Ph.D. Admissions – Entrance Test Syllabus

PART 1 – GENERAL

Syllabus common for all Specializations

Meaning of Research: Objectives of Research, Types of Research, Research Process, Problem Statement, Research Design, Approaches to Research-Quantitative, Qualitative Approach, Exploratory, Confirmatory Research, Experimental and Theoretical Research.

Problem Formulation: Conducting Literature Review, Information Sources (Books, monographs, reviews, blogs, etc.), Information Retrieval, Role of libraries in Information Retrieval, Tools for identifying literature (digital resources and print media), Indexing and abstracting services, Citation indexes, Summarising the Review, Critical Review, Identifying Research Gap, Conceptualising and Hypothesising the research gap.

Research Design: Experimental / Simulation/ Theoretical /Empirical Research, Cause effect relationship, Development of Hypothesis, Measurement Systems Analysis, Validity and Reliability, Statistical Design of Experiments, Field Experiments, Data/Variable Types & Classification, Data collection - Methods and Tools.

Data Analysis and Interpretation: Sampling, Sampling Error, Statistical Methods/Tools - Measures of Central Tendency and Variation, Test of Hypothesis- z test, t test, F test, ANOVA, Chi square, correlation and regression analysis, Error Estimation.

Writing Research Articles and Thesis: Data Presentation- Types of tables and illustrations, Guidelines for writing the abstract, introduction, methodology, results and discussion, conclusion sections of a manuscript. References – Styles and methods, Citation and listing system of documents. Plagiarism. Ethical considerations in Research.

PART 2 – SUBJECT-SPECIFIC

Syllabus for Ph.D. in Nursing

Nursing Educational programs

Perspectives of nursing education: Global and national. Patterns of nursing education and training programmes in India. Non-university and University programs: ANM, GNM, Basic B.Sc. Nursing, Post Certificate B.Sc. Nursing, M.Sc (N) programs, M.Phil and Ph.D in Nursing, Post basic diploma programs, Nurse practitioner programs.

Curriculum Development

Definition, Curriculum determinants, Process and steps of curriculum development, Formulation of philosophy, Objectives, Selection and Organization of learning experiences; Master plan, Course plan, Unit plan. Equivalency of courses: Transcripts, credit system.

Health Assessment of Patients

History taking. Physical examination of various systems. Nutritional assessment. Relatedinvestigations and diagnostic assessment.

Nursing as a Profession

History of development of nursing profession, Characteristics, Criteria of the profession, Perspective of nursing profession-national, Global Code of ethics(INC), Code of professional conduct(INC), Autonomy and accountability, Assertiveness, Visibility of nurses, Legal considerations, Quality assurance in nursing (INC)

Nursing Research and Statistics

Foundations of research, Problem identification and formulation, Research design, Qualitative and quantitative research , Concept of measurement, Problems in measurement in research, Concepts of statistical population , sample, Sampling frame, Sampling error, Sample size, Non response, Characteristics of good sample, Data analysis, Data preparation, Frequency tables, Bar charts, Pie charts, , Percentages, Interpretation of data and Paper writing, Impact factor of journals , Plagiarism and Self- Plagiarism, Software for paper formatting like LaTeX/Ms Office, Software for detection of Plagiarism.

PART 2 – SUBJECT SPECIFIC

Syllabus for Ph.D. in Management

Marketing Management

Marketing Orientation, Core Concepts in Marketing-Value, Satisfaction, Marketing Mix. Marketing Environment and Environment Scanning; Marketing Information Systems and Marketing Research; Understanding Consumer and Industrial Markets; Demand Measurement and Forecasting; Market Segmentation-Targeting and Positioning; Product Decisions, Product mix. Product Life Cycle; New Product Development; Branding and Packaging; Pricing Methods and Strategies. Promotion Decisions- Promotion mix; Advertising; Personal Selling; Channel Management; Vertical Marketing Systems; Evaluation and Control of Marketing Effort; Marketing of Services; Customer Relation Management Digital Marketing, e-commerce-B2B, B2C.

Financial Management & Economics

Financial Management-Nature and Scope. Long Term and Short Term financing instruments. Time Value of Money and cost of Capital. Capital Structure. Capital Budgeting and Risk analysis. Working Capital Management. Dividend policy, determinants. Financial analysis, Ratio analysis and Cash flow statements. Managerial Demand Analysis, Production Function and Production Theory, Cost-Output Relations, Market Structures, Pricing Techniques, Demand – Cost – Profit – Forecasting, Macro- Economics, National Income Concepts, Economic policy – Export import Policy, Business Environment

Human Resource Management and Organizational Behavior

Concepts and Perspectives in HRM- Human Resource Planning- Objectives, Process and Techniques. Job analysis-Job Description- Job Evaluation. Recruitment and Selection and Exit Policy. Training and Development- Types, Training Need Analysis and methods. Performance Appraisal and Evaluation Types and Methods. Compensation Management and Wage Determination. Industrial Relations and Trade Unions. Dispute Resolution and Grievance Management. Labour Welfare, Functions of Management, Concept and significance of organizational behavior, Theories of organizational behavior. Organizational Structure. Individual behavior - Personality-Perception-Values-Attitudes; Group Behavior-Group dynamics, Teamwork. Motivation- Types and Theories of Motivation. Leadership – Types and Theories. Learning – Types and Barriers. Conflict Management – Types. Change Management. Communication - Types and Barriers. Organizational Development – Theories, Intervention and Models.

Operations & IT Management

Role and Scope of Production Management; Faculty Location; Layout Planning and Analysis; Production Planning and Control-Production Process Analysis; Demand Forecasting for Operations; Determinants of Product mix; Production Scheduling; Work measurement; Time and Motion Study; Statistical Quality Control. Role and Scope of Operations Research; Linear Programming; Transportation Model; Inventory Control; PERT/CPM. Concept of Supply Chains, Responsive and Efficient Supply Chains, Retail Supply

Chain, Industrial Supply Chain and Digital Supply Chain Management, Services Supply Chain. Use of Computers in Managerial applications; Technology issues and Data processing in organizations; Information systems; MIS and Decision making; System analysis and design; Internet and Internet-based applications.

Business Ethics, Entrepreneurship, Innovation & Management Strategy

Concept of Corporate Strategy; Components of Strategy Formulation; Ansoffs Growth Vector; BCG Model; Porter's Generic Strategies; Competitor Analysis; Strategic Dimensions and Group Mapping; Industry Analysis; Strategies in Industry Evolution, Fragmentation, Maturity, and decline. Competitive strategy and Corporate Strategy; Managing Cultural Diversity; Global Entry Strategies; Globalization of Financial System and Services. Ethical issues in Management; Corporate Social Responsibility; Corporate governance and ethics. Innovation and Entrepreneurship; Small business-Concepts Government policy for promotion of small and tiny enterprises; Process of Business Opportunity Identification Detailed business plan preparation; Managing small enterprises; Planning for growth; Sickness in Small Enterprises; Rehabilitation of Sick Enterprises; Entrepreneurship (Organizational Entrepreneurship) Start-up Ventures.

PART 2 – SUBJECT SPECIFIC

Syllabus for Ph.D. in Medical Anatomy

A) GENERAL ANATOMY

I) General Osteology

Definition, Nutrition & Morphological Classification, Distribution and Functions of bone, Appendicular, Axial. Diaphysis, Metaphysis, Epiphysis, Types of epiphysis

Primary centres, Secondary centers, Law of ossification, Epiphyseal plate, Blood supply of long bone CARTILAGE: Definition, Types, structure, Distribution, Nutrition

II) General Arthrology

Classification, Synarthrosis, Amphiarthrosis, Diarthrosis. Cartilaginous. Primary, Secondary

Synovial - Axis of movement, Structure of typical synovial joints Classification of synovial joints Simple, Compound, Complex joints, Blood supply & Nerve supply.

III) General Myology

Definition, types: Origin, Insertion, Morphological classification Actions of muscles, nerve supply Functional classification, Prime movers, Fixators, Antagonists, Synergists

BURSA, Structure, Functions, types

LIGAMENTS, Types & functions, Sprains

IV) Integument

a) Skin - Types:Thin, Thick, hairy, Functions, innervation Structure: Epidermis, Dermis, Appendages

b) SUPERFICIAL FASCIA - Distribution of fat, functions

c) DEEP FASCIA - Features, Modifications, Functions

V) General Angiology

Arteries: Muscular, Elastic; Arterioles; Capillaries: Sinusoids, Veins - Anastomosis: End arterial; Vasa vasorum, nerve supply of blood vessels

Lymphatic system, Lymph vessels, Central lymphoid tissue, Peripheral lymphoid organs, Circulating lymphocytes - T and B lymphocytes

VI) General Neurology

Structure of nervous tissue,

Neurons: Synapses: Structural – type, Functional types

Classification of neurons: According to polarity and According to relative lengths of axons and dendrites Neuroglia: Nerves: Cranial – Spinal, Structure of typical spinal nerve

Autonomic nervous system: Sympathetic: Sympathetic ganglia, postganglionic fibres Parasympathetic: Cranial outflow, sacral outflow

B) REGIONAL ANATOMY

Regional Anatomy, Arthrology, Osteology, Neurology, Angiology of

I) Upper Limb
II) Lower limb
III) Abdomen
IV) Thorax
V) Pelvis & perineum
VI) Head, Neck & Face

C) MICROANATOMY

I) Microscope : Light microscope: parts, magnification, resolution, Electron microscope, Micro techniques, H and E staining

II) Cytology

III) Epithelial Definition, Classification, Structure of various types & subtypes of epithelia

Surface modifications, Cilia; Microvilli; Stereocilia; Cell junction and junctional complexes;

Glands, Classification; Unicellular and Multicellular; Exocrine, Endocrine, Amphicrine. Exocrine: Simple, Compound; Apocrine, Merocrine, Holocrine; Tubular, alveolar, tubuloalveolar; Serous; Mucous; Mixed

IV) Connective tissue, classification, structure, fibres, ground substance, loose areolar tissue, adipose tissue

V) Bone & Cartilage Compact, Cancellous, Developing bone; ossification, Woven, lamellar bone Cartilage, Classification, types, Perichondrium, functions

VI) Muscle

VII) Nervous Neurons, types; Neuroglia, types; Myelinated nerve fibre LS; Non-myelinated nerve fibre; Peripheral nerve; Nodes of Ranvier; Synapses;

VIII) Vessels

Large sized artery, Medium sized artery, Arteriole; Capillary, Sinusoid; Medium sized vein;

Lymphoid tissue

T cells, B cells; Mucosa Associated Lymphoid Tissue; Humoral immunity, Cell mediated immunity; Lymph node section; Thymus, Spleen, Tonsil

D) NEUROANATOMY:

I) The Forebrain
II) Brainstem
III) Cerebellum
IV) Blood supply of the brain
V) Spinal coed
VI) Peripheral nervous system
VII) Cranial nerves
VIII) Spinal nerves
IX) Autonomic nervous system

E) Genetics

I) Human chromosomes and chromosomal anomalies

II) Single gene pattern inheritance

III) Multifactorial pattern of inheritance

IV) Reproduction genetics

PART 2 – SUBJECT-SPECIFIC

Syllabus for Ph.D. in Medical Biochemistry

Applied and Clinical Biochemistry:

1. History & scope of Biochemistry
2. Biochemistry of Cell
3. Chemistry & biological importance of carbohydrates, proteins & amino acids, lipids, nucleic acids
4. Chemistry of blood & hemoglobin, plasma proteins, Blood coagulation
5. Environmental Biochemistry
6. Chemistry, composition & functions of biological fluids
7. Urine formation, excretion & urine analysis.
8. Composition, chemistry & functions of specialized tissues like muscle, bone, nerve, connective tissue, & brain adipose tissue.
9. Acid base balance & imbalance
10. Biochemistry of Diabetes mellitus, Atherosclerosis, Fatty liver, and obesity
11. Organ function tests : Liver function tests, Kidney function test, Thyroid function tests, Adrenal function tests, Pancreatic function tests, Gastric function tests
12. Radioisotopes & their clinical applications
13. Biochemistry of aging.
14. Neurochemistry in Health & Disease.
15. Biochemical changes in pregnancy & lactation
16. Water & electrolytes balance & imbalance.
17. Total Quality Management of Laboratories: Internal Quality control, External Quality control, Accreditation of laboratories
18. Basics of Medical statistics
19. Inborn errors of metabolism
20. Biotrasformations of Xenobiotics
21. Basic concepts of Biochemical Defense Mechanisms

Vitamins, Minerals, Hormones and Nutrition:

1. Principles of Nutrition – Balanced diet & its planning, Nutritive importance of various food sources, Calorific value of food , toxins & additives , Obesity, Protein Energy Malnutrition (PEM)- Kwashiorkor & Marasmus .
2. Diet in management of chronic diseases viz, Diabetes mellitus, Coronary artery disease, Renal disorders, Cancer, Hypertension, Anemia, Rickets & Osteomalacia.
3. Diet for overweight person, pregnant woman and during lactation
4. Vitamins- chemistry, biological importance, deficiency manifestations & recommended daily allowance.

5. Macro & micro –elements & their role in health & disease
6. Hormones : Communication among cells & tissues, Hormone- General mechanism of action of hormones, chemistry, functions, synthesis of steroid hormones, polypeptide hormones, & thyroid hormones. Chemistry & functions of hormones of pancreas and parathyroid. Local hormones. Clinical disorders of hormones, Hormone receptors.
7. Principles of Nutrition –Balanced diet & its planning, Nutritive importance of various
8. food sources, Calorific value of food , toxins & additives , Obesity, Protein Energy
9. Malnutrition (PEM)- Kwashirkor & Marasmus .
10. Diet in management of chronic diseases viz, Diabetes mellitus, Coronary artery disease, Renal disorders, Cancer, Hypertension, Anemia, Rickets & Osteomalacia.
11. Diet for overweight person, pregnant woman and during lactation

Metabolism, Genetics and Molecular Biology:

1. Digestion & absorption from gastrointestinal tract.
2. Intermediary metabolism, metabolism of Carbohydrates, Lipids, Proteins and Amino acids , Nucleic acids, Hemoglobin, metabolic control, energy production & regulation.
3. Metabolic interrelationships & regulatory mechanisms
4. Metabolic changes during starvation
5. Energy metabolism- Calorimetry, BMR- its determination & factors affecting it, SDA of food.
6. Central dogma, genetic code, protein biosynthesis & its regulation.
7. DNA: structure, functions, replications, Mutation & repair of DNA, Sequencing of nucleotides in DNA, Mitochondrial DNA, and DNA recombination.
8. RNA: composition, types, structure & functions.
9. Role of Nucleic acids in diagnosis of Molecular diseases & infectious diseases
10. Mitochondrial DNA & diseases.
11. Human Genome Project.
12. Genes & chromosomes, Gene mapping, Chromosome walking etc.
13. Gene expression & gene amplification & gene regulation, Oncogenes & biochemistry of cancer.
14. Genetic engineering: Recombinant DNA technology & its applications. Restriction endonucleases, Plasmids, Cosmids, Gene cloning, Gene libraries.
15. Basics techniques in genetic engineering.
    a) Isolation & purification of DNA, Methods of DNA assay.
    b) Blotting techniques – Southern, Northern & Western blotting.
    c) Polymerase chain reaction & its applications.
    d) Ligase chain reaction & its applications.
16. Tumor markers & growth factors
17. Biotechnology: Gene therapy, Nucleic acid hybridization, and DNA probes, Microarray of gene probes.
18. Genomics and Proteomics
19. Medical Bioinformatics

20. Lipid peroxidation, free radicals & antioxidants, Nitric oxide formation & its metabolism & its role in Medicine.
21. Biochemistry of AIDS
22. Genetic control of Immunity
23. Research Methodology & Medical ethics.

PART 2 – SUBJECT-SPECIFIC

Syllabus for Ph.D. in Medical Microbiology

General Microbiology and Immunology

Contains	**Topics**
Details of General Microbiology	Historical aspects, Classification of living beings, Microscopy
	Study of bacteria, Structure and composition of bacterial cell, Growth and multiplication of bacteria
	Sterilization& Disinfection,
	Culture media & Culture methods, Biochemical reactions,
	Antibiotic sensitivity test, Antimicrobial Agents & Minimization
	Universal safety precautions & Hospital waste Management
	Hospital acquired infections. Infection control committee
	Bacterial genetics, Genetic engineering and Molecular techniques
Details of Immunology and Serology.	Infection, Immunity, Vaccines and immunization schedule
	Antigen, Antibodies, Complement
	Serological reactions –Precipitation, Agglutination, CFT, Opsonization, neutralization, IFA, RIA, ELISA
	Structure and functions of immune system
	Hypersensitivity
	Autoimmunity
	Transplantation immunity, Tumour immunity

Systemic Bacteriology

Contains	**Topics**
Gram Positive Organisms	Staphylococcus
	Streptococcus, Pneumococcus
	Corynebacterium, Bacillus
Anaerobes and Mycobacteria	Clostridium- Perfringens, Tetani, Botulinum, Difficile
	Non-sporing anaerobes
	Mycobacterium tuberculosis
	M. leprae, Atypical mycobacteria
Gram Negative Organisms	Gonococcus, Meningococcus
	Escherichia Coli, Klebsiella, Proteus
	Salmonella, Shigella,
	Vibrio
	Pseudomonas, Burkholderia, Stenotrophomonas, Pasteurella,
	Hemophilus, Bordetella and Brucella
Spirochetes & Miscellaneous	Spirochetes. Treponema Pallidum, Leptospira, Borrelia
	Rickettsiae, Chlamydiae, Campylobacter, Helicobacter
	Actinomycetes and Nocardia
	Mycoplasma, legionella, Listeria
	Miscellaneous Bacteria

Virology, Mycology & Parasitology

Contains	**Topics**
Details of Virology	General Properties of viruses
	Outline of diagnosis of viral diseases, Virus host interactions
	Bacteriophage, Pox viruses.
	Herpes viruses, Adeno viruses
	Picorna viruses, Orthomyxoviruses
	Paramyxoviruses, Corona virus (all details about Pandemic 2019)
	Arboviruses, Rhabdoviruses
	Hepatitis viruses
	Human immunodeficiency virus and AIDS
	Oncogenic viruses
Details of Mycology	Historical aspects
	Classification of fungal diseases
	Fungi causing superficial infection
	Fungi causing subcutaneous mycoses
	Fungi causing systemic infection
	Fungi causing opportunistic infection
Details of Protozoology	E. histolytica and other amoebae
	Giardia, Trichomonas,
	Leishmania donovani and Trypanosomes
	Malarial Parasites , Babesia
	Toxoplasma gondii, Sarcocystis

Contains	Topics
Details of Helminthology	Introduction, General characters, classification
	Nematodes
	Cestodes
	Trematodes
	System wise Parasitic Infections.
	Parasitic Diseases In AIDS
	Diagnostic Procedures Concentration Techniques.

Applied Microbiology & Molecular Biology

Contains	Topics
Quality management & Quality Control in Microbiology	Total Quality Management including Quality Assurance & Quality Control, SOP writing
	Accreditation of Medical laboratory
	Laboratory Safety, Biomedical waste disposal
Molecular Biology and recent advances in Diagnostic Microbiology	
Applied Microbiology, Epidemiological markers, Biological Warfare, Zoonotic diseases	
Causative agents and Lab Diagnosis of various common clinical conditions- UTI, URTI, LRTI, Blood stream infections, IE, PUO, Diarrhea, dysentery, gastroenteritis, meningitis	
Bacteriology of food, water and Air	
Vehicles and vectors in Medical microbiology	

PART 2 – SUBJECT-SPECIFIC

Syllabus for Ph.D. in Medical Physiology

I) History of Physiology & General Physiology

History of Physiology
Genetic control mechanism.
Biophysics principles, Bioelectric potentials.
Growth, Development and Ageing
Regulations of Body fluids & electrolyte & applied aspects

II) Basic Biostatistics

Collection & Presentation of Data, Measurement of Central tendency, Normal distribution, T- Test

III) Environmental Physiology

Physiology at High altitude, Hyperbarism, Regulation of body temperature, Space Physiology; Environmental pollution- radiation, smoke, noise, industrial.

IV) Yoga & Meditation

Yoga Asanas, Physiological Effects of Yoga, Physiological Effects of Meditation, Health Benefits of Yoga & Meditation.

V) Endocrine System

Introduction: Mechanism of hormone action; Endocrine functions of Hypothalamus; Anterior pituitary hormones: functions, regulation, disorders. Posterior pituitary hormones- ADH & Oxytocin functions, regulation, disorders, Thyroid hormones: synthesis, fate, functions, regulation, disorders; Parathyroid hormone: synthesis, functions, regulation, disorders. Adrenal cortex and Adrenal medulla Hormone: secretion, functions, regulation, disorders; pancreatic hormones- Insulin & Glucagon secretion, functions, regulation, disorders.

VI) Reproductive System

Sex Chromosomes, Determination, Differentiation; Functional Anatomy of Reproductive System; Puberty & Menopause; Spermatogenesis & Testosterone Oogenesis; Menstrual cycle; ovarian cycle & Ovulation; Estrogen & progesterone Placenta - Circulation, functions & Physiological basis of fertilization & implantation: Pregnancy; parturition; Lactation and contraception.

VII) Cardiovascular System

General organization of CVS; Physiological anatomy of Heart; Cardiac muscle Excitatory and Conducting tissue; Electrocardiography: Normal ECG & abnormal ECG; Cardiac Cycle; Heart sounds; Heart rate and its regulation; Hemodynamics of blood flow: Arteries and Arterioles: Blood pressure, its regulation, applied; Microcirculation; Local Blood Flow Regulation, Lymphatic system; Oedema; Cardiac Output; Venous Return; Coronary Circulation; Ischemic heart disease; Cardiac failure; Circulatory Shock; Congenital heart Disease: Regional Circulations; Effect of exercise on CVS .

VIII) Respiratory System

Internal & External Respiration; Functional Anatomy of Respiratory Tract: Functions of respiratory system; Mechanics of respiration; Compliance: Surfactant; Lung volumes and capacities; Dead space; Diffusion of Gases; Respiratory membrane: Transport of O_2: Oxygen-hemoglobin dissociation curve; Transport of CO_2: Neural control of Respiration; Chemical control of Respiration; Pulmonary Circulation; Ventilation perfusion ratio; Hypoxia Respiratory adjustments in exercise; Artificial Respiration; Pulmonary function Test.

IX) Kidney

Structure & Functions of kidney; Nephron Functional unit; Juxtaglomerular Apparatus; Renal Circulation; Clearance; Formation of urine: Glomerular Filteration, Tubular reabsorption & secretion; Concentration & Dilution of urine; Role of kidney in acid base balance; Physiology of micturition; Renal failure, dialysis; renal transplant; artificial kidney; diuretics; Composition of urine & abnormal constituents; Renal Function Tests.

X) Special Senses

Vision: Functional anatomy of eye; Optics, Errors of refraction; Aqueous humor, Pupillary reflexes; Microscopic structure of retina, Rods & Cones, Photochemistry of vision; dark & light adaptation; Colour vision; Visual pathway; Visual cortex. Movements of eyeballs.
Hearing: Physiological anatomy and Functions of external ear, middle ear and inner ear, Cochlea, Mechanism of hearing, Place principle, Auditory pathway & auditory cortex; Deafness, Audiometry.
Taste: Functional anatomy of taste buds, different taste modalities, pathway, receptors of taste, pathways, applied. Smell: Functional anatomy of receptors, primary olfactory sensations, pathway, Applied.

XII) Central Nervous System

General organization of Nervous System; Structural and Functional divisions and Levels; Synapse; Receptors; Ascending Tracts; Physiology of pain; Internal analgesia system; Sensory Cortex; Thalamus; Motor system - Organization and different motor components; Spinal cord - Organization for motor functions, Cord reflexes, Spinal shock; Reflexes; Muscle Spindle and Golgi tendon organs: Motor Cortex: Descending Tracts; Upper motor Neuron Lesion, Lower Motor Neuron Lesion; Brain stem - Role in control of Motor functions, Vestibular apparatus and brainstem nuclei, Maintenance and regulation of tone, posture and equilibrium; Cerebellum and its motor function; Basal Ganglia and its motor functions; Parkinson's disease; Higher function of the brain-learning, Memory, Language; Limbic system; Hypothalamus; Reticular activating system; Electroencephalogram; sleep; Cerebral blood Flow and Cerebrospinal fluid.

PART 2 – SUBJECT-SPECIFIC

Syllabus for Ph.D. in Medical Pharmacology

General Pharmacology principles and Biomedical sciences

1. Introduction
2. Transitional Medicine
3. Pharmo dynamics and receptor Pharmacology
4. Pharmo Kinetics absorption and distribution of drugs
5. Bio transformation and excretion of drugs
6. Factors modifying drugs action
7. Posology and reverse Pharmacology
8. Adverse drug reaction
9. Drug interaction fixed-dose combination
10. Rational of drug development
11. Toxicology

Clinical Pharmacology and recent advances

1. Kinetics of elimination of drugs
2. Therapeutic drug monitoring
3. Phases of dug development

Systemic pharmacology, and Applied therapeutics

1. Autonomic nervous system
2. Autacoids
3. Gene therapy
4. Immunosuppressant drugs
5. Hormones and hormone replacement therapy
6. Vitamins and chelating agents
7. Anticancer agents
8. Pharmaco therapy of drugs affecting calcium balance
9. Antiviral agents
10. Immunomodulators

Experimental pharmacology and bioassay

1. Good laboratory practice
2. Drugs screening methods for various drugs
3. Drug analyses
4. Methods involved in drugs testing of chemotherapeutic drugs
5. Teratogenicity
6. ‘P’ drug concept

PART 2 – SUBJECT SPECIFIC

Syllabus for PhD in Computer Science & Engineering

Complexity of Algorithm. Algorithm Design Paradigms. Stack. Queues. Hash Table. Binary Search, AVL. Red-black. B-Trees. Skip-lists. Priority Queue. Graph: Shortest Path, MST, Depth-first and Breadth-first Algorithms. Advanced Sorting Methods. Multi-Dimensional, Kinetic Data Structures.

Algorithms:

Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, connected components, spanning trees, shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes - P, NP, NP-hard, NP-complete. Series Evaluation, Algorithm Correctness and Efficiency.

Operating Systems:

Synchronization Mechanisms. Process Deadlocks. Resource Models. Local and Global states. Distributed Operating Systems. Event Ordering. Timestamps. Distributed Mutual Exclusion. Token and non-token-based algorithms. Comparative Performance Analysis. Concurrency Control. Shared Memory. File Systems. Agreement Protocols for handling Processor Failures.

Database Systems:

Database design (integrity constraints, normal forms). ER model, Relational model (relational algebra, tuple calculus), Storage and File Structures. Indexing and Hashing. Transactions and Concurrency control. Recovery. Query Processing. Query Optimization. Object-Oriented DBMS. Extended Relational Model. Spatial databases. Multimedia Databases. Distributed Databases. Active Databases. Temporal Databases. Deductive Databases. Mobile Databases and Web-enabled Database Systems.

Computer Organization and Architecture:

Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point). Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage. Performance Analysis, Fault Tolerance and Scalability. Modeling Performance. Pipelined Systems. Interconnection Networks. Processor Array. Multi-computers. Multiprocessors. Systolic Array. Vector Processors. Structured Memory Design for Parallel Systems – Symmetric Shared, Distributed Shared, Synchronization. Grid computing.

Software Engineering:

Requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance. Personal Software Process. Team Software Process. Usability. Agile Methods. Process Models- Iterative, Scrum, XP, and Evo. Advanced UML.

Computer Networks:
ISO/OSI stack, TCP/IP, LAN technologies (Ethernet, Token Ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (ICMP, DNS, SMTP, POP, FTP, HTTP); Basic concepts of hubs, switches, gateways, and routers. Network security. IPv6 Protocols and their applications. Real-time communication protocols. High-speed local and wide area networks. Virtual networks. Broadband networks. Introduction to intelligent networking. Performance analysis of networks.

Artificial Intelligence:
Artificial Intelligence, Intelligent Agents, Solving Problems by Searching, Beyond Classical Search, Adversarial Search, Constraint Satisfaction Problems, Logical, First- Order Logic, Inference in First-Order Logic, Classical Planning, Planning and Acting in the Real World, Knowledge Representation, Quantifying Uncertainty, Probabilistic Reasoning, Probabilistic Reasoning over Time, Making Simple Decisions, Making Complex Decisions, Learning from Examples, Knowledge in Learning, Learning Probabilistic Models, Reinforcement Learning.

Mathematics for Computation:
Discrete Mathematics: Propositional and first-order logic. Sets, relations, functions, Partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions. Linear Algebra: Matrices, determinants, systems of linear equations, eigenvalues and eigenvectors.

PART 2 – SUBJECT SPECIFIC

Syllabus for PhD in Art and Commerce

- Nature and Scope of Marketing, Role of Marketing in India, Concepts of Marketing – Consumer Buying Behavior – Buying motives, Perception, Learning, reference Groups – Consumer Decision Making – Market Segmentation, Pricing – Methods of price determination, Competitive pricing, Advertising – Objectives, Types of Advertising, sales promotion and types.

- Concepts and Perspectives in HRM- Human Resource Planning- Objectives, Process and Techniques. Job analysis-Job Description- Job Evaluation. Recruitment and Selection and Exit Policy. Training and Development- Types, Training Need Analysis and methods. Performance Appraisal and Evaluation Types and Methods. Compensation Management and Wage Determination. Industrial Relations and Trade Unions. Dispute Resolution and Grievance Management. Labor Welfare.

- Introduction: Meaning and Objectives of Auditing. Types of Audit, Internal Audit. Audit Process: Audit Program, Audit and book, working papers and evidence, Preparation before commencing of Audit. Internal Check System: Routine Checking, Internal Check and Test Checking. Internal Control and Audit Procedure.

- Accounting Principles & Concepts: Book-Keeping and Accounting – Financial Accounting – Concepts and Conventions – Double Entry System – Preparation of Journal, Ledger and Trial Balance – Preparation of Final Accounts –Trading, Profit and Loss Account and Balance Sheet With Adjustment Entries, Simple Problems Only - Capital and Revenue Expenditure and Receipts. Depreciation – Causes – Methods of Calculating Depreciation – Straight Line Method, Diminishing Balance Method and Annuity Method - Ratio Analysis – Uses and Limitations – Classification of Ratios – Liquidity, Profitability, Financial and Turnover Ratios – Simple Problems Only.

- Management: Meaning and definition, Nature, Purpose, Scope, Importance and Functions, Management as art, science and profession, Management as a social system, Concept of Management, administration and organization. Principles of management, Scientific Management.

- Mutual Funds-Types of mutual funds schemes, ETFs, Expenses associated with mutual funds; Hedge funds, venture capital funds, private equity funds and their regulation. Pension Funds-Issues in saving for retirement & role of the financial system; Defined benefit, defined contribution and hybrid pension plans; Pension funds as financial

intermediaries and their regulation. Insurance-Incentive problems in insurance-moral hazard & adverse selection, pure premium, premium smoothing etc.; Reinsurance, catastrophe insurance, captive insurance.

PART 2 – SUBJECT SPECIFIC

Syllabus for PhD in Physical Education and Sports

Section-1 Physical Education- Physical education and adapted physical education, their objectives, Philosophies of education as applied to physical education. Growth and development of physical education in India: Recreation- its principles, characteristics and importance. Indoor and outdoor recreational programmes. Wellness- its importance, benefits and challenges. Development and maintenance of wellness, sports leadership, sports as cultural heritage and social aspects of competition. Ancient & Modern Olympics games, Asian and Commonwealth games. Structure and functions of international and national bodies controlling various games and sports,. Prominent honors and awards in games and sports

Section 2 Exercise Physiology, Cardio respiratory adaptations to long and short-term physical activities Muscle- its types, characteristics and functions. Microscopic structure of muscle fiber. Sliding filament theory of muscular contraction. Types of muscle fibers and sports performance. Muscular adaptations to exercise Neuro-muscular junction and transmission of nerve impulse, kinesthetic Sense organs and neural control of motor skills. Bio-chemical aspects of exercise – Metabolism of food products. Aerobic Recovery process – Physiological aspects of fatigue. Restoration of energy stores, Nutritional aspects of performance, Environmental influence on human physiology. Women in sports- trainability.

Section 3 Kinesiology and biomechanics, Modern trends in biomechanics, Planes and Axes of human body. Joints and their movements. Muscle attachments – Origin, insertion, action and leverage of the principal muscles used in sports. Motion: its laws and their application in sports. Projectile and principles of projections Linear and angular kinematics and kinetics. Friction, Spin, impact and elasticity. Air and water dynamics. Mechanical advantage and applications of Levers in sports. Posture and its deformities with their corrective exercises. Kinesiological, Muscular and mechanical analyses of fundamental movements: Mechanical analyses of major sports skills

Section 4 Sports psychology- its importance in the field of physical education and sports. Motivation in sports- types, theories and dynamics. Psychological factors affecting sports performance Emotions, Anxiety aggression, stress, self-confidence, concentration, mental practice and goal setting. Personality- Theories of personality, measurement of personality. Group dynamics, Group cohesion and leadership in sports. Cognitive process- memory and thinking. Principles of Motor skill learning. Transfer of training and its types with its implication in sports. Long- and short-term psychological preparation for performance/ competition. Psychological skill training for activation and relaxation Spectators and sports performance.

Section 5 Health Education, Role of genetics and environment in achieving health. Community health programme. Psychosomatic disorders/ sedentary life style diseases: causes, symptoms and prevention. Obesity related health problems. Body weight control and its significance on health. Role of exercise, dieting and combination of exercise & dieting on weight control. Nutrition-Balanced diet and its components. Nutritional Deficiencies. Understanding of malnutrition and nutritional supplements. Effects of smoking, alcohol, & drugs on health; prevention and rehabilitation.

Section 6 Sports training, Training load, its features, principles and adaptation process, Endurance- its characteristics, types of endurance, factors determining endurance and endurance development. Speed- its characteristics, types of Speed, factors determining Speed and speed development. Flexibility, Coordinative abilities, Technique and skill- its characteristics and importance. Different stages of technique development and technique training, Tactics and strategy, Planning- its importance and principles. Concept of different periods – Preparatory, competition and transitional. Types of Competition: Talent identification- process and procedure

Section 7 Test, Measurement and Evaluation, Principles and processes of evaluation in physical education, Tests for fitness- Physical fitness, motor fitness, motor ability and motor educability. Health related fitness tests, Test for fitness components- strength, endurance, speed, flexibility and coordinative abilities. Sports skill tests- Badminton, Basketball, Football, Hockey, Tennis, and Volleyball. Anthropometric Measurements- land marks and measurement of various body segments, height, sitting-height, weight, diameters, circumferences, skinfolds, body mass index, ponderal index. Somatotype and Posture evaluating techniques.

Section 8 Management in Physical Education Management- its principles and theories. Scope of management in physical education and sports. Guiding principles for organizing physical education & sports programmes in institutions. Personnel management- objectives and principles. Self-appraisal, Essential skills of administration. Financial management- objectives, purposes, principles and scope.