B.PHARMACY SYLLABUS (PCI / NEP 2020)

SEMESTER III

Subject Name: Introduction to Machine Learning in Pharmaceutical Sciences (Theory)

Subject Code: BP301T

UNIT I: Foundations of Machine Learning (6 Hours)

- Definition and scope of Artificial Intelligence, Machine Learning, and Data Science.
- Types of machine learning: supervised, unsupervised, and reinforcement learning.
- Features and labels, training data and testing data.
- Concept of model building and prediction.
- Train-test split, overfitting and underfitting.
- Conceptual explanation of bias-variance trade-off.
- Overview of the basic ML workflow.

UNIT II: Regression Models in Healthcare (6 Hours)

- Overview of the concepts in predictive modeling for continuous outcomes, with emphasis on interpretation of outputs, and applications in pharmaceutical sciences.
- Linear regression and multiple linear regression.
- Model coefficients and their interpretation.
- Residuals and goodness-of-fit.
- Performance metrics such as Mean Squared Error (MSE), Root Mean Squared Error (RMSE), R^2 score.
- Implementation of regression models on pharmaceutical data (e.g. dose–response relationships, predicting drug dissolution rates, estimating PK parameters), and demonstration of predictive modeling using Python libraries such as sklearn.

UNIT III: Classification Models in Clinical Applications (6 Hours)

- Overview of the following ML models used for categorical prediction, with emphasis on conceptual understanding, interpretation of outputs and applications in pharmaceutical sciences.
- Logistic regression.
- Probability output and threshold selection.
- Confusion matrix.
- Accuracy, sensitivity, specificity, precision, recall.
- Intuitive understanding of ROC curve and AUC, and k-Nearest Neighbors.
- Demonstration of predictive modeling using pharmaceutical and clinical examples such as predicting adverse drug reactions, disease risk prediction, binary therapeutic outcome modeling.

UNIT IV: Tree-Based Models & Ensemble Learning (6 hours)

- Overview of the following ML models with emphasis on intuitive and conceptual understanding.
- Decision Trees (structure and splitting criteria), interpretation of decision paths and feature importance.
- Random Forest, overview of ensemble concept.
- Advantages and limitations of tree-based models.
- Demonstration of these models for pharmaceutical and clinical applications such as ADR risk stratification, patient classification, predicting treatment outcomes etc.

UNIT V: Unsupervised Learning & Practical Case Studies (6 Hours)

- Overview of unsupervised learning with emphasis on intuitive and conceptual understanding of pattern recognition and clustering, and their applications in pharmaceutical sciences.
- Concept of unsupervised learning.
- Clustering overview, K-means clustering, choosing number of clusters, interpreting cluster outputs.
- Mini-case study integrating regression, classification, or clustering on healthcare datasets to demonstrate patient segmentation, and drug grouping based on properties.

Subject Name: Environmental Sciences (Theory)

Subject Code: BP302T

UNIT I: Environmental Pollution (3 Hours)

- Definition, scope, and importance of environmental studies.
- Types, causes, effects, and control measures of Air, water, soil, noise, and nuclear pollution.
- Solid waste and hazardous waste management in pharmaceuticals.
- Role of pharmacists in conservation and sustainable use of resources.

UNIT II: Pharmaceutical Waste and Effluent Management (3 Hours)

- Types of pharmaceutical waste: chemical, expired drugs, packaging, biomedical waste.
- Biomedical Waste Management Rules (2016) and CPCB guidelines.
- Effluent Treatment Plant (ETP) design and functioning.
- Water purification methods in pharmaceutical settings (RO, UV, distillation, filtration).

UNIT III: Environmental Impact of the Pharmaceutical Industry (3 Hours)

- Sources of pollution in pharmaceutical manufacturing.
- Types of pharmaceutical waste: solid, liquid, and gaseous.
- Environmental risks of active pharmaceutical ingredients (APIs) and its dosage forms.
- Impact of pharmaceutical residues on ecosystems and human health.

UNIT IV: Sustainability in the Pharmaceutical Sector (3 Hours)

- Principles of sustainable development in pharma.
- Principles and Practices of Green pharmacy.
- Energy conservation and resource optimization.

UNIT V: Government Policies, Compliance, and Practical Exposure (3 Hours)

- Environmental laws: Environment (Protection) Act, 1986; Water (Prevention and Control of Pollution) Act.
- National Green Tribunal (NGT) and regulatory bodies (CPCB, SPCB).
- Government initiatives: Swachh Bharat Abhiyan; River rejuvenation program – Namami Gange Programme; Jal Jeevan Mission.
- ISO-14000.

Subject Name: Ethics and Universal Human Values (Theory)

Subject Code: BP303T

UNIT I: Introduction to Value Education (3 Hours)

- Concept, definition, and need for value education.
- Content and process of value education.
- Application of human values in everyday life.

UNIT II: Self-Exploration and Human Aspirations (3 Hours)

- Self-exploration as a means of value education.
- Development of positive attitude and self-confidence.
- Right understanding of happiness and prosperity.

UNIT III: Harmony in the Human Being (3 Hours)

- Human being as more than just the physical body.
- Harmony between the Self ('I') and the Body.
- Understanding the coexistence of the Self and the Body.

UNIT IV: Harmony in the Individual and Society (3 Hours)

- Understanding the needs of the Self and the needs of the Body.
- Activities of the Self and activities of the Body.
- Family as the basic unit of human interaction and the role of values in relationships.
- Foundations of respect in relationships: affection, kindness, guidance, reverence, glory, gratitude, and love.

UNIT V: Harmony in Society and Nature (3 Hours)

- Comprehensive human goal: the five dimensions of human endeavour.
- Harmony in nature and the four orders in nature.
- Holistic perception of harmony in existence.

Subject Name: General Pharmacology (Theory)

Subject Code: BP304T

UNIT I: Introduction to Pharmacology (08 Hours)

- Definition, historical perspectives, branches of pharmacology and their scope, drug, nature and sources of drugs, International Classification of Diseases (ICD) and International Non-proprietary Names (INN) for drugs.
- Concept of generic medicines, essential drugs and rational drug use (RDU). Indian Government's initiatives to promote these concepts.
- Routes of drug administration along with their advantages and disadvantages.

UNIT II: Pharmacokinetics (07 Hours)

- Drug absorption, mechanisms of drug absorption, membrane transporters, bioavailability, bioequivalence, factors affecting drug absorption.
- Drug distribution in different compartments, volume of distribution, storage sites, plasma protein binding and its therapeutic importance.
- Drug biotransformation, microsomal, non-microsomal metabolism and cytochrome P450 enzyme system, phase I and II reactions, first-pass metabolism, entero-hepatic cycling, concept of prodrugs.
- Drug excretion and its kinetics.

UNIT III: Pharmacodynamics (10 Hours)

- Types of drug action and mechanisms of drug action, dose response relationship.
- Receptor theories, structure of receptors, classification and regulation of receptors, spare receptors. Concept of agonist, inverse agonist, partial agonist and antagonist.
- Signal transduction mechanisms of receptors.
- Factors modifying drug action including the concepts of tachyphylaxis, idiosyncrasy, drug tolerance, dependence, addiction, and the combined effect of drugs (Additive effect & Synergism).
- Adverse drug reactions (ADR) and types of ADRs.
- Drug interaction, types, pharmacokinetic and pharmacodynamic drug-drug interactions.

UNIT IV: Overview of Drug Discovery and Evaluation of New Drug (12 Hours)

- Brief discussion on drug discovery and preclinical evaluation of new drugs.
- Human relevant screening techniques: Reconstructed human epidermis, organ-on-Chip model, skin irritancy test by reconstructed corneal epithelium, skin corrosivity testing by Direct Peptide Reactivity Assay.
- Advantages and disadvantages of in vitro and in silico pharmacological screening and evaluation.
- Recent trends in pharmacology – Chronopharmacology: Introduction, biological clock, types of rhythms, hormones, diseases and drugs affected by circadian rhythm. Introduction to chrono kinetics and importance of chronotherapeutic and future scope.
- Introduction, general principles, applications and scope of Pharmacogenomics, Gene therapy, Biosimilars and Precision medicine.

UNIT V: Toxicology (8 Hours)

- Introduction to toxicology and its branches. Classification of poisons based on actions and lethal doses, types of antidotes.
- General principles of treatment of acute poisoning including heavy metal poisoning. Management of poisoning.

- Definition and basic knowledge of preclinical toxicity testing – acute toxicity, sub-acute toxicity, combined chronic and carcinogenicity testing as per OECD norms.
- Basic understanding of principles of genotoxicity and teratogenicity as per OECD guidelines.
- Definition and concepts of safety pharmacology as per ICH and OECD guidelines.

Subject Name: Heterocyclic Compounds and Stereochemistry (Theory)

Subject Code: BP305T

UNIT I: Chemistry of Carboxylic Acids, Phenols, Amines and Polynuclear Aromatic Hydrocarbons (15 Hours)

- Aliphatic and aromatic carboxylic acids – Methods to prepare carboxylic acids (Oxidation of alcohols, carbonation of Grignard reagent, Kolbe-Schmidt reaction). Study of acidity of carboxylic acids and effect of substituents on acidity. Study of chemical reactions of carboxylic acids [Mechanism of nucleophilic acyl substitution, Decarboxylation and Hell-Volhard-Zelinsky reaction]. Pharmaceutical applications of aromatic carboxylic acids (Benzoic acid, Salicylic acid, Acetyl Salicylic acid).
- Aliphatic and aromatic amines – Methods to prepare amines (Reduction of nitro compound, reduction of nitriles and Hofmann degradation of amides). Study of basicity of amines and effect of substituents on basicity. Study of mechanism and synthetic applications of diazonium salts including Sandmeyer's and azo-dye coupling reaction.
- Alcohols and Phenols – Classification of alcohols, methods to prepare alcohols (oxymercuration-demercuration, reduction of carbonyl compounds). Acidity of alcohols and Phenols including effect of substituent on acidity. Definition of phenols, method to prepare phenols by cumene process. Comparison of the acidity of phenol vs alcohol. Study of mechanism of chemical reactions of phenols (Reimer-Tiemann reaction, halogenation and nitration of phenols). Pharmaceutical applications of alcohols and phenols (Glycerine, Thymol, Paracetamol).
- Chemistry of polynuclear hydrocarbons – Definition, and classification of polynuclear aromatic hydrocarbons. Study of synthesis (Haworth synthesis) and mechanism of electrophilic aromatic substitution reactions of naphthalene, phenanthrene and anthracene. Medicinal uses of drugs containing Naphthalene (Propranolol, Naphazoline) and Phenanthrene (Morphine, Codeine).

UNIT II: Optical Isomerism (7 Hours)

- Definition of stereoisomerism and types of stereoisomerism with examples.
- Definition with examples for optical activity, origin of chirality, elements of symmetry, chiral and achiral molecules, enantiomerism, diastereoisomerism and meso compounds.
- Study of configuration including D & L system, sequence rules, R & S system. Medicinal importance of optical isomers with examples.
- Racemic mixture and resolution of racemic mixtures.

UNIT III: Geometrical Isomerism (6 Hours)

- Nomenclature of geometrical isomers (Cis & Trans, E & Z, Syn & Anti system).
- Conformational isomerism and its analysis in ethane, butane and cyclohexane.
- Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity in biphenyl compounds.

UNIT IV: Chemistry of Five Membered Heterocycles (10 Hours)

- IUPAC nomenclature and classification of heterocyclic compounds as per the Hansch-Widman system.
- Relative aromaticity and reactivity of pyrrole, furan and thiophene.
- Study of synthesis of pyrrole (Paal–Knorr synthesis), furan (Feist-Bénary reaction), thiophene (Hinsberg synthesis) and Mechanism of Electrophilic substitution reactions of pyrrole, furan and thiophene.
- Medicinal uses of drugs containing pyrrole (Ethosuximide, procyclidine), furan (Furosemide, Nitrofurazone) and thiophene (Cephaloridine, Clopidogrel).

UNIT V: Chemistry of Other Heterocycles (07 Hours)

- Study of nomenclature of fused heterocyclic compounds, synthesis for pyrazole (Knorr synthesis), imidazole (Debus-Radziszewski reaction), pyridine (The Hantzsch synthesis), quinoline (The Skraup synthesis) and Electrophilic aromatic substitution reactions of pyrazole and imidazole.
- Chemical structures of Indole, pyrimidine, benzimidazole, purine, azepine, pyrazole, oxazole, Phenothiazine, benzotriazole, quinoxaline.
- Basicity of imidazole, pyridine and quinolone.
- Medicinal uses of drugs containing: pyrazole (Sildenafil, Celecoxib); imidazole (Metronidazole, Pilocarpine); pyridine (Isoniazid, Chlorpheniramine); quinoline (Chloroquine, Ciprofloxacin); indole (Indomethacin, Reserpine); benzimidazole (Albendazole, Mebendazole); pyrimidine (Fluorouracil, Sulphadiazine); purine (Mercaptopurine, Thioguanine); azepine (Diazepam, Loxapine) heterocycles.

Subject Name: Pharmaceutical Dosage Forms I (Theory)

Subject Code: BP306T

UNIT I: Fundamentals of Dosage Form Development (07 Hours)

- Pre-formulation studies: concept, need, and parameters including solubility, pKa, physical nature (amorphous and crystalline), polymorphism, particle size and shape, and powder flow parameters.
- Drug–excipient compatibility studies.
- Packaging selection for various dosage forms.
- Drug product and container-closure interaction.
- Introduction to stability guidelines of new drug substances and products (ICH Q1).

UNIT II: Compressed Solids – Tablets and Tablet Coating (12 Hours)

- Tablets – Excipients (roles and examples); tooling (types and specifications); manufacturing methods and equipment; tablet defects and remedies; in-process quality control (IPQC); finished-product tests; packaging.
- Tablet Coating – Types of coating (sugar, film, compression, enteric); need, advantages, and limitations; polymers, process specifications, and equipment; coating defects; quality control of coated tablets.

UNIT III: Finely Divided and Filled Solids (12 Hours)

- Medicated powders and granules: formulation considerations, manufacturing processes (mixing, granulation), quality control, and packaging.
- Gelatin and non-gelatin shells: composition, empty shell manufacturing, quality control, and capsule sizes.
- Hard gelatin capsules: formulation design; filling methods (manual, semi-automatic, automatic); IPQC and finished-product tests; packaging.
- Soft gelatin capsules: shell composition and plasticizers; fill materials; manufacturing methods (rotary die and others); defects; quality control and stability.

UNIT IV: Modified-Release Solids (07 Hours)

- Types of tablets: sustained-release and controlled-release tablets.
- Concept, need, advantages, and disadvantages.
- Formulation design and drug-release mechanisms.
- Polymers used for sustained and controlled release.
- Evaluation of modified-release dosage forms.

UNIT V: Microencapsulation (07 Hours)

- Concept, need, advantages, and disadvantages.
- Methods of microencapsulation: spray drying, spray congealing, extrusion and spheronisation, fluidized bed coating, and phase-separation coacervation.
- Evaluation of microcapsules.

Subject Name: Pharmaceutical Engineering (Theory)

Subject Code: BP307T

UNIT I: Unit Operations Associated with Solids (12 Hours)

- Principle, construction, working, advantages and disadvantages and pharmaceutical applications of size reduction, size separation and mixing equipment.

UNIT II: Unit Operations Associated with Liquids (12 Hours)

- Principle, construction, working, advantages and disadvantages and pharmaceutical applications of filtration, crystallization and centrifugation equipment.

UNIT III: Unit Operations Associated with Heat Transfer (12 Hours)

- Principle, construction, working, advantages and disadvantages and pharmaceutical applications of evaporation, drying, distillation and heat transfer equipment.

UNIT IV: Materials and Material Handling (05 Hours)

- Introduction to material handling equipment and techniques.
- Conveyors, hoists, and automated guided vehicles (AGVs).
- Storage systems: bins, silos in warehouses.
- Safety considerations in material handling and waste management.
- Types of corrosion and their impact on pharmaceutical processes and environment.

UNIT V: Flow of Fluids (04 Hours)

- Types and measurement of flow, manometers, Reynolds number and its significance.
- Bernoulli's theorem and its applications.
- Orifice meter, Venturimeter, Pitot tube and Rotometer.

Subject Name: Pharmaceutical Microbiology (Theory)

Subject Code: BP308T

UNIT I: Introduction and Role of Microorganisms in Pharmaceutical Industry (09 Hours)

- Fundamentals of microbiology: Microorganisms and medicines, Introduction to various microorganisms, Microbial cultivation, isolation and enumeration. Pharmaceutical importance of microorganisms.
- Introduction to Microscope (Compound and Electron Microscope).
- Identification of bacteria using staining techniques (simple, Gram's & Acid-fast staining) and biochemical tests (IMViC).
- Antibiotics produced by microbiology (Production and uses – streptomycin, cephalosporin).

UNIT II: Evaluation of Microbiological Contamination (09 Hours)

- Sources and types of microbial contaminants.
- Control of microbial contamination during manufacture of non-sterile dosage forms and sterile dosage forms (including Aseptic area), control of Atmosphere, Water, Raw material, Facility, Packaging, Equipment.
- Microbiological spoilage of pharmaceuticals, Factors affecting microbial spoilage of pharmaceuticals.
- Introduction to Fermentation, types and fermenters.

UNIT III: Microbial Control and Evaluation (09 Hours)

- Designing of aseptic area. Laminar flow equipment, clean area classification, Biological Safety Level categories. Methods of prevention.
- Disinfectants, antiseptics, and preservatives, and their evaluation.
- Factors affecting the antimicrobial activity of disinfectants.

UNIT IV: Sterilization Procedures, Assurance and Evaluation (09 Hours)

- Physical, chemical, gaseous, radiation and mechanical methods of sterilization. Advances sterilization technologies. Evaluation of efficiency of sterilization; Validation of sterilization procedures and Sterility indicators.
- Sterility assurance, Bioburden determination, Modelling in predicting microbial growth and death, Test for bacteriostatic, bactericidal activity.

UNIT V: Microbiological Quality Control (09 Hours)

- Microbial limit tests and Microbial assay (antibiotics, vitamins and amino acids).
- Sterility testing of products according to IP, BP and USP.
- Methods for monitoring Water and Air Quality.
- In vitro cell cultures, general procedure for cell culture, Application of cell cultures in pharmaceutical industry and research.

Subject Name: General Pharmacology (Practical)

Subject Code: BP309P

PRACTICAL

(Minimum 12 experiments must be performed)

- 1. To describe the contributions of renowned pharmacologists and their discoveries based on pharmacological experiments (Any 5 Noble Laureates whose research contributed to the development of Pharmacology).
- 2. To study various laboratory safety precautions, hazards, personal hygiene, commonly used tools, devices and instruments in experimental pharmacology.
- 3. To study common experimental animals including transgenic animals along with their applications in the pharmacological experiments in current drug discovery paradigm.
- 4. To study concept of 6Rs along with the maintenance and experimentation on laboratory animals as per the CCSEA guidelines.
- 5. To demonstrate collection/isolation of DNA and RNA using computer simulations and audiovisual aids.
- 6. To study important anaesthetics and euthanasia procedures for experimental animals.
- 7. To demonstrate different routes of drug administration using computer simulation and understand the significance of each route along with the maximum administrable dose.
- 8. To study preparation of different types of physiological salt solutions (PSS), cell culture media and to understand the role of each ingredient used in PSS preparation.
- 9. To study the instrumentation used for isolated tissue experiments (students organ bath assembly) and recent development in recording of the responses of isolated tissues.
- 10. To record the dose response curve of any two agonists on suitable isolated tissue preparation using computer simulation experiment.
- 11. To study the potentiating effect of physostigmine on DRC of acetylcholine through interactive computer simulation.
- 12. To study antagonizing effect of d-tubocurarine on the DRCs of acetylcholine through interactive computer simulation.
- 13. To determine PD2 of given agonists using isolated tissue preparation using computer simulation experiment.
- 14. To study and determine various pharmacokinetic parameters (Cmax, Tmax, Ke, t½, Vd, Clt, AUC, AUMC) from given hypothetical data.
- 15. To estimate LD50 using hypothetical data through computer-simulated experimentation (as per OECD 425 guideline) using software.
- 16. Software based quantification of micronucleus test and chromosomal aberration test.
- 17. Software based prediction of teratogenicity.
- 18. Use of UV-Spectrophotometer for studying drug-protein interactions.

Note:

PCI recommended softwares shall be used for performing experiments.

Subject Name: Heterocyclic Compounds and Stereochemistry (Practical)

Subject Code: BP310P

PRACTICAL

(Minimum 12 experiments must be performed)

- 1. Prepare, purify and characterize by melting point, recrystallization the following organic compounds (Minimum of 04 aromatic and any two heterocyclic compounds with different chemical reactions):
  - a. Benzanilide/phenyl benzoate/acetanilide from aniline/phenol by acetylation/acylation reaction.
  - b. 2,4,6-Tribromo aniline from aniline/para bromo acetanilide from Acetanilide by halogenation (Bromination) reaction.
  - c. 5-Nitro salicylic acid from salicylic acid / meta di-nitro benzene from nitro benzene by nitration reaction.
  - d. Benzoic acid/Salicylic acid from alkyl benzoate/alkyl salicylate by hydrolysis reaction.
  - e. 1-Phenyl-azo-2-napthol from aniline by diazotization and coupling reactions.
  - f. Synthesis of 2,4,6-trinitrophenol by nitration reaction.
  - g. Synthesis of 3,5-dimethyl pyrazole from acetylacetone.
  - h. Synthesis of benzimidazole from ortho phenylene diamine.
  - i. Preparation of benzophenone oxime.
- 2. Qualitative analysis of binary mixture of organic compounds (any two) (Acid + Neutral and Base + Neutral).
- 3. To draw and visualize 3D structures, calculate molecular properties and to draw chemical reactions using software tools.

Subject Name: Pharmaceutical Dosage Forms I (Practical)

Subject Code: BP311P

PRACTICAL

(Minimum 12 experiments must be performed)

- 1. Preformulation study of any drug/excipient as per pharmacopoeia.
- 2. Evaluation of powder flow properties for tablet blends.
- 3. Evaluation of effect of lubricating agents on powder flow properties.
- 4. Preparation and evaluation of tablets by direct compression.
- 5. Preparation and evaluation of tablets by dry granulation.
- 6. Preparation and evaluation of tablets by wet granulation.
- 7. Quality control of marketed tablets (IR, coated, enteric-coated).
- 8. Preparation and evaluation of coated tablets.
- 9. Comparison of dissolution profiles of marketed preparations.
- 10. Preparation and evaluation of hard-/non-gelatin capsules (fill weight, disintegration).
- 11. Virtual demonstration: hard-gelatin shell and soft-gel manufacturing (with overview of aseptic line/isolator).
- 12. Evaluation of packaging materials: primary and secondary/tertiary.
- 13. Preparation and evaluation of sustained-release tablets.
- 14. Preparation and evaluation of enteric-coated tablets.

Subject Name: Ability Enhancement Course – Elective (Select ONE): BP312P AEC1: Nutraceuticals and Functional Foods / BP312P AEC2: Food Analysis / BP312P AEC3: Yoga and Life Sciences

Subject Code: BP312P AEC*

PRACTICAL

Only one elective course shall be selected from the following three options. Syllabi are given below.

- --- BP312P AEC1: Nutraceuticals and Functional Foods (Practical) ---
- (Perform any 12 Experiments)
- 1. Identification and classification of nutraceuticals and functional foods from marketed products.
- 2. Preparation of a probiotic drink or yogurt using lactic acid bacteria.
- 3. Extraction of phytochemicals (flavonoids, alkaloids) from plant material.
- 4. Estimation of antioxidant activity using DPPH method.
- 5. Formulation of a herbal supplement capsule or powder.
- 6. Demonstration of dietary fiber content from cereals or vegetables.
- 7. Assessment of total polyphenol content using Folin–Ciocalteu reagent.
- 8. Label analysis of functional foods and dietary supplements (FSSAI standards).
- 9. Case study presentation: Role of omega-3 fatty acids in cardiovascular health.
- 10. Demonstration of stability testing of a nutraceutical formulation.
- 11. Preparation of fortified food product (e.g., iron-fortified juice).
- 12. Visit to a food testing laboratory or nutraceutical industry (or virtual tour).
- 13. Evaluation of glycemic index of selected carbohydrate-rich foods (conceptual).
- 14. Regulatory comparison of nutraceutical guidelines (FSSAI vs. FDA vs. EFSA).
- 15. Preparation of a functional food label with nutrition facts and claims.
- --- BP312P AEC2: Food Analysis (Practical) ---
- (Perform any 12 Experiments)
- 1. Determination of the acid value for the given oil/fat.
- 2. Determination of the ester value of the given oil/fat.
- 3. Determination of the saponification value of the given oil/fat.
- 4. Determination of total and free acidity in honey as per FSSAI method.
- 5. Quantification of caffeine content in soft drinks.
- 6. Determination of fat content in milk by gravimetric method.
- 7. Detection of starch and urea in milk as per FSSAI method.
- 8. Assessment of fluoride content in drinking water.
- 9. Assessment of total hardness in drinking water.
- 10. Determination of the rancidity of the oil by UV Visible spectrophotometer.
- 11. Quantification of benzoic acid as preservative in beverages/jam/jellies by titrimetric/spectrophotometric method.
- 12. Isolation and identification of synthetic food colours by paper chromatography/Thin layer chromatography.
- 13. Determination of total curcuminoid content in turmeric by UV visible spectrophotometer.
- 14. Assessment of the total ash content for spices and condiments.
- 15. Determination of gluten content in whole wheat/wheat flour.
- 16. Determination of alcoholic acidity in bread and bread products.
- 17. Determination of Caloric value of food and nutritional supplements.

- --- BP312P AEC3: Yoga and Life Sciences (Practical) ---
- (Perform any 12 Experiments)
- 1. Demonstration and practice of Surya Namaskar (Sun Salutation).
- 2. Practice of basic asanas: Tadasana, Vrikshasana, Bhujangasana.
- 3. Practice of Pranayama techniques: Nadi Shodhana, Bhramari.
- 4. Meditation session: Focused awareness and breath control.
- 5. Yoga-based stretching and warm-up routine.
- 6. Recording physiological parameters (heart rate, BP) before and after yoga.
- 7. Yoga journal: Track weekly yoga practice and mood changes.
- 8. Poster presentation on 'Scientific benefits of yoga on immunity'.
- 9. Yoga for specific health conditions: Back pain, asthma, stress.
- 10. Group chanting of Mantra – observation of mental state.
- 11. Learning the role of yoga in circadian rhythm regulation.
- 12. Visit to a yoga wellness center or attending a virtual session.
- 13. Assessment of flexibility using sit-and-reach test before/after practice.
- 14. Demonstration of Yog Nidra (guided relaxation technique).
- 15. Case presentation: Impact of yoga on a chronic disease condition.