

Principles and applications of the following: Absorption spectroscopy (UV, visible & IR). Fluorimetry, Flame photometry, Potentiometry. Conductometry and Polarography. Pharmacopoeial assays. Principles of NMR, ESR, Mass spectroscopy. X-ray diffraction analysis, different modern chromatographic methods, capillary electrophoresis. PCR, ELISA, blotting, DNA Sequencing. Principles and methods of microbiological assays as per Pharmacopoeia. Methods of preparation of Pharmacopoeial sera and vaccines. Serological and diagnostics tests. Applications of microorganisms in Bio Conversions and in Pharmaceutical industry. rDNA technology: Tools, techniques and applications,. Hybridoma technology: Production and applications.