



Ph.D – Pharmaceutical Sciences Entrance Test Syllabus

QUESTION PAPER FORMAT

#	TYPE	MAXIMUM MARKS
I	WRITTEN	
a	PART A – Research Methodology	50 Marks (25 Questions of 2 Marks Each)
b	PART B – Technical Paper	50 Marks (25 Questions of 2 Marks Each)
II	VIVA-VOCE	
c	PART C – Technical Interview	50 Marks

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PART A

EPHM001: RESEARCH METHODOLOGY

(COMMON TO ALL PROGRAMS)

Unit-I (8 hrs)

RESEARCH - MEANING. WHY? WHAT? : Meaning, Objectives and Characteristics of research – Scientific Method Types of research - Descriptive Vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual Vs. Empirical - Research process - Criteria of good research

PROBLEM STATEMENT: Defining the research problem - Selecting the problem - Necessity of defining the problem - Techniques involved in defining the problem;

LITERATURE SURVEY: Importance of literature review in defining a problem - Survey of literature - Primary and secondary sources - web as a source - searching the web - Identifying gap areas from literature review; Development of working hypothesis.

HYPOTHESIS: Definition of hypothesis, Basic concepts , variables-Dependent and independent variables, Development of working hypothesis; deriving objectives of research

Unit- II (12 hrs)

SAMPLE & SAMPLING DESIGN: Sample- Sampling - Types of sampling: Non-probability sampling; Probability sampling; simple random sampling; systematic sampling; stratified sampling; cluster sampling; Sampling and non-sampling errors

RESEARCH DESIGNS: Research design; Need of research design - Basic Principles; Features of good design – Important concepts relating to research design; Different research designs: Exploratory; descriptive & diagnostic studies; Case-control studies; longitudinal studies; cross-sectional studies; cohort studies; hypothesis-testing research studies;

ELEMENTS OF DATA AND STATISTICS

Data – Basics of Analysis – Data Cleaning -Tabulation: Principles of tabulation -Tables – Graphical Representation – statistics in research- Missing values and outliers – Descriptive Statistics: mean, median, mode, range, standard deviation

Unit -III (10 hrs)

REPORT: Structure and components of scientific reports; Types of report; Technical reports and thesis

SCIENTIFIC ARTICLE WRITING:

Title preparation – Importance of title; need for specific titles; List of authors and addresses – order of names; defining the order with example; Abstract writing-Key words; How to write introduction- Rules; exceptions; Materials and methods: Purpose; materials; methods; tables and figures; Result and Discussion writing: content of results; Discussion writing: Components of discussion; factual relationships; strengths and limitations; significance of paper; Summary and conclusions - Stating Acknowledgements: Ingredients of the acknowledgements; courtesy; Citation of the References: Rules; electronics aid; in-text citation; styles of referencing

Unit- IV (10hrs)

RESEARCH ETHICS:

Values, Ethics & Moral; Profession and professionalism; Tenets of Ethics; What is Research Ethics?; Why lecture on Research Ethics? Conducting and reporting of science/engineering; Relationship in research groups; Hazards to good scientific practice; scientific misconduct

INTELLECTUAL PROPERTY RIGHTS: IPRs- Invention and Creativity- Intellectual Property-Importance and Protection of Intellectual Property Rights (IPRs); A brief summary of: Patents, Patent Application Procedure, Copyrights, Trademarks

Unit- V (12 hrs.)

TECHNICAL COMMUNICATION

Importance of effective communication; English language and its importance; Elements of communication cycle - Active listening: Meaning and art of listening; listening and empathy in communication; Why don't we listen (reasons for poor listening); poor listening habits; Qualities of a good listener; Active versus passive listening; Barriers for effective listening; tips for effective listening.

EFFECTIVE SPEAKING

Confidence, clarity and fluency; Manipulating paralinguistic features (Rate, volume, pitch , pause); Barriers to speaking; Public speaking

EFFECTIVE ORAL PRESENTATION STRATEGIES

Planning; Preparation; Tips for creating an impact on audience; Modes of delivery: Extemporaneous; Impromptu; Controlling nervousness and stage fright; Slide preparation

References:

1. **Research Methodology: Methods & Techniques**
C.R. Kothari, 2nd Edition, 2004, New Age International (P) Limited
2. **An introduction to Research Methodology**
Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002., RBSA Publishers.
3. **Doing Science: Design, Analysis and Communication of Science Research**
Valielaivan, Oxford University Press, 2009
4. **Technical Communication Principles and Practice**
Meenakshi Raman, Sangeeta Sharma, 2015, 3rd Edition, Oxford University Press

PART B:

EPMH015: TECHNICAL PAPER.

- UNIT- I.** a) Electro Magnetic Spectrum, Definition, equation and applications of Beer's law, Hook's law & Bragg's Law.
b) Principles of various spectroscopic analytical techniques like UV-Visible I.R, Fluorimetry, Nephelo- Turbidimetry, NMR and Mass Spectroscopy.

UNIT-II.

Principle and applications of various chromatographic techniques like GC, HPLC, HPTLC, Ion Exchange, Size Exclusion and Electrophoresis.

UNIT-III. Introduction to dosage forms: Classification and definitions. Commonly used vehicles, essential adjuvants like stabilizers, colorants and flavorants with relevance to monophasic liquid dosage forms.

a) Suspensions: Definition, classification, advantages and disadvantages, additives used in suspension, stability of suspension.

b) Emulsions: Definition, classification and identification of types of emulsions, additives used in emulsions, mechanism of action of emulsifying agents, stability of emulsions.

UNIT- IV.

a) Powders and granules: Classification, advantages and disadvantages and methods of mixing of powders.

b) Tablets: Types of Tablets, Excipients used in tablets. Sugar coated tablets, film coated tablets, quality control tests.

c) Capsules: Types of Capsules, raw materials for gelatin capsule shell, storage conditions of capsules.

d) Novel drug delivery systems: advantages and disadvantages, concepts, types of drug delivery systems, Applications of microspheres, liposomes, niosomes, nanoparticles

UNIT-V.

a) Pharmacokinetics- The dynamics of drug absorption, distribution, metabolism and elimination.

b) Pharmacodynamics- Molecular mechanisms of drug action (general). Drug toxicity and poisoning.

UNIT- VI.

Scope and relevance of preclinical and clinical trials. Adverse drug reactions (ADRs). Role of pharmacovigilance ability in ADR monitoring. Receptors- Adrenergic, cholinergic, histaminergic and dopaminergic receptors.

UNIT-VII.

Physicochemical properties in relation to biological action- Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein Binding and Bioisosterism.

UNIT-VIII.

- Sulphonamides
- Antitubercular agents
- Antimalarial agents
- Classification of antibiotics .
- Concept of Prodrug

UNIT-IX.

a) Principle and Applications of different extraction & isolation methods viz ., Maceration, Percolation, Soxhlet extraction, microwave extraction, supercritical fluid extraction.

b) Adulteration and evaluation of crude drugs:- Different methods of adulteration: Evaluation of drugs by organoleptic, microscopic, physical, chemical and biological methods.

c) Phytoconstituents: - Definition, classification, and pharmaceutical importance of: alkaloids, glycosides, steroids.

d) Quality control and Standardization of herbal drugs: Significance and determination of Extractive values, Ash values, Heavy metals, Pesticidal residue and microbial load in herbal preparations

UNIT-X.

a) Plant tissue culture: - Growth media, Plant growth regulators, Callus & Suspension cultures, immobilization, hairy root culture. Transgenic plants and their applications, Plant tissue culture as source of secondary metabolites.

b) Enzymes: - Biological sources and uses of: Papain, Bromelain, Urokinase, and streptokinase.

Reference Books:

UNIT- I & II.

1. Instrumental Methods of Analysis Paperback – December 1, 2004 , Willard, Merritt , & Dean. 7th edition.
2. Principles of Instrumental Analysis , Douglas A. Skoog , F. James Holler , Stanley R. Crouch. 6th Edition
3. Morrison and Boyd Organic Chemistry ,8th edition.
4. Organic chemistry. Volume 2: Stereochemistry and the chemistry of natural products, Finar, I. L. 8th edition

UNIT-III & IV.

5. Ansel's Pharmaceutical Dosage Form and Drug Delivery Systems, Loyd V. Allen, Jr. Nicholas G. Popovich, Howard C. Ansel, Lippincott Williams and Walkins, New Delhi. 9th edition
6. Pharmaceutics, The Science & Dosage Form Design M.E. Aulton Churchill Livingstone, Edinburgh Pharmaceutics : the science of dosage form design, 2nd ed, 2002.
7. Remingtons- The Science and Practice of Pharmacy Alfonso R. Gennaro Remington Lippincott Williams, New Delhi. Joseph Price Remington (Author), Alfonso R. Gennaro, 20th ed.

8. Bentley's Text Book of Pharmaceutics E.A. Rawlins, (Old Edition) Paperback – 2010, English Language Book Society, Elsevier Health Sciences, USA
9. Modern Pharmaceutics Gilbert S. Banker & C.T. Rhodes ,5th Edition.

UNIT-V & VI.

10. The Pharmacological Basis of Pharmacotherapeutics, Goodman and Gilman's 12th Edition.
11. "Pharmacology" Elsevier Churchill Livingstone, Rang and Dale's, Eight edition.

UNIT- VII & VIII.

12. Wilson and Giswold's textbook of Organic medicinal and Pharmaceutical Chemistry.- 12th Edition
13. Foye's Principles of Medicinal Chemistry.-7th edition
14. Bentley And Driver*s Textbook Of Pharmaceutical Chemistry Hardcover – 2004, L.M. Atherden.
15. Burger's Medicinal Chemistry, Drug Discovery, and Development: 8 Volume Set , 2010 by Donald J. Abraham , David P. Rotella, seventh edition .

UNIT-IX & X.

16. Pharmacognosy, C.K.Kokate ,51st Edn.
17. Pharmacognosy & Phytochemistry ,S L . Deore & S.S.Khadabadi, 2nd Edn.
18. Pharmacognosy & Phytochemistry, Vinod D. Rangari Vol.-I-3rd Edn. Vol.-II -2nd Edn.
19. Pharmacognosy, Trease & William C Evans, 16th Edn.