



SYLLABUS FOR MRV PhD ENTRANCE EXAMINATIONS

JUL 2026 BATCH

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PhD Entrance Exam Pattern

Paper 1 (Research Methodology- Section A): 35 Marks

Paper 2 (Subject-Specific – Section B): 35 Marks

Duration: 1 hr

Total Marks: 70



SECTION A

RESEARCH METHODOLOGY, BIostatISTICS, RESEARCH ETHICS, AND PUBLICATION ETHICS (COMMON TO ALL FACULTIES)

Unit I: Understanding the Research: Definitions, Quality, Purpose, Importance, and Objectives.

Research Ethics: Integrity, Moral Principles, and Ethical Practices, Values, Privacy, and Confidentiality.

Unit II: Types of Research: Basic and Applied Research, Quantitative and Qualitative Research, Descriptive and Analytical Research.

Unit III: Writing a Research Proposal: Identifying and selecting the Research problem, Research questions, Background or literature review, Method and design, and References.

Unit IV: Definition and Importance of Hypothesis, Types of Hypothesis (Null Hypothesis and Alternative Hypothesis). Sampling Techniques – Random sampling, Stratified sampling, Cluster sampling, Systematic sampling, convenience sampling, and Judgment sampling.

Unit V: Data Collection Tools: Primary data and secondary data, Types of Questionnaire, Interview protocol, observation methods, Data Interpretation. Data Analysis: Tabulation, Diagrammatical representation of the data, Graphical representation of the data; Basics of documentation software tools



SYLLABUS FOR Ph.D. ENTRANCE EXAMINATIONS

SECTION – B

FACULTY OF MEDICINE

UNIT I: Molecular and Cellular Foundations

- i. **Cell Biology:** structure-function relationships, nucleic acids, chromatin organization, DNA replication, RNA synthesis, and epigenetic regulation.
- ii. **Developmental biology:** Organogenesis, teratogens, and congenital anomalies
- iii. **Homeostasis:** Body fluid dynamics, electrolyte and acid base balance, blood composition (RBCs, WBCs, platelets), plasma proteins, and lymphatics.

UNIT II: Systemic Physiology and Pathophysiology

- i. **Cardiovascular dynamics:** Cardiac cycles, hemodynamics, ECG interpretation, blood pressure regulation.
- ii. **Respiratory physiology:** Gas exchange, pulmonary function tests, regulatory mechanisms.
- iii. **Neurophysiology:** Nerve conduction, synaptic transmission, neuromuscular disorders.
- iv. **Reproductive and endocrine physiology:** Gametogenesis, hormonal cycles, pregnancy physiology, renal-endocrine interactions.

UNIT III: Metabolic and Immunological Processes

- i. **Biochemistry:** Carbohydrate, lipid, and protein metabolism; vitamins and micronutrients (calcium, iron, iodine).
- ii. **Immune mechanisms:** Innate and adaptive immunity, hypersensitivity, autoimmunity, transplantation immunology.
- iii. **Pathological responses:** Inflammation, carcinogenesis, metabolic disorders, shock

syndromes, and hemorrhage management.

UNIT IV: Pharmacological Principles and Clinical Applications

- i. **Pharmacokinetics/pharmacodynamics:** Drug absorption, bioavailability, therapeutic indices, drug interactions.
- ii. **Advanced therapeutics:** Gene therapy, pharmacoeconomics, critical appraisal of clinical trials.
- iii. **Antimicrobial science:** Bacterial, viral, and fungal pathogenesis; antimicrobial resistance.

UNIT V: Cardiovascular and Respiratory Medicine

- i. **Cardiac pathologies:** Ischemic heart disease, arrhythmias, heart failure, congenital defects.
- ii. **Respiratory diseases:** Asthma, COPD, tuberculosis, occupational lung disorders, neoplastic conditions.

UNIT VI: Gastrointestinal, Hepatic, and Renal Health

- i. **GI disorders:** Peptic ulcers, malabsorption syndromes, inflammatory bowel disease.
- ii. **Hepatobiliary and pancreatic diseases:** Hepatitis, cirrhosis, portal hypertension.
- iii. **Renal pathophysiology:** Acute/chronic kidney injury, glomerular disorders, dialysis, transplantation.

UNIT VII: Endocrinology, Hematology, and Oncology

- i. **Endocrine dysregulation:** Diabetes, thyroid/parathyroid/adrenal disorders.
- ii. **Hematologic conditions:** Anemias, leukemias, coagulopathies.
- iii. **Oncology:** Oncogenes, tumor markers, common cancers (breast, lung), palliative care.

UNIT VIII: Neurological and Psychiatric Disorders

- i. **Neuropathology:** Stroke, epilepsy, spinal cord injuries, neurodegenerative diseases.
- ii. **Mental health:** Mood disorders, schizophrenia, psychosomatic illnesses, therapeutic interventions.

UNIT IX: Maternal, Neonatal, and Pediatric Health

- i. **Obstetrics:** Antenatal care, hypertensive disorders, labor complications.
- ii. **Pediatrics:** Neonatal sepsis, growth anomalies, nutritional deficiencies, childhood infections (malaria, dengue).

UNIT X: Dermatology and Musculoskeletal Health

- i. **Integumentary disorders:** Infections (bacterial, fungal, viral), autoimmune skin conditions.
- ii. **Musculoskeletal pathologies:** Osteoarthritis, rheumatoid arthritis, osteomyelitis, trauma management.

UNIT XI: Sensory Systems and ENT

- i. **Ophthalmology:** Cataracts, glaucoma, retinal diseases, preventive ophthalmology.
- ii. **Otolaryngology:** Hearing loss, chronic otitis media, sinusitis, airway emergencies.

UNIT XII: Public Health and Epidemiology

- i. **Disease control:** Transmission dynamics, disinfection, vaccination strategies.
- ii. **Health systems:** Primary healthcare, universal health coverage, national health programs.
- iii. **Social determinants:** Occupational hazards, environmental health, demographic trends.

Recommended books

1. Achar's textbook of Pediatrics 4th edition. ISBN: 978-8173716546
2. Ananthanarayan and Paniker's Textbook of Microbiology, 11th edition. ISBN: 978-9389211436
3. Davidson's Principles and Practice of Medicine, International Edition, 24th edition. ISBN: 978-0702070273
4. Guyton and Hall Textbook of Medical Physiology, International Edition, 13th edition. ISBN: 978-1455770168
5. Harper's Biochemistry, 32nd edition. ISBN: 978-1260469943
6. Mudaliar & Menon Clinical Obstetrics 12th edition ISBN: 978-9393330369
7. Park's textbook of Preventive & Social Medicine, 26th edition. ISBN: 978-9382219163
8. Parsons' Diseases of the Eye 23rd edition. ISBN: 978-8131254158
9. Rang & Dale's Pharmacology, 10th edition. ISBN: 978-0323873956
10. Textbook of Ear, Nose and Throat Diseases 12th edition. ISBN: 978-9350904954



SYLLABUS FOR Ph.D. ENTRANCE EXAMINATIONS

SECTION - B

FACULTY OF DENTISTRY

UNIT I: Anatomy & Physiology (Dental & Craniofacial Focus)

- Cranial nerves relevant to dental practice.
- TMJ anatomy, disorders, and biomechanics.
- Muscles of mastication and facial expression.
- Pterygopalatine and infratemporal fossae, submandibular region.
- Oral cavity boundaries, palate, tongue, vascular and nerve supply.
- Paranasal sinuses in sinus lift surgeries.
- Osteology of maxilla, mandible, cranial bones.
- General physiology of blood, endocrine, and cardiovascular systems.
- CBCT-based 3D anatomy, neurosensory mapping, anatomical variations in implant planning.

UNIT II: Biochemistry & Cell Biology in Oral Sciences

- Macromolecule metabolism relevant to oral tissues.
- Collagen, bone matrix proteins; calcium/phosphate metabolism.
- Diagnostic enzymes and dental material interactions.
- Hormonal influence on oral health.
- Salivary diagnostics and biochemistry.
- Salivary diagnostics, molecular signaling in tooth development and repair.

UNIT III: Oral Histology & Embryology

- Tooth morphogenesis and epithelial-mesenchymal interaction.
- Microscopic anatomy of dental and supporting tissues.
- Age-related histological changes.
- Oral mucosa and salivary gland development.
- Tissue engineering, stem cell research, regenerative endodontics.

UNIT IV: General Pathology & Microbiology

- Pathological mechanisms: cell injury, necrosis, inflammation, healing.
- Blood disorders and implications in dental practice.
- Infection control, sterilization, and culture techniques.
- Oral microbiome and its role in disease.
- Bacterial, viral, fungal, and parasitic infections relevant to oral health.
- Oral microbiota modulation, immunopathogenesis, antimicrobial resistance.

UNIT V: Pharmacology & Dental Therapeutics

- Pharmacokinetics/pharmacodynamics of dental drugs.
- Analgesics, antibiotics, anesthetics in dental practice.
- Systemic drug implications: cardiovascular, endocrine, CNS drugs.
- Vitamin deficiencies and oral health.
- Topical agents: mouthwashes, fluoride, astringents.
- Pharmacogenomics, nano-drug delivery systems in dentistry.

UNIT VI: Oral Medicine, Diagnosis, and Radiology

- Precancerous/cancerous lesions and differential diagnosis.
- Mucocutaneous lesions and systemic disease manifestations.
- Oral radiology: IOPA, OPG, CBCT, MRI.
- Common oral diseases and their management.
- AI in diagnostics, salivary biomarkers, digital pathology.

UNIT VII: Operative Dentistry & Endodontics

- Dental caries and restorative approaches.
- Cavity preparation and pulp protection.
- Endodontic access, shaping, obturation techniques.
- Aesthetic dentistry and hypersensitivity management.
- Bio ceramics, rotary endodontics, regenerative endodontics.

UNIT VIII: Oral & Maxillofacial Surgery*

- Surgical principles, asepsis, infection control.
- Extractions, impacted teeth, sinus pathologies.

- TMJ disorders and maxillofacial trauma.
- Implantology and peri-implant disease.
- Guided implantology, CAD-CAM surgical stents, and platelet concentrates.

UNIT IX: Oral Diagnosis & Management

- Developmental anomalies and traumatic injuries.
- Salivary gland disorders and pigmentation.
- Pain disorders, altered sensations, halitosis.
- Systemic conditions affecting oral health.
- Tele-dentistry, AI in diagnostics, oral-systemic links.

UNIT X: Orthodontics & Dentofacial Orthopaedics

- Craniofacial growth and occlusion.
- Etiology and classification of malocclusion.
- Orthodontic appliances: removable, fixed, myofunctional.
- Materials and biomechanics in orthodontics.
- Clear aligners, 3D cephalometry, AI-based planning.

UNIT XI: Periodontology

- Periodontal histology and aging.
- Gingival and periodontal diseases.
- Regenerative procedures and implant maintenance.
- Periodontal-systemic health link.
- Host modulation therapy, lasers, salivary diagnostics.

UNIT XII: Prosthodontics

- Complete and removable dentures.
- Fixed partial dentures and implant-supported prostheses.
- Occlusion and esthetics.
- Digital workflow in prosthodontics.
- CAD/CAM prostheses, zirconia, digital impressions.

UNIT XIII: Pedodontics & Preventive Dentistry

- Child growth and dental development.

- Pediatric pathology and psychology.
- Preventive and interceptive orthodontics.
- Special needs dentistry and dental trauma.
- MI dentistry, AI in behavior management, fluoride innovations.

UNIT XIV: Research Methodology & Biostatistics

- Study designs: observational, experimental.
- Data analysis, hypothesis testing, statistics.
- Research ethics and literature review.
- Systematic reviews, meta-analyses, evidence-based dentistry.

UNIT XV: Digital Dentistry & Innovation

- CAD/CAM, 3D printing, intraoral scanners.
- Virtual planning and AI diagnostics.
- Digital records and data security.
- AR/VR simulations, robotic dentistry, digital occlusion analysis.

UNIT XVI: Public Health Dentistry & Policy

- Oral epidemiology and health indicators.
- Health education and dental programs.
- Dental health policy and outcomes.
- mHealth, dental teleconsultations, health economics.

UNIT XVII: Translational & Regenerative Dentistry

- Stem cell types and applications.
- Tissue engineering scaffolds and biomaterials.
- Gene therapy and biomimetic regeneration.
- CRISPR gene editing, scaffold-free 3D bioprinting, exosome therapy.

Reference books

1. Newman MG, Takei H, Klokkevold PR, Carranza FA. Newman and Carranza's Clinical Periodontology E-Book: Newman and Carranza's Clinical Periodontology E-Book. Elsevier Health Sciences; 2018 May 29.
2. McMinn RM. Last's Anatomy-Revised Edition. Churchill Livingstone; 2019 Oct 30.

3. Guyton AC. Textbook of medical physiology. China; 2006.
4. Murray K, Rodwessl V, Bender D, Botham KM, Weil PA, Kennelly PJ. Harper's illustrated biochemistry. 28. Citeseer, New York, United States. 2009.
5. Anusavice KJ, Shen C, Rawls HR, editors. Phillips' science of dental materials. Elsevier Health Sciences; 2012 Sep 27.
6. Kumar V, Abbas AK, Aster JC, Deyrup AT, editors. Robbins & Kumar basic pathology, e-book: Robbins & Kumar basic pathology, e-book. Elsevier Health Sciences; 2022 Oct 23.
7. Ananthanarayan R. Ananthanarayan and Paniker's textbook of microbiology. Orient Blackswan; 2006.
8. Tripathi KD. Essentials of medical pharmacology. Jaypee Brothers medical publishers; 2018 Oct 31.
9. Bhaskar SN, editor. Orban's oral histology and embryology. Elsevier India; 1991.
10. Walker BR, Colledge NR. Davidson's principles and practice of medicine e-book. Elsevier Health Sciences; 2013 Dec 6.



SECTION B

FACULTY OF PHARMACEUTICAL SCIENCES

UNIT I

PHARMACEUTICS

1. (a) Professional Pharmacy: Professional Pharmacy, Pharmaceutical jurisprudence including Drugs and Cosmetics Act 1940 and rules 1945. Pharmacy Act 1948, Revised Schedule M, Code of Pharmaceutical ethics. Drug regulatory agencies. Concepts on ICH, WHO, FDA, TGA, ISO, GMP, SOP, QBD, Patents etc.

(b) Physical Pharmaceutics: Physical properties of drug molecules, pH, buffers and isotonic solution, solubility phenomena, surface tension, interfacial phenomenon, Kinetics, Rheology, Micromeritics & powder flow, Diffusion and dissolution, Colloids, Complexation and protein binding

Pharmaceutical Technology:

(a) Principles, Formulation, Ingredients, method of manufacture, evaluation, quality control tests, labelling and packaging of the following class of product:

- ✓ **Solid dosage forms**- Tablets, coating, capsules, microcapsules, powders, granules etc. **Liquid dosage forms**- solutions, suspensions, emulsions,
- ✓ **Semisolid dosage forms**- ointment, creams, gels, suppositories,
- ✓ **Parenterals**- injections small volume, large volume, ophthalmic preparations and
- ✓ Pre-formulation studies, stability studies and pharmacopeial specifications for various formulations.
- ✓ Formulation of cosmetics preparation like lipstick, shampoo, creams, nail preparations, dentifrices, powders etc.

(b) Novel Drug Delivery Systems, Targeted Drug Delivery Systems.

Biopharmaceutics and Pharmacokinetics and their importance in formulation.

Introduction to biopharmaceutics: Drug absorption, distribution, metabolism and elimination. Compartment model- Definition and Scope. Pharmacokinetics of drug absorption - Zero order and

first-order absorption rate constant. Determination of pharmacokinetic parameters. Dose adjustment in Renal and Hepatic failure.

Bioavailability and bioequivalence: Measures of bioavailability, C_{max} , t_{max} , K_{el} and Area Under the Curve (AUC); Review of regulatory requirements for conducting bioequivalent studies. Biopharmaceutical Classification System (BCS) of drugs, Biosimilars.

UNIT II

PHARMACEUTICAL CHEMISTRY

Pharmaceutical Organic Chemistry

- ✓ Structure, nomenclature, stereochemistry, reactivity, named reactions, reagents, and associated mechanism.

Heterocyclic Chemistry

- ✓ Structure, nomenclature, synthesis, chemical reactions, and medicinal uses.

Medicinal Chemistry

- ✓ Structure, nomenclature, classification, synthesis, SAR, mechanism of action, therapeutic uses, and metabolism of the following classes: Drugs acting on ANS, CNS, CVS, Anti-infectives, and Anti-cancer agents.

Biochemistry

- ✓ Biochemical role of biomolecules (Carbohydrates, Proteins, Lipids, Nucleic acids), hormones, vitamins, enzymes, metabolic pathways, and bioenergetics.

Phytochemistry

- ✓ Major classes of phytochemicals (Alkaloids, Terpenoids, Phenolics, Glycosides); their isolation, identification, and biological activities.

UNIT III

PHARMACEUTICAL ANALYSIS AND QUALITY ASSURANCE

1. Spectroscopic techniques: UV-Visible spectroscopy, infrared (IR) spectroscopy, nuclear magnetic resonance (NMR) spectroscopy and mass spectrometry (MS).

2. Chromatography: Analytical high-performance liquid chromatography (HPLC), preparative HPLC, Gas chromatography (GC), ion exchange chromatography, affinity chromatography, Gel chromatography and, capillary electrophoresis (CE), super critical fluid chromatography (SFC).

3. Hyphenated techniques: LC-MS and GC-MS.

4. Other analytical techniques: X-ray diffraction (XRD), Differential scanning calorimetry (DSC), Thermogravimetric analysis (TGA) and differential thermal analysis (DTA).

5. Stability studies: Stability testing of pharmaceuticals, various stability tests, kinetic studies, shelf-life determination, thermal stability, formulation stability and impurity profiling.

6. Bioanalysis: Sample preparation techniques, bioanalytical method validation, Pharmacokinetics, cytochrome P450-based drug interactions, drug interactions linked to transporters. microsomal assays, reaction phenotyping, enzyme inhibition, enzyme induction, metabolic stability, metabolite profiling, Caco-2 permeability assay, plasma protein binding, tissue binding and tissue distribution.

7. Quality assurance: cGMP guidelines, ICH guidelines, documentation, Quality management systems, cleaning validation, calibration, validation, qualification.

UNIT IV

PHARMACOGNOSY & PHYTOCHEMISTRY

1. Systematic pharmacognostic study of the following: Carbohydrates and derived products:

Agar, guar gum, acacia, Honey, Isabagol, pectin and Tragacanth. Lipids: Bees wax, Castor oil, Codliver oil, Shark liver oil and Wool fat. Resins: Colophony, podophyllum, jalap, cannabis, capsicum, myrrh, asafoetida, balsam of Tolu, balsam of Peru, benzoin, turmeric, ginger. Volatile oils: Mentha, Coriander, Cinnamon, Cassia, Lemon peel, Orange peel, Lemon grass, Citronella, Caraway, Dill, Clove, Fennel, Nutmeg, Eucalyptus, Chenopodium, Cardamom, Sandal wood.

2. Study of the biological sources, cultivation, collection, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests of following groups of drugs. Cardioactive glycosides: Digitalis, squill, strophanthus and thevetia, Anthraquinones: Aloe, senna, rhubarb and cascara, Alkaloid containing drugs: Pyridine-piperidine: Tobacco, areca and lobelia. Tropane: Belladonna, hyoscyamus, datura, duboisia, coca and withania. Quinoline and Isoquinoline: Cinchona, ipecac, opium. Indole: Vinca alkaloids, Ergot, rauwolfia, catharanthus, nux-vomica and physostigma. Steroidal: kurchi. Purines: Coffee, tea and cola.

3. Selection of plant materials, claims of folklore on traditional systems, Authentication of

plant materials by various organizations. Extraction methods of plant materials, chromatographic techniques (TLC, HPTLC, and LCMS) of plant constituents, characterization of the isolates by spectroscopy techniques (UV, IR, NMR and Mass). Methods of isolation of volatile oils and their identification & Chemical identification of plant constituents

4. **WHO Guidelines for the assessment of crude drugs:** Evaluation of identity, quality and purity of crude drugs. Alternative system of medicine: Principles of Ayurveda, Homeopathy and Unani system of medicines, their merits and demerits. Methods of improving quality of crops and their application. Plant tissue culture techniques. Applications of plant biotechnology in Pharmacy. Indian and International patent laws, proposed amendments as applicable to herbals/natural products and processes.

UNIT V

PHARMACOLOGY

1. (a) **Fundamentals of general pharmacology:** Dosage forms and routes of administration, mechanism of action, combined effect of drugs, factors modifying drug action, tolerance and dependence; Pharmacogenetics; Principles of Basic and Clinical pharmacokinetics, absorption, Distribution, Metabolism and Excretion of drugs, Adverse Drug Reactions; Bioassay of Drugs and Biological Standardization; Discovery and development of new drugs, Bioavailability and bioequivalence studies.

(b) **Pharmacology of Peripheral Nervous System:** Neurohumoral transmission (autonomic and somatic), Parasympathomimetics, Parasympatholytics, Sympathomimetics, Sympatholytics, Ganglion stimulants and blocking agents, Neuromuscular blocking Agents, Local anesthetic Agents.

(c) **Pharmacology of Central Nervous System:** Neurohumoral transmission in the C.N.S., General Anesthetics, Alcohols and disulfiram, Sedatives, Hypnotics, Anti-anxiety agents and Centrally acting muscle relaxants, Psychopharmacological agents (anti-psychotics), anti-manics, and hallucinogens, Antidepressants, Anti-epileptics drugs, Anti-Parkinsonism drugs, Analgesics, Antipyretics, Narcotic analgesics and antagonists, C.N.S. stimulants, Drug Addiction and Drug Abuse.

2. (a) **Pharmacology of Cardiovascular System:** Drugs used in the management of congestive cardiac failure, Antihypertensive drugs, Anti-angina drugs and Vasodilator drugs, including calcium channel blockers and beta adrenergic antagonists, Anti arrhythmic drugs, Anti-hyperlipidemic drugs, drugs used in the therapy of shock.

(b) **Drugs acting on urinary system:** Fluid and electrolyte balance, Diuretics, Anti-diuretics; Drugs Acting on the Respiratory System: Anti-asthmatic drugs including bronchodilators, Anti-tussives and expectorants, Respiratory stimulants.

(c) **Drugs acting on the Gastrointestinal Tract:** Antacids, Anti-secretory and Anti-ulcer drugs, Laxatives and anti-diarrhoeal drugs, Appetite Stimulants and Suppressants, Emetics and anti-emetics, Miscellaneous: Carminatives, demulcents, protectives, adsorbents, astringents, digestants, enzymes and mucolytics.

3. (a) **Pharmacology of Endocrine System:** Hypothalamic and pituitary hormones, Thyroid hormones and anti-thyroid drugs, parathormone, calcitonin and Vitamin D, Insulin, glucagons, incretins, oral hypoglycemic agents and insulin analogs, ACTH and corticosteroids, Androgens and anabolic steroids, Estrogens, progesterone and oral contraceptives, Drugs acting on the uterus.

(b) **Chemotherapy:** General Principles of Chemotherapy, Bacterial resistance; Sulfonamides and cotrimoxazole, Antibiotics- Penicillins, Cephalosporins, Aminoglycosides, Chloramphenicol, Macrolides, Tetracyclines, Quinolones, fluoroquinolones and Miscellaneous antibiotics; Chemotherapy of tuberculosis, leprosy, fungal diseases, viral diseases, HIV and AIDS and Cancer Chemotherapy.

Books recommended:

1. The Science and Practice of Pharmacy by Remington
2. Bentley and Driver's Text Book of Pharmaceutical Chemistry by Atherden L M
3. Foyes principles of Medicinal chemistry.
4. Text book of Pharmacognosy by Trease and Evans, 16th edition.
5. Ross and Wilson Anatomy and Physiology in Health and Illness, International Edition 12th Edition
6. Robbins & Cotran Pathologic Basis of Diseases, by Vinay Kumar Abul Abbas Jon Aster, 9th edition
7. A Textbook of Pharmacy Practice , by Dr. K.G. Revikumar and Dr. B.D. Miglani
8. A Text Book of Clinical Pharmacy Practice: Essential Concepts and Skills by G. Parthasarathi, Karin Nyfort-Hansen, Milap C. Nahata. Merchant & Quadry's A Text Book Of Hospital Pharmacy by Dr.R.K.Goyal, Dr.R.K.Parikh, Dr.Mayur M.Patel.

9. Hospital Pharmacy by H. P. Tipnis, Bajaj Amrita 1st Edition.
10. Hospital and Clinical Pharmacy, by Mohammed Ali, 1st Edition
11. Wilson and Gisvold text book of organic medicinal and pharmaceutical chemistry
12. Drug Screening methods- preclinical evaluation of new drugs- S K Gupta
13. Pharmacognosy – C K Kokate, A P Purohit, s B Gokhale, 40th edition

Reference books:

1. Biochemistry by Dr. U. Satyanarayana, Dr. U. Chakrapani, 3rd edition
2. Essentials of Medical Pharmacology by Tripathi DK
3. Pharmcognosy: An Indian Perspective by Mangathayaru K
4. Dispensing for Pharmaceutical Students by Carter S
5. Introduction to Pharmaceutical Dosage Forms by Ansel H C
6. The Theory and Practice of Industrial Pharmacy by Lachman L, Lieberman
7. Inorganic and medicinal and pharmaceutical chemistry – Wilson and sonie
8. Physical chemistry- Bahl and Tuli
9. Text book of physical chemistry - Ashutoskar
10. Organic chemistry by Morrison and Boyd
11. Text book of medicinal chemistry – Dr Alagarsamy- Vol I and II
12. Practical pharmaceutical chemistry by Beckette and stenlake
13. Pharmaceutical titrimetric analysis- A.A.Napoleon
14. Organic spectroscopy - Silverstein
15. Anthony's Textbook of Anatomy & Physiology, by Kevin Patton Gary Thibodeau, 21st Edition.
16. Pathophysiology: Concepts of Altered Health States, by Carol Mattson Porth, Glenn Matfin. Eighth Edition.
17. Practice of Hospital, Clinical and Community Pharmacy Practice by Mohd. Aqil
18. Hospital Pharmacy by Stephens Martin, Second edition



SYLLABUS FOR Ph.D. ENTRANCE EXAMINATIONS

SECTION - B

FACULTY OF ALLIED AND HEALTH SCIENCES

UNIT I:

Nervous System Structure and Function

- Divisions: CNS & PNS, major brain regions (Forebrain, Midbrain, Hindbrain)
- Key brain structures: Cerebrum, cerebellum, brainstem, spinal cord
- Cranial nerves, their origin, and pathways
- CSF: Secretion, absorption, composition, and circulation
- Blood-brain barrier and blood supply to the CNS (Circle of Willis)

Neural Communication and Motor Control

- Nerve fibers, synapses, neurotransmitters
- Neuromuscular junction and muscle contraction
- Reflex arc, Broadmann's areas, motor and sensory homunculus

UNIT II:

Head and Neck Anatomy

- Cells, tissues, and cartilages of the head and neck
- Muscles of the neck and face: muscles of the lips, cheeks, and mastication
- Muscles of the tongue: intrinsic and extrinsic muscles, origin, insertion, functions, and nerve innervations
- Muscles of the palate and pharynx: origin, insertion, and nerve innervations

- Velopharyngeal mechanism and larynx: cartilages (paired and unpaired), connections, nerve innervations, and vocal fold physiology
- Paranasal sinuses: frontal, maxillary, ethmoidal, and sphenoidal sinuses, blood supply, and venous drainage

Sensory Organs and Physiology

- Anatomy of the ear: external, middle, and inner ear parts, blood supply, venous drainage, and nerve supply
- Physiology of hearing and balance
- Anatomy of the eye: glands, blood supply, optic nerve, and eye function
- Anatomy of teeth: types, parts, structure, arterial supply, and lymphatic drainage

UNIT III: Muscle and Cardiovascular System

- Muscle tissue types, skeletal muscle functions, contraction, relaxation, muscle tone, and conditioning
- Anatomy of the heart, chambers, cardiac cycle, blood vessels, and blood composition

Respiratory System and Physiological Measures

- Anatomy of the upper and lower respiratory tract, diaphragm, and intercostal muscles
- Mechanism of respiration (internal and external influences)
- Blood pressure regulation and electrocardiogram (ECG)

UNIT IV: Human Development and Fetal Growth

- Development of brachial arches, pouches, and their derivatives
- Stages of neural tube development
- Monthly fetal development and factors affecting fetal growth
- Effects of drugs, hormones, and chemicals on fetal development and birth defects

Genetics and Inheritance

- Basic cell biology, structure, and functions of genes and chromosomes
- Autosomal dominant and recessive inheritance patterns
- Sex-linked inheritance and non-traditional models of inheritance
- Genetic testing: Karyotyping, structural aberrations, and gene therapy

- Clinical genetics and genetic counselling

UNIT V: Pathological Conditions and Inflammation

- Cell injury, adaptation, and death
- Acute and chronic inflammation
- Tissue repair: cell regeneration and fibrosis
- Hemodynamic disorders, thrombosis, and shock
- Characteristics of benign and malignant neoplasms
- Tumors of the head and neck
- Obstructive and restrictive lung diseases
- Diseases of the larynx, oro-pharynx, and voice and speech disorders

Ear, Endocrine, and Nervous System Disorders

- Infections of the ear (otitis externa and otitis media)
- Hearing loss: sensory and conductive
- Endocrine disorders
- Infections and tumors of the nervous system
- Stroke, aphasia, and dysarthria

UNIT VI: Motor and Cognitive Development

- Stages of motor development, manipulative behavior, and complex motor skills
- Handedness, motor development during later childhood, and evolutionary growth of intelligence
- Emotional and social development in children, perception, and memory
- Sensory systems development (vision and hearing)

Language, Feeding, and Developmental Disorders

- Early language development and language development through childhood
- Development of feeding and eating behaviors
- Developmental disorders in children

UNIT VII:

Clinical Psychology Foundations and Assessments

- Definition and historical development of psychology
- Scope of clinical psychology in health science
- Concepts of normality and abnormality
- Methodology in clinical psychology: case history, interview, and observation
- Psychology of learning: classical and operant conditioning, reinforcement strategies
- Piaget's theory of cognitive development and Freud's psychosexual development theory
- DSM and ICD classification of abnormal behavior
- Assessment of primary mental functions: attention, concentration, memory, and intelligence
- Assessment of personality and interpersonal relationships
- Introduction to cognitive behavior therapy and counseling

UNIT VIII:

1. Foundations of Food, Nutrition, and Health

- Definitions of nutrition, health, good nutrition, and malnutrition
- Diet and health: issues of deficiency, diseases of affluence, food safety (additives and contamination)
- Digestion and absorption of carbohydrates, fats, proteins, vitamins, and iron

2. Nutritional Considerations and Challenges

- Overweight and obesity: causes and treatment
- Nutrition at different life stages and in deficiency or diet-related diseases
- Water and electrolyte balance
- Food security, organic foods, and technologies for food and nutrition security
- Nutritional implications of food processing and packaging

UNIT IX:

Introduction and Phases of Counseling

- Definition, scope, origin, and history of counseling
- Phases of counseling: assessment, initiation, and termination

- Individual and group counseling
- Counseling skills: observation, questioning, communication, note-taking, and reflection

Specialized Counseling and Ethical Considerations

- Hospital counseling: terminally ill, pain management, and rehabilitation
- Cultural issues in counseling
- Counseling intellectual exceptionality and sensory handicaps
- Family, personal, and educational counseling
- Ethical codes, client rights, confidentiality, and legal responsibilities

UNIT X:

Fundamentals of Electricity and Electronics

- Current, static electricity, voltage, current, resistance, and their effects on the human body (electric shock)
- Basic electronics: conductors, insulators, semiconductors, passive circuit devices, diodes, transistors, amplifiers, oscillators
- Transducers: microphones, biosensors, piezoelectric transducers, and their applications
- Measuring instruments: multimeter, cathode ray oscilloscope, sound level meter

Sound, Light, Heat, and Electromagnetism

- Sound: production, propagation, and its applications (reflection, diffraction, interference)
- Light: nature, reflection, refraction, and defects of vision
- Heat: types of heat transfer, body temperature regulation, and applications
- Electromagnetism in diagnosis: ECG, EEG, EMG, EGG, CT, MRI procedures
- Electronic equipment in patient care and safety precautions

UNIT XI: Human Body Maintenance and System Functions

- Cardiovascular, lymphatic, respiratory, endocrine, digestive, urinary, and reproductive systems: organs and functions

- Classification and metabolism of carbohydrates, lipids, proteins, enzymes, vitamins, and minerals
- Basic concepts of infection, immunity, sterilization, disinfection procedures, and disease concepts (inflammation, repair, lesion classification)

Diseases, Infections, and Preventive Measures

- Systemic disorders: coronary heart disease, asthma, emphysema, bronchiectasis, autoimmune diseases, and diseases of the urinary, reproductive, and nervous systems
- Hospital-acquired infections: sources, routes, preventive measures, and waste management
- Communicable diseases: tuberculosis, leprosy, HIV/AIDS, hepatitis B and C, food poisoning
- Non-communicable diseases: CHD, obesity, diabetes, hypertension, cancer—risk factors and prevention

References:

1. A Agarwal & S Udipi. *Textbook of human nutrition*. 2014. Jaypee brothers medical publishers ltd. New Delhi.
2. A Parthasarathy. *IAP textbook of paediatrics*. 3rd Ed. 2006. Jaypee brothers medical publishers ltd. New Delhi.
3. CT Morgan, RA King, JR Weisz & J Schopler. *Introduction to psychology*. 7th ed. 2008. Tata McGraw Hill. New Delhi
4. DA Bender. *Introduction to nutrition and metabolism*, 2nd ed. 2002. London.
5. JD DiClementi, IG Sarason & BR Sarason. *Abnormal Psychology, The Problem of Maladaptive behaviour* 11th Ed. 2004, Pearson/Prentice Hall. New York
6. K Thayalan. *Bio-medical physics*. 2007. Jaypee brothers medical publishers Ltd. New Delhi.
7. KT Patton, GA Thibodeau & MM Douglas. *Essentials of anatomy and physiology*. 2011. Elsevier Health Sciences Division. NY.

8. LB Jorde, JC Carey & MJ Bamshad. *Medical genetics* 4th ed. 2010. Mosby Inc. PA
9. R Soundararajan. *Counselling- theory, skills and practice*. 2012. Tata McGraw Hill Education Pvt. Ltd. New Delhi.
10. RW Dudek & JD Fix. *Embryology*. 3rd ed. 2005. Lippincott William & Wilkins Ltd. PA
11. V Kumar, AK Abas & JC Aster. *Robbins basic pathology*, 7th Ed. 2013. Elsevier Saunders. Canada
12. V Singh. *Anatomy of head neck and brain – Vol 3*. 2nd Ed. 2014. Reed Elsevier India Pvt Ltd. New Delhi.
13. V Singh. *Anatomy of upper limb and thorax – Vol 1*. 2nd Ed. 2014. Reed Elsevier India Pvt Ltd. New Delhi.
14. VK Mehta, R Mehta. *Principles of electronics*. 2005. S Chand & Company Ltd. New Delhi.

15. Guyton & Hall Text book of medical physiology.
16. Harper's biochemistry.
17. Text book of microbiology by Ananthanarayanan & jeyaram panicker.
18. Robin's and cotran Text book of pathology.
19. Park's Text book of preventive and social medicine by Park.



SYLLABUS FOR Ph.D. ENTRANCE EXAMINATIONS

SECTION - B

FACULTY OF PUBLIC HEALTH

UNIT I – Environmental Health and Its Impact

- Environmental hazards, exposure pathways, air and water pollution, sanitation, food safety, vectors, and diseases
- Solid waste management, noise pollution, indoor air quality, and heat exposure
- Climate change and its impact on health, occupational diseases, and environmental disasters
- Emerging environmental issues, global burden of disease, and India's disease estimates

UNIT II – Epidemiology and Biostatistics

- Key concepts: proportion, ratio, incidence, prevalence, odds ratio, relative risk, attributable risk, and attributable fraction
- Study designs: ecological study, cross-sectional study, cohort study, case-control study, and randomized controlled trials
- Biases: selection bias, information bias, and confounding
- Disease surveillance, public health screening, sensitivity and specificity
- Data organization and analysis: mean, median, mode, range, standard deviation, coefficient of variation
- Scales of measurement: continuous and ordinal scales
- Probability, data distribution, sampling techniques, sample size, and probability distributions

UNIT III- Public Health Biology

- Toxic agents, spectrum of undesired effects, characteristics of exposure, and dose-response relationship
- Factors influencing toxicity and toxic responses
- Body composition, fluids, and the functions of cells, organelles, and organs
- Human physiological systems and immunity
- Genetics and environmental health
- Infectious diseases: sources, means of transmission, and reservoirs
- Outbreaks, nutrition-related disorders, and essential nutrients (macronutrients)

UNIT IV – Health Policy and Management

- Globalization and health
- Economic evaluation of health, health economics, cost-benefit, and cost-effectiveness analysis
- Health care systems, health insurance, and financing
- Health sector reforms and national health programs in India
- Policies and program formulation, implementation, and monitoring
- Analyzing program outcomes and resource allocation

UNIT V – Social & Behavioral Sciences

- Demographic and social perspectives on population health
- Population behavior, health disparities, and determinants of health
- Lifestyle, disease, and health equity
- Gender and health, major health indicators
- Behavioral change, intervention, and social marketing

UNIT VI – Occupational Safety and Health

- Types of industrial processes and elements of industrial safety
- Industrial hygiene, chemical, physical, biological, and psychosocial hazards
- Ergonomics and control methods for hazards
- Disaster management and environmental protection acts
- Permissible exposure limits, standards, and guidelines

- Factories Act, OSHA, ACGIH, and environmental management systems

UNIT VII – Environmental and Research Ethics

- Ethical issues in epidemiology and responsible conduct of research
- Conflict of interest, privacy, and confidentiality
- Data access, management, and plagiarism

References

1. Environmental Health, From Global to Local, Howard Frumkin, John Wiley & Sons, Inc.SFO, CA, ISBN 0-7879-7383-1
2. Bonita R, Beaglehole R, Kjellström T. Basic epidemiology. 2nd Edition. World Health Organization http://apps.who.int/iris/bitstream/handle/10665/43541/9241547073_eng.pdf;jsessionid=F897DC3C99A1E7E75CFBB6C49E525A21?sequence=1 Accessed on August 9, 2018
3. Ganong`s Review of Medical Physiology, 25th Edition, Section VI – Circulation, Chapter 27 – Circulating Body Fluids
4. Parks Textbook Of Preventive & Social Medicine- 24th Edition, 2017by Park K
5. Brian P.Hinote and Jason Adam Wasserman (2016) „Social and Behavioral Science for Health Professionals“ Rowman & Littlefield Publishers, 1st Edition.
6. The occupational Environment: Its Evaluation, Control, and Management, 2nd Edition, AIHA Press, ISBN 1-931504-43-1: Chapter 1, 3, 20, 21, 24, 28, 32
7. ICMR. Ethical guidelines for biomedical research on human participants. https://www.iitm.ac.in/downloads/ICMR_Ethical_Guidelines_2017.pdf Accessed on August 9, 2018



Syllabus For Ph.D. Entrance Examinations

Section - B

FACULTY OF ENGINEERING AND TECHNOLOGY

UNIT 1: Engineering Mathematics

Discrete Mathematics and Related Topics

- Propositional and first-order logic, sets, relations, functions, partial orders, lattices
- Monoids, groups, graph theory (connectivity, matching, coloring)
- Combinatorics (counting, recurrence relations, generating functions)
- Linear algebra (matrices, determinants, systems of linear equations, eigenvalues and eigenvectors, LU decomposition)
- Calculus (limits, continuity, differentiability, maxima and minima, mean value theorem, integration)
- Probability and statistics (random variables, distributions, mean, median, mode, standard deviation, conditional probability, Bayes theorem)

UNIT 2: Digital Logic

Digital Logic and Arithmetic

- Boolean algebra, combinational and sequential circuits
- Minimization techniques
- Number representations and computer arithmetic (fixed and floating point)

UNIT 3: Computer Organization and Architecture

- Machine instructions and addressing modes
- ALU, data path, and control unit

- Instruction pipelining, pipeline hazards
- Memory hierarchy (cache, main memory, secondary storage)
- I/O interface (interrupt and DMA mode)

UNIT 4: Programming and Data Structures

- Programming in C
- Recursion
- Arrays, stacks, queues, linked lists
- Trees, binary search trees, binary heaps
- Graphs

UNIT 5: Algorithms

- Searching, sorting, hashing
- Asymptotic worst-case time and space complexity
- Algorithm design techniques: greedy, dynamic programming, divide-and-conquer
- Graph traversals, minimum spanning trees, shortest paths

UNIT 6: Theory of Computation

- Regular expressions and finite automata
- Context-free grammars and push-down automata
- Regular and context-free languages, pumping lemma
- Turing machines and undecidability

UNIT 7: Compiler Design

- Lexical analysis, parsing, syntax-directed translation
- Runtime environments
- Intermediate code generation
- Local optimization

- Data flow analyses: constant propagation, liveness analysis, common subexpression elimination

UNIT 8: Operating System

- System calls, processes, threads, inter-process communication
- Concurrency and synchronization, deadlock
- CPU and I/O scheduling
- Memory management and virtual memory
- File systems

UNIT 9: Databases

- ER-model, relational model: relational algebra, tuple calculus, SQL
- Integrity constraints, normal forms
- File organization, indexing (B-trees, B+ trees)
- Transactions and concurrency control

UNIT 10: Computer Networks

- Layering concept: OSI and TCP/IP protocol stacks
- Packet, circuit, and virtual circuit switching
- Data link layer: framing, error detection, Medium Access Control, Ethernet bridging
- Routing protocols: shortest path, flooding, distance vector, and link state routing
- Fragmentation, IP addressing, IPv4, CIDR notation
- IP support protocols: ARP, DHCP, ICMP, Network Address Translation (NAT)
- Transport layer: flow control, congestion control, UDP, TCP, sockets
- Application layer protocols: DNS, SMTP, HTTP, FTP, Email

Reference Book

1. Higher Engineering Mathematics" by B.S. Grewal

2. "Digital Design" by M. Morris Mano and Michael D. Ciletti
3. "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy
4. "Fundamentals of Data Structures in C" by Ellis Horowitz, Sartaj Sahni, and Susan Anderson-Freed
5. "Introduction to Algorithms" by Cormen, Leiserson, Rivest, and Stein (CLRS)
6. "Introduction to Automata Theory, Languages, and Computation" by John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman
7. "Compilers: Principles, Techniques, and Tools" by Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman
8. "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne
9. "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross
10. "Computer Networking: Principles, Protocols, and Practice" by Olivier Bonaventure



Syllabus For Ph.D. Entrance Examinations

Section - B

FACULTY OF DIGITAL HEALTH

UNIT-1: Digital Health: Introduction

Need and Case Studies: Drivers, benefits, challenges, and real-world examples of mHealth and eHealth implementations. **Health Informatics Standards:** Overview of HL7, IHE, and Vendor Neutral Archives (VNAs) for data exchange and interoperability. **Open Source and Data Innovation:** Benefits of open-source platforms like OpenMRS, the role of big data, AI, and blockchain in healthcare. **IT Infrastructure:** Applications of IoT and cloud computing in healthcare, focusing on security, scalability, and data sharing. **Future Trends and Impact:** The impact of mHealth/eHealth on patient care, cost-efficiency, and global health, with a focus on AI and personalized medicine.

Unit-2: Wearable Devices and Physiological Signal Processing

Signal and Physiological Data Processing: Sampling, Filters, Decimation, Interpolation, STFT, Wavelets; ECG & EEG Acquisition and Analysis; Wearable Health Sensors (Accelerometers, Glucose, ECG, EEG); Speech & Audio Signal Processing

Unit-3: Machine Learning Basics for Real-world

Mathematics for ML, Data & Model Basics, ML Workflow & Applications; Real-World Signal Processing (Text, Speech, Image, Video); Feature Extraction & Robustness; Learning as Optimization; Linear & Logistic Regression; Pattern Recognition & Generative Modeling (Gaussian Models); ML for Physiological Signal Processing; Time Series Modeling

Unit-4: Deep Learning in Digital Health

Deep Learning: Basics, MLPs, Backpropagation, CNNs & RNNs; Deep Learning for Physiological Signal Processing; Practical Considerations & Regularization (Dropout); Sequence Mapping Architectures; Applications in Healthcare; NLP: LSTMs, Language Models, Knowledge Graphs, Q&A (Demo)

Unit-5: Deep Learning in Imaging/Vision

Methods & Deep Learning; Neuroimaging Challenges; Deep Learning in Vision: Loss Function, Optimization, CNNs, Training, Object Detection & Segmentation; Models: AlexNet, VGG, GoogleNet, ResNet, RNN/LSTM

References

1. Mobile e-Health Publisher: Springer
2. <https://iisc.ac.in/wp-content/uploads/2021/09/IISc-Brochure.pdf>
3. EEG Signal Processing and Machine Learning; Authors: Saeid Sanei, Jonathon A. Chambers; Publisher: John Wiley & Sons; Year: 2021
4. Basic Mathematics for Machine Learning; Authors: Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong; Publisher: Cambridge University Press; Year: 2020
5. Deep Learning for Natural Language Processing; Author: Stephan Raaijmakers; Publisher: Manning Publications; Year: 2019
6. Deep Learning for Medical Image Analysis (2nd Edition); Authors: S. Kevin Zhou, Hayit Greenspan, Dinggang Shen; Publisher: Elsevier; Year: 2021



Syllabus for Ph.D. Entrance Examinations

Section - B

FACULTY OF MANAGEMENT

Unit I

The syllabus covers Management concepts, processes, theories, roles, skills, and core functions such as planning, organizing, staffing, coordinating, and controlling; Communication, including types, processes, and barriers; Decision Making, with its concept, process, techniques, and tools; Organization Structure and Design, including types, authority, responsibility, centralization versus decentralization, and span of control; Managerial Economics, focusing on its concept and importance; Macroeconomics, including national income (concepts, types, measurement) and inflation (concepts, types, measurement); and Business Ethics and CSR, addressing ethical issues, dilemmas, corporate governance, value-based organizations, and CSR practices.

Unit – II

Organizational Behavior covers its significance, key theories, individual behavior (personality, perception, values, attitudes, learning, motivation), group behavior (team building, leadership, group dynamics), interpersonal behavior, transactional analysis, organizational culture and climate, workforce diversity and cross-cultural behavior, emotions and stress management, organizational justice, and whistleblowing. It also covers Human Resource Management, including its concept, perspectives, influences, and recent trends, along with HR planning, recruitment and selection, induction, training and development, job analysis, job evaluation, and compensation management.

Unit – III

Human Resource Management, competency mapping, balanced scorecard, career planning and development, performance management and appraisal, organization development, change, and OD interventions, talent management, skill development, employee engagement, and work-life balance. Includes industrial relations, addressing disputes, grievance management, labor welfare, social

security, trade unions, and collective bargaining, as well as international human resource management, HR challenges in international business, and Green HRM.

Unit – VI

Strategic Management, including its concept, process, decisions, and types; strategy formulation using SWOT analysis, corporate strategies (growth, stability, retrenchment, integration, diversification), business portfolio analysis (BCG, GE, Ansoff's product-market growth matrix); and strategy implementation, including challenges of change and frameworks like McKinsey 7S. Also covers Marketing, including concept, orientation, trends, tasks, and customer value and satisfaction; market segmentation, targeting, and positioning; product and pricing decisions (product mix, product life cycle, new product development, pricing types and strategies); and place and promotion decisions, including marketing channels, value networks, VMS, IMC, advertising, and sales promotion.

Unit –V

Consumer and industrial buying behavior, including key theories and models; brand management, focusing on the role of brands, brand equity, equity models, branding strategy, brand name decisions, brand extensions, and brand loyalty; logistics and supply chain management, including drivers, value creation, supply chain design, and managing sales force and personal selling; service marketing, managing service quality and brands, and marketing strategies of service firms; customer relationship marketing, covering relationship building, strategies, values, and processes; retail marketing, including recent trends in India and types of retail outlets; emerging trends in marketing, such as e-marketing, direct marketing, digital marketing, and green marketing; and international marketing, including entry mode decisions and planning the marketing mix for international markets.

Unit –VI

Covers Statistics for Management, including concepts, measures of central tendency and dispersion, and probability distributions (Binomial, Poisson, Normal, Exponential); data collection and questionnaire design, and sampling concepts and process; facility location and layout, including site selection, analysis, and layout design; Enterprise Resource Planning (ERP), covering ERP modules, implementation, and scheduling (loading, sequencing, monitoring); and quality management and statistical quality control, including quality circles, Total Quality Management (TQM) practices such as Kaizen, Benchmarking, Six Sigma, and ISO 9000 series standards.

Unit –VII

International Business, including managing business in the globalization era, theories of international trade, and balance of payments; Foreign Direct Investment, including benefits and costs; multilateral regulation of trade and investment under WTO, international trade procedures and documentation,

and EXIM policies; role of international financial institutions, including IMF and World Bank; and information technology in management, including use of computers, MIS, DSS, artificial intelligence, and big data applications.

Reference Books:

1. Durai, P. (2015). Principles of management. Pearson Education India.
2. Robbins, S. P. (2009). Organisational behaviour in Southern Africa. Pearson South Africa.
3. Prasanna, C. (2001). Financial Management Theory and Practice. Tata McGraw.
4. Dessler, G., & Varrkey, B. (2005). Human Resource Management, 15e. Pearson Education India.
5. Kotler, P. (2009). Marketing management. Pearson Education India.
6. Levin, J., Rubin, D. S., Rastogi, S., & Siddiqui, M. H. (1992). Statistics.
7. Mahadevan, B. (2015). Operations management: Theory and practice. Pearson Education India.
8. Turban, E., Leidner, D., McLean, E., & Wetherbe, J. (2008). INFORMATION TECHNOLOGY FOR MANAGEMENT, (With CD). John Wiley & Sons.
9. Damodaran, S. (2010). Managerial Economics. OUP Catalogue.



Syllabus for Ph.D. Entrance Examinations

Section - B

FACULTY OF PHYSIOTHERAPY

Unit – I: Electrotherapy (LMHF & Equipment Care)

This unit covers techniques for patient evaluation, including receiving and positioning the patient for electrotherapy treatment. It includes collection of required materials, testing of apparatus, and application of electrical stimulation for muscles supplied by peripheral nerves. Students learn plotting of SD curves with chronaxie and rheobase, demonstration of FG test, and application of ultrasound for different regions using various methods. The unit also includes treatment techniques using SWD, IRR, microwave diathermy, UVR exposure with test dose calculation, IFT application, LASER dosage calculation, and treatment techniques using hydrocollator packs, cryotherapy, contrast bath, wax therapy, whirlpool bath, and Faradism under pressure for upper and lower limbs. Equipment care includes checking, arrangement of exercise and electrotherapy equipment, calibration, purchase and billing documentation, safety handling, research lab equipment maintenance, and maintenance of stock and movement registers. Demonstration of TENS applications includes types such as conventional, acupuncture, burst, brief and intense, and modulated TENS, electrode types and placement, dosage parameters, physiological and therapeutic effects, indications and contraindications. Ultrasound application includes frequency, piezoelectric effects, production of ultrasound, dosage parameters, continuous and pulsed modes, intensity, and ultrasound fields.

Unit – II: Exercise Therapy

This unit focuses on specific exercise regimens including isotonic exercises such as De Lorme's, Oxford, MacQueen, and circuit weight training; isometric exercises including BRIME and multiple angle isometrics; and isokinetic regimens. Proprioceptive Neuromuscular Facilitation techniques are covered for mobility, strengthening, stability, skill, and endurance using contract-relax, hold-relax, rhythmic initiation, slow reversals, repeated contractions, timing for emphasis, rhythmic stabilization, alternating isometrics, resisted progression, and agonist reversals. The unit also covers aerobic exercise including definition, physiological responses, evaluation of aerobic capacity through exercise testing, determinants of exercise programs,

normal and abnormal responses to acute aerobic exercise, physiological adaptations to training, and application of aerobic conditioning programs including types and phases of training.

Unit – III: General Medicine, Paediatrics & Psychology

This unit includes infections, their effects on the body, pathology, source and spread, vaccinations, generalized infections, rashes, food poisoning, gastroenteritis, sexually transmitted diseases, HIV and AIDS. Poisoning is covered including clinical features, management, common agents, drugs of misuse, chemical pesticides, and envenomation. Food and nutrition topics include nutritional assessment, energy requirements, deficiency diseases, protein-energy malnutrition, obesity, complications, and management. Pediatrics includes LBW infants, perinatal problems, congenital abnormalities, respiratory conditions, cerebral palsy, spina bifida, epilepsy, developmental delay, orthopedic and neuromuscular disorders, sensory disorders, and learning and behavioral problems such as hyperactivity and autism. Psychiatric disorders include classification, causes, clinical manifestations, treatment modalities, physiotherapy in psychiatry, anxiety, depression, obsessive-compulsive neurosis, psychosis, manic-depressive psychosis, PTSD, psychosomatic reactions, and stress-related illness theories.

Unit – IV: Exercise Physiology

This unit discusses energy production, expenditure, and transfer during exercise including oxygen metabolism, oxygen transport in blood, oxygen deficit and debt, oxygen measurement during exercise and recovery, energy release from carbohydrates, lipids, and proteins, basal metabolic rate, and energy expenditure during activity. Short-term and long-term energy systems are also covered. Exercise performance topics include lung function, regulation of ventilation and blood pressure, cardiovascular adjustments, muscle fiber types and their role in performance, ventilation during steady and non-steady exercise, energy cost, blood pressure response, cardiac output in trained and untrained individuals, and cardiovascular drift.

Unit – V: Orthopaedics

This unit covers upper limb and lower limb musculoskeletal conditions including bicipital tendinitis, tennis elbow, golfer's elbow, carpal tunnel syndrome, trigger finger, osteoarthritis, deformities such as swan neck and claw hand, cervical spondylosis, upper cross syndrome, scapular dyskinesis, dislocations, muscle injuries, fasciitis, tendinopathy, thoracolumbar dysfunction, vascular headache, impingement syndrome, and referred pain. It also includes fractures of upper limb, lower limb, pelvis, spine, and soft tissue injuries. Arthritis and rheumatic diseases such as rheumatoid arthritis, polymyalgia rheumatica, gout, osteoarthritis, ankylosing spondylitis, adhesive capsulitis, infections of bones and joints including tuberculosis, disc prolapse, cord compression, scoliosis, kyphosis, lordosis, and congenital malformations are included.

Unit – VI: Sports Medicine

This unit includes sports-related injuries such as rotator cuff injuries, bicipital tendinitis, tennis elbow, carpal tunnel syndrome, trigger finger, frozen shoulder, ligament injuries, cervical spondylosis, whiplash injury, scapular dyskinesis, dislocations, upper back pain, wrist drop, muscle strain, impingement syndrome, referred pain, muscle contusion, cramps, fasciitis, tendinopathy, thoracic and lumbar dysfunction, overload injuries, and vascular headache. It also covers sports-specific conditions related to soccer, swimming, weight lifting, tennis, cricket, hockey, and breast injuries.

Unit – VII: Cardiopulmonary

This unit includes cardiac disorders covering diagnostic procedures such as cardiac catheterization, radionuclide scanning, stress testing, ABG, and laboratory investigations. It includes assessment of heart disease symptoms, disorders of cardiac rate and rhythm, cardiac arrest, cardiac failure, shock, rheumatic fever, congenital heart disease, valvular disease, infective endocarditis, ischemic heart disease, hypertension, orthostatic hypotension, and pericarditis. Pulmonary disorders include obstructive pulmonary disease, respiratory infections, interstitial lung disease, pulmonary disorders due to pollutants, pulmonary disorders due to systemic inflammatory disease, pulmonary vascular disease, pleural diseases, respiratory failure, and oxygen therapy including supplemental oxygen delivery devices.

Unit – VIII: Neurology

This unit covers disorders of cerebral circulation including stroke epidemiology, causes, types, pathophysiology, clinical features, investigations, treatment, recovery, rehabilitation, and prevention. Disorders of higher cerebral cortical function include involvement of frontal, temporal, parietal, occipital lobes, and subcortical lesions. Cranial nerve disorders include testing of cranial nerves, cranial neuropathies, and rehabilitation protocols.