NIRMA UNIVERSITY

INSTITUTE OF PHARMACY

SYLLABUS FOR PH.D ENTRANCE EXAMINATION-2020-21

SUBJECT: RESEARCH METHODOLOGY

1. **Fundamentals of Research**
   - Objective & Types of Research
   - Selecting a research problem
   - Methods, Design and Tools used in research
   - Literature Survey, Primary & Secondary Sources of Information
   - Documentation types and techniques

2. **The research Report/Paper writing/thesis writing and Scientific Writing**
   - E-Resources
   - Presentation of Experimental Data
   - Ethics in Research & Publication
   - Plagiarism and software to detect plagiarism
   - Writing scientific manuscript

3. **Research Grants Writing**
   - Overview of various National and International Agencies
   - Types of different Government and Private granting bodies
   - Research Proposal Writing

4. **Intellectual property rights (IPR) & Patents**
   - IPR: Introduction to patents, copy rights & trademarks
   - Patent : Prior art search, patent filing in India and abroad, patent infringement

5. **Statistics in research**
   - Fundamentals and applications of mean, median, mode, standard deviation, SEM, Regression and Correlation analysis, hypothesis testing (Z-test, t-test, chi square etc.), ANOVA etc. in pharmaceutical research with its interpretations.

SUBJECT: PHARMACEUTICAL SCIENCES

1. **Pharmaceutics**

   - Formulation and evaluation of various solid, liquid and semisolid dosage forms. An overview of aerosol and cosmetic products. Pre-formulation and stability testing, Process Validation and GMP practices in Pharmaceutical Industry, Sterilization and aseptic manufacturing of parenteral products, Biopharmaceutics and Pharmacokinetics and their importance in formulation, Development of novel drug delivery systems. An overview of NDA, ANDA and IND application. Applications of Design of experiments and Quality by design in optimization.

2. **Pharmacology & Medicinal Chemistry**

   - Structure, nomenclature, classification, SAR, chemistry and pharmacology of drugs acting on Central nervous system, Cardiovascular system, Autonomic nervous system, Gastro intestinal system, Respiratory system, chemotherapeutic agents, Hormonal and Immune system. Structure based and Ligand based drug design, An overview on Clinical trials, Pharmacovigilance, Enzyme based immune assay.

3. **Pharmaceutical Analysis**

   - Principles, instrumentation and applications of UV visible, FT-IR, NMR (^{1}H & ^{13}C), Fluorescence, Mass spectroscopy, Thermal analysis, Chromatographic methods like TLC, Paper and Column Chromatography, GC, HPLC, HPTLC, Flash and Ion chromatography, GC-MS, LC-MS, Supercritical Fluid Chromatography. An overview of ICH guidelines and PAT tools.

4. **Pharmacognosy & Phytochemistry**

   Sources, chemistry, isolation, characterization and estimation of Alkaloids, Glycosides, Flavonoids, Phenolics, Terpenoids and Steroids. Dietary supplements and Nutraceuticals. Potential of traditional drugs in herbal drug industries and cosmetics.