

Doctor of Philosophy (Ph.D.)

Ph.D. Entrance Examination (PhDEE) - July 2022

Information Brochure



(For admission into various Ph.D. Programs for Academic Session 2022-2023)

AT A GLANCE

Important Dates of Ph.D. Entrance Examination - July 2022		
1.	Schedule for on-line submission of Application forms with requisite fee	21 April 2022 (Wednesday) to 20 June 2022 (Monday)
2.	Date of downloading Admit-Cards from University website	02 July 2022 (Saturday)
3.	Date & Time of Entrance Examination	10 July 2022 (Sunday) 10:00 AM to 12:00 Noon
4.	Date of Uploading Answer Keys on University website	12 July 2022 (Tuesday)
5.	Declaration of Entrance Examination Result	22 July 2022 (Friday)
6.	Personal interaction and Interview	Tentatively between 01 August 2022 (Monday) to 06 August 2022 (Saturday)
7.	Final Result	13 August 2022 (Saturday)
8.	Date of Physical Document Verification and payment of fees	27 August 2022 (Saturday)

Link to fill online application for Ph.D.E.E. July 2022

https://himshikhar.srhu.edu.in/SRHU_ADMISSION/login

Online Application fee: ₹ 1500 /- + Transaction Charges as applicable

Important Note

- Be it known to all that there is no management quota in the University or its Constituent Colleges/Schools. The admissions to Ph.D. programs offered by the University are made purely on merit decided by the University (wherever applicable). Public, in general, is informed that Swami Rama Himalayan University or its constituent colleges have never authorized/solicited any person(s) or any agent(s) for admissions in the Ph.D. programs. Therefore, public is cautioned to be aware of unscrupulous person(s)/agents/advertisements. The Authorities of the University or its constituent colleges shall not be responsible, if students/wards are cheated on this account.
- No claim for refund of application fee, paid for Ph.D.E.E.-July 2022 shall be entertained.
- After declaration of the result of written entrance exam, the qualified candidates will be called for personal interaction and interview to discuss research interest/area.
- Ph.D. programme shall be in **Regular Mode** for a minimum duration of three years, including course work and a maximum of six years.
- Candidates working under Central Govt. /State Govt. /Semi Govt. /Autonomous/ Private organizations shall submit their applications through proper channels i.e. through the employer. They shall submit a '**No Objection Certificate**' from their employer along with the prescribed application form.
- Employees of Swami Rama Himalayan University intending to register for Ph.D. programme shall submit their application through their respective Head of the Constituent College/ Academic Unit. It is mandatory for all the employees of SRHU, to obtain '**No Objection Certificate**' from the respective HOD prior to applying for Ph.D. program. The selection procedure for these candidates shall be the same as for the external candidates.
- **Candidates having their Master's degree from foreign university are required to submit equivalence certificate issued by Association of Indian Universities (AIU) at the time of physical document verification. Foreign nationals are required to follow the norms and procedures as prescribed by the Government of India/University Grants Commission or any other Authorities/Bodies and Guidelines for admission of International Students of the Swami Rama Himalayan University, Dehradun.**
- Candidates shall have to produce their Master's degree and marksheet with the required percentage as per the UGC (Minimum Standards and Procedure for Award of M.Phil./PH.D Degrees) Regulations, 2016, at the time of admission/ document verification; failing which his/her candidature will be cancelled automatically.
- Merely qualifying the Ph.D. Entrance Examination (written examination & personal interaction and interview) will not entitle the student secure admission to Ph.D. program unless all other conditions laid down by the University are fulfilled.
- **Admission/Registration of a candidate in Ph.D. program shall be cancelled by the University/competent authority (as the case may be), if any information provided by the candidate is found false/wrong at any time during the duration of Ph.D. program.**

1. Doctoral Degree Program

The University offers Ph.D. in following areas:

S. No.	Specialization	Specialization Code	Eligibility Criteria
1.	Biochemistry	01	<p>1. Postgraduate Master's degree in Biochemistry/ Biotechnology or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. Degree in Biochemistry/ Biotechnology with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
2.	Biotechnology	02	<p>1. Postgraduate Master's degree in Biotechnology/ Biochemistry/ Botany/ Zoology/ Microbiology, or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. Degree in Biotechnology/Biochemistry/ Botany /Zoology/ Microbiology with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
3.	Epidemiology	04	<p>1. Postgraduate Master's degree in Epidemiology/ Community Medicine or M.S. in Clinical Research with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. Degree in Epidemiology/ Community Medicine/ Clinical Research with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
4.	Immunology	06	<p>1. Postgraduate Master's degree in Immunology/ Biochemistry/ Biotechnology/ Microbiology or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale from a recognized university.</p> <p>2. M.Phil. in Immunology/ Biochemistry/ Biotechnology/ Microbiology with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
5.	Management (Finance, Human Resource, Marketing)	07	<p>1. Postgraduate Master's degree in Commerce/ Business Administration/ Human Resource Management/ Finance/ Marketing or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. in Commerce/ Business Administration/ Human Resource Management/ Finance/ Marketing with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>

S. No.	Specialization	Specialization Code	Eligibility Criteria
6.	Medical Physics	08	<p>1. Postgraduate Master's degree in Medical Physics or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. in Medical Physics with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
7.	Microbiology	09	<p>1. Postgraduate Master's degree in Microbiology/ Biotechnology or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. Degree in Microbiology/ Biotechnology with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
8.	Oncological Sciences	11	<p>1. Postgraduate Master's degree in Oncology Sciences/ Pharmacology/ Microbiology/Biochemistry/Biotechnology or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. Degree in Oncology Sciences/ Pharmacology/ Microbiology/Biochemistry/Biotechnology with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
9.	Pharmacology	12	<p>1. Postgraduate Master's degree in Pharmacology, or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. Degree in Pharmacology with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
10.	Physiology	13	<p>1. Postgraduate Master's degree in Physiology, or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. Degree in Physiology with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>
11.	Yoga Sciences	14	<p>1. Postgraduate Master's degree in Yoga, or any other related fields with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p> <p>2. M.Phil. Degree in Yoga with minimum 55% aggregate marks or 5.5 CGPA out of 10 on a 10 point scale.</p>

Note: A relaxation of 5% marks, from 55% to 50%, or an equivalent relaxation of grade, may be allowed for the candidates belonging SC/ST/OBC (non-creamy layer)/ differently-abled.

2. Fee Structure

S. No.	Heads	For All India Candidates	For Permanent Resident of Uttarakhand Candidates
1.	Tuition Fee	₹ 80,000/- (per annum)	₹ 59,200/- (per annum)
2.	Admission Fee	₹ 20,000/- (one time non-refundable)	
3.	Enrolment Fee	₹ 1,000/- (one time)	
4.	Security Fee	₹ 15,000/- (refundable on completion of programme)	
5.	Course Work Fee	₹ 10,000/- (one time)	
6.	Examination Fee for Course Work	₹ 3,500/- (Additional examination fee of ₹ 3,500/- shall be charged in case the candidate fails to complete the course work in first attempt)	
7.	Charges for Plagiarism check of Ph.D. Synopsis	₹ 2,500/-	
8.	Charges for DRC held to approve the Ph.D. Research Title & Synopsis	₹ 10,000/- per DRC	
9.	Laboratory fee	₹ 20,000/- (Annually, after DRC)-The fee is applicable to the Ph.D. scholars wherever the laboratory work is the part of their research.	
10.	Charges for Plagiarism check for Ph.D. thesis	₹ 5,000/- (one time)	
11.	Thesis Evaluation & Viva Voce (To be deposited one month prior to submission of Thesis)	₹ 5000/- per External Evaluation & ₹ 20,000/- per Viva-Voce	
12.	Hostel & Mess charges	As per actuals	
13.	Late fee for delayed fee submission (Will be calculated from date of first fee submission for Ph.D. program)	₹100/- per day	
14.	Convocation fee	₹ 2,000/- (one time)	
15.	Alumni Fee	₹ 1,000/- (one time)	
16.	Hepatitis B Vaccination Charges (Mandatory for Ph.D. scholars working in Himalayan Hospital)	₹ 1,500/- (one time) If previously vaccinated deposit the certificate of vaccination	
<p>Note:</p> <ul style="list-style-type: none"> Duplicate Degree fee ₹1,000/- shall be charged subject to the condition that the original Degree has been mutilated/ lost. The Tuition fee shall continue to be paid by the Ph.D. scholar, who are either already enrolled or enrolled in future, till submission of thesis within stipulated duration as prescribed by the University from time to time. 			

3. Pattern of Entrance Examination

3.1. Written Entrance Examination

- Date of Written Entrance Examination: **10 July 2022 (Sunday)**
 - Duration of Written Entrance Examination: **2 Hrs (10:00 AM to 12:00 Noon)**
 - Time of Reporting: 9:30 AM with original and valid Photo ID (PAN Card, Driving License and Aadhaar Card) along with the admit card downloaded from the University website.
 - **Center for Written Entrance Examination:** Swami Rama Himalayan University Campus, Jolly Grant, Dehradun.
- Answer of the Multiple Choice Questions (MCQ) should be marked by the candidate using black ink ball point pen only.
 - Language of question paper will be in English medium only.
 - There is no penalty (negative marking) for wrong answer marked by the candidate.

3.2. Personal Interaction and Interview

- The Personal Interaction and Interview shall also consider the following aspects, viz. whether:
 - a) The candidate possesses the competence for the proposed research
 - b) The research work can be suitably undertaken at the Institution/College
 - c) The proposed area of research can contribute to new/additional knowledge
- The assessment of the Ph.D. candidates in Personal Interaction and Interview shall be on the basis of following criteria:
 - a) Presentation (15 Marks)
 - b) Knowledge (20 Marks)
 - c) Aptitude for Research (15 Marks)
- The Presentation should be based on the proposed Ph.D. research work which could be undertaken by the candidate after completion of the admission process.

Note: UGC/CSIR-NET/SLET/GATE/GPAT/M.Phil. Qualified candidates are exempted from Written Entrance Examination. However, they will have to appear for personal interaction and interview as notified. Such candidates are required to obtain 50% marks in the personal interaction and interview to qualify for admission to the Ph.D. program. The UGC/CSIR NET/SLET/GATE/GPAT/M.Phil. etc. certificate shall be valid till three (3) years from the date of declaration of the result or issue of certificates.

S. No.	Examination	Marks	Syllabus	Duration	Timings
1	Written Entrance Examination	100	The Question paper will comprise of Multiple Choice Questions (MCQ) of two sections: Research Methodology (50%) and Subject Specific (50%) (as per SRHU syllabus)	2 Hrs.	10:00 A.M. To 12:00 Noon
The Written Entrance Examination shall be qualifying with qualifying marks as 50%					
2	Personal Interaction and Interview	50	Qualified candidates are required to discuss their proposed area of research in the form of PPT, before duly constituted Departmental Research Committee (DRC)	30 Min.	The date for personal interaction and interview will be intimated only to the candidates who qualify in the Written Entrance Examination.

- A candidate who has secured a minimum of 50% marks each in the Entrance Examination and Personal Interaction and Interview separately, shall be considered eligible for admission into the Ph.D. programme of the University.
- In the final merit list a weightage of 70% to the Written Entrance Examination and 30% to the performance in the Personal Interaction and Interview shall be given.
- Ph.D. program shall also include of a common course work program of six months (one semester) for all Ph.D. students, which must be mandatorily cleared by the students within two attempts.
- The minimum eligibility criteria indicated above for each programme is only an enabling clause. The admission to Ph.D. program is subject to the scrutiny of eligibility of the candidates; availability of seats/supervisors/co-supervisor and any other criteria as framed by the University from time to time.
- The candidates, who have passed the qualifying examinations from any foreign University will have to submit equivalence certificates from the Association of Indian Universities (AIU), New Delhi.

4. Areas of Research

Prospective candidates may go through the area of research as are available in the departments of Swami Rama Himalayan University.

S. No.	Program	Areas of Research
1	Biochemistry, Biotechnology, Microbiology	Environmental Biotechnology, Biological Research, Biochemistry, Microbiology Genetics, Neuro Biology, Virology, Human, Animal, Plant, Microbial Cell and Molecular Biology. Nano Biotechnology, Nano toxicology, Bio informatics and Systems Biology.
2	Epidemiology	Health services research, Cancer Epidemiology, Cardiovascular Epidemiology, Clinical Epidemiology, Environmental and Occupational Epidemiology, Epidemiologic Methods, Epidemiology of Aging, Infectious Disease Epidemiology, Nutritional Epidemiology, Reproductive, Perinatal and Pediatric Epidemiology, Social Epidemiology, Public and Population Health, Global Health Epidemiology, Molecular Epidemiology
3	Immunology	Cancer immunology and immunotherapy, Autoimmunity and Immune-mediated diseases, Immune system development and Regeneration, Adaptive immunity, Innate immunity, Infectious diseases, Transplantation
4	Management (Finance, Human Resource, Marketing)	Accounting and Finance, Economics, Human Resource, Marketing Management
5	Medical Physics	Medical imaging, Nuclear medicine, Radiation protection and Radiation oncology
6	Oncological Sciences	Cancer genetics & Genomics, Cancer immunotherapy and vaccines, Cancer metabolism, Cell Signalling & Regulation, Cell based therapy, Computational Oncology, Clinical Oncology, Cancer prevention, Drug Development and Clinical Trials, Community Oncology, Palliative and Supportive Oncology, Nursing and Psychosocial Issues in Oncology
7	Pharmacology	Clinical pharmacology, Cardiovascular pharmacology, Neuropharmacology, Respiratory pharmacology, Renal pharmacology, Gastrointestinal pharmacology, Cancer pharmacology, Pharmacovigilance, Adverse drug reaction monitoring, Drug interaction studies, Pharmaco-epidemiological studies and Pharmaco-economics, Drug utilization studies.
8	Physiology	Yoga in stress disorders, Exercise physiology, Occupational Health, Non-communicable diseases
9	Yoga Sciences	Yoga and its allied subjects

5. Ph.D. Syllabus for Entrance Examination **Research Methodology (Common for all candidates)**

Unit - I

Introduction of Research, Nature and purpose of scientific enquiry, Parameters of research, Problem Definition, Definition of construct and variables, Research Process, Steps in Research Process.

Unit - II

Research Design, Concepts and Type of research design, Design of research on the basis of application–Fundamental and Applied.

Descriptive Research, Qualitative and Quantitative.

Quantitative design of research on the basis of Mathematical and Statistical methods, Field and laboratory experiment.

Qualitative design of research on the basis of Exploratory, case study, Focus Group and descriptive. Surveys and observations.

Unit - III

Measures of Central Tendency: Mean, Median and Mode.

Unit - IV

Reading Comprehension

A passage to be set with questions to be answered (General)

Unit - V

Reasoning- Mathematical, Logical and Analytical

Number Series; Letter Series; Codes, Verbal Analogies; Word Analogy – Verbal Classification, Reasoning Logical Diagrams, Venn diagram, Analytical Reasoning

Ph.D. Syllabus for Entrance Examination - **Biochemistry**

Unit - I

Structural organization of eukaryotic and prokaryotic cells. Ultrastructure of nucleus, mitochondria, endoplasmic reticulum (smooth and rough), Golgi apparatus Role of ER and GA in synthesis of membrane proteins. Lysosomes (primary and secondary lysosomes and their functions), peroxisomes, vacuoles and microbodies. Molecular constituents, physico-chemical properties, supramolecular structure, organization and architecture (fluid mosaic model) of bio-membranes. General principles of cell communication- extra-cellular signaling molecules and their receptors.

Unit - II

History of Microbiology, Identification, characterization and classification of microorganisms. Distinguishing characteristics between prokaryotic and eukaryotic cells Structure and function of Cell wall of bacteria, cell membranes, flagella, pili, capsule, gas vesicles, carboxysomes, magnetosomes and phycobilisomes.

Unit - III

Carbohydrate – Classification, structure and functions, Carbohydrate Metabolism, Protein – Classification, structure and functions, Overview of Amino acid metabolism, Urea cycle. Lipids - Classification and structure, Fatty Acid Metabolism: Fatty Acid Oxidation. Fatty Acid Biosynthesis and Regulation. Nucleic Acid Metabolism.

Unit - IV

Structure and properties of nucleic acids, DNA Replication, Transcription, Translation, Gene regulation in prokaryotes and eukaryotes, Principles and Tools of Gene Cloning, Gene cloning: Steps of cloning, Genome, Genome Analysis and Applications of RDT.

Unit - V

Biochemical and analytical techniques: Microscopy and Biosensors, Centrifugation, Chromatography, Electrophoretic Techniques, Spectroscopy and Radiotracer Techniques.

Ph.D. Syllabus for Entrance Examination - **Biotechnology**

Unit - I

Structural organization of eukaryotic and prokaryotic cells. Ultrastructure of nucleus, mitochondria, endoplasmic reticulum (smooth and rough), Golgi apparatus, lysosomes (primary and secondary lysosomes and their functions), peroxisomes, vacuoles and microbodies. Identification, characterization and classification of microorganisms. Distinguishing characteristics between prokaryotic and eukaryotic cells Structure and function of Cell wall of bacteria, cell membranes, flagella, pili, capsule, gas vesicles, carboxysomes, magnetosomes and phycobilisomes.

Unit - II

Structure and properties of nucleic acids, DNA Replication, Transcription, Translation, Gene regulation in prokaryotes and eukaryotes, Principles and Tools of Gene Cloning, Gene cloning: Steps of cloning, Genome, Genome Analysis and Applications of RDT.

Unit - III

Biochemical and analytical techniques: Microscopy and Biosensors, Centrifugation, Chromatography, Electrophoretic Techniques, Spectroscopy and Radiotracer Techniques.

Unit - IV

Immunology: fundamental concepts and overview of the immune system: Components of innate and acquired immunity; phagocytosis; complement and inflammatory responses; innate immune response. Organs of immune system, primary and secondary lymphoid organs.

Enzyme Technology: Methods for large scale production of enzymes. Methods for immobilization of enzymes. Artificial enzyme, enzyme electrode.

Environmental biotechnology: Basic concepts and issues. Environment Pollution: Types of pollution, methods for measurement of pollution, methods for environmental management.

Unit - V

Structure and organization of animal cell, Equipment and materials for animal cell culture technology & Cryopreservation. Animal cell culture medium

Plant tissue culture: Setting up a cell culture laboratory, Plant tissue culture media, Type of plant cell and tissue culture. Clonal propagation and production of virus -free plants.

Ph.D. Syllabus for Entrance Examination - Epidemiology

Unit-I: Design & Conduct of clinical and epidemiological studies

1. Descriptive Studies
 - 1.1 Types- Correlation studies
 - Case reports and case series
 - Cross sectional Surveys
 - 1.2 Time, place and person distribution (Please check the bullet numbering)
 - 1.3 Hypothesis formulation
2. Case Control Studies
 - 2.1 Design of case control studies
 - 2.2 Selection bias
 - 2.3 Matching
 - 2.4 Analysis
 - 2.5 Interpretation
3. Cohort Studies
 - 3.1 Study design
 - 3.2 Timing of measurements
 - 3.3 Selection of subjects
 - 3.4 Data collection
 - 3.5 Analysis
 - 3.6 Interpretation
4. Clinical studies (Design & Conduct)
 - 4.1 Research question
 - 4.2 Hypothesis
 - 4.3 Core design
 - a) Parallel
 - b) Cross over
 - c) Mixed
 - 4.4 Study participants
 - 4.5 Sample size calculation
 - 4.6 Statistical power
 - 4.7 Allocation
 - 4.8 Masking
 - 4.9 Treatment groups
 - 4.10 Ethical issues
 - 4.11 Data collection
 - 4.12 Analyses
 - 4.13 Interpretation

Unit-II: Chronic Disease Epidemiology

1. Chronic Disease: A Public Health Perspective
2. Epidemiology of Non Communicable Diseases
 - Cardiovascular Diseases including stroke
 - Cancers particularly in relation to India
 - Type II Diabetes

Unit-III: Ethical Issues Design, Conduct & Reporting of Medical Research

1. Gold standard
2. Ethical frameworks for conduct of clinical trial
 - Issues in clinical trial design
 - Informed consent
3. Four golden rules of ethical conduct in clinical research
 - Respect for patient autonomy
 - Maximization of research impact on medical treatment
 - Minimization of risk to research participants
 - Scientific integrity

Unit-IV: Public health surveillance system

1. **Population health: assessment, indicators, and measures**
 - Introduction to public health surveillance
 - Population health information
 - Population health and community health assessment
 - Population health indicators
 - Disease surveillance at state and local level
 - Surveillance : The Sentinel Health Event Approach
2. **Information systems**
 - Types of health information systems in India
 - Evaluating Public health surveillance system
3. **Types of surveillance**
 - Chronic disease surveillance
 - Occupational and environmental surveillance
 - Infectious disease surveillance
 - Syndromic surveillance

Unit-V: Social Problems, Communication & Health Education

1. a. Social context of Medicine
b. Concepts in Sociology
c. Psychology
 - Emotions
 - Role of emotions in health & disease
 - Control of emotions
 - Learning
 - Conditions affecting learning
 - Types of Learning
 - Personality - Components of Personality and I.Q.
- d. Family life of cycle
 - Family cycle & stress
 - Family in Health & Disease
2. **Cultural factors in Health & Disease**
 - The Community**
 - a. Structure of Society
 - b. Social class & Socio –economic status
 - c. Social Problems of a Community
 - d. Social Agencies

e. Community Services

3. Communication

- a. The Communication Process
- b. Types of Communication
- c. Barriers of Communication

4. Health Education

- a. Definition
- b. Aims & objectives of Health Education
- c. Approaches, Models, Contents, Principles and Practices of Health Education

Ph.D. Syllabus for Entrance Examination - Immunology

Unit - I

Principles of Immunization, Techniques for analysis of immune response. General Idea of Active and passive immunization; Live, killed, attenuated, sub unit vaccines; recombinant DNA and protein based vaccines, plant-based vaccines, reverse vaccinology; Peptide vaccines, conjugate vaccines; Hybridoma, antibodyengineering - chimeric and hybrid monoclonal antibodies; Transfusion of Immunocompetent cells; stem cell therapy; Cell based vaccines.

Unit - II

Host-pathogen interactions, Introduction to the Immune System, Cells and Organs of the Immune system, Innate immune responses Cells of the innate immune system, Inflammatory response. Components of immune system.

Unit - III

Structure and function of antibody. Inflammation, opsonization. Primary and secondary lymphoid organs. Complement. Fluorochromes and staining techniques for live cell imaging and fixed cells; immunofluorescence, immunoelectron microscopy; Flow cytometry:

Unit - IV

B cell, T cell ontogeny. Characteristics of antigen, T cell dependent and independent antigens. Hypersensitivity. Primary and Secondary immune responses. Techniques in humoral immunology. Treatment of autoimmune diseases; Transplantation – Immunological basis of graft rejection; Clinical transplantation and immunosuppressive therapy; General Idea of Tumor immunology,

Unit - V

Cytokines. T cell education, Affinity maturation. Immunological Memory. Cell-cell interaction, signal transduction. Development of tolerance. Characteristics of T helper and Tc TL and B cell peptide. Transplant immunology. Bone marrow chimera. Auto immunity, molecular mimicry, Therapy. Monoclonal antibody. Techniques in molecular immunology.

Ph.D. Syllabus for Entrance Examination - Management

Unit - I

Functions of management and manager, Managerial roles and skills, Evolution of management thought and Management thinkers. Scientific Management, General administrative theories, types, steps and approaches, Decision Making in various conditions, decision tree, structure and process of organization, Bases of departmentation, Line & Staff concept; problems of use of staff & ways to avoid line-staff conflict. Authority & power, Delegation, Span of Management. Decentralization vs. centralization, Coordination, planning-control relationship, process of control, Japanese Management and Z-culture of American Companies, Chinese Style Management, Business process Re-engineering, business outsourcing, benchmarking, total quality management process, McKinsey's 7-S Approach.

Unit - II

What managers do, Definition of OB, Learning, Theories of Learning, Attitudes, Attitude Change, Values & Beliefs, Personality: Determinants of Personality, Perception, Motivation Process of Motivation, Early Theories of Motivation, Contemporary Theories of Motivation, Job Satisfaction, Leadership: Theories of Leadership; Leadership traits & Skills; Behavioral Styles in Leadership. Transactional Analysis, Life Position, Johari Window Model, Stages of Group Formation, Teams - Difference between Group & Team, Conflict Management: Definition of Conflict, Individual & Group Level Conflict; Organization level Conflict; Conflict Management, Organizational Change & Development, Learning Organization, Organizational Culture

Unit - III

Concept of Human Resource Management, Recruitment & Selection, Tests and Interviews Orientation, Promotion, Types of Transfer, Separations, Outplacement, Training & Development Training vs. Development, Training need assessment, Types of training programmes, on-the-job and off-the-job, In basket Training, Sensitivity Training, Grid training, Apprenticeship training; Evaluation of Training Programmes. Performance Appraisal-objectives, uses, methods, Traditional vs. Modern Methods, Wages & Salary concepts, components of wages, criteria of wage fixation, Job evaluation - Concept, Methods

Unit - IV

An overview of financial management, financial planning, constituents of financial sector, reforms measures in financial institutions and markets, role of a modern finance manager, major financial decisions in financial management.

Emerging trends in financial markets – Capital market and money market, Mergers and Acquisitions-motives, considerations in M & A decisions, Stock Market and Regulation in India: Stock Exchanges in India. Micro Financing in India; Role of banks. Demonetization and its impact on Indian economy. Concept of Goods and Services Tax-GST.

Unit -V

Nature and scope of Marketing Management, Marketing process, Marketing environment, Marketing Organizations, Marketing Challenges, Emerging Concepts in Marketing, Marketing Mix. Marketing Planning and Marketing Competitiveness, Customer Value, Marketing Planning Process, Identifying and analyzing the competitors. Four Ps of marketing. Marketing Issues and Relevance in 21st century business Enterprises. Competing through e-Marketing – Components of e-marketing, Impact of e-Marketing on marketing Strategy. Product Life Cycle, Product Mix Decisions, Branding, Packaging and Labeling Decisions. Price: Objectives of Pricing, Pricing Policies, Pricing Methods, Managing Price Changes. Promotion: Advertising, Sales Promotion, Personal Selling, Public Relations.

Ph.D. Syllabus for Entrance Examination - Medical Physics

Unit - I

Production and properties of X-rays, structure and types of X-ray tubes, insulation and cooling of X-ray tubes, filament and high voltage transformers and circuits, half and full wave rectifiers, three phase and constant potential generators, automatic brightness control, automatic exposure control, measurement of kV and mA, timers, image intensifiers, flat panels and close circuit TV systems. General Properties of alpha, beta and gamma rays, Laws of radioactivity, Artificial Radioactivity, Particle Accelerators – Van De Graff generator, Cyclotron, Betatron, Linear Accelerator, Klystron and Magnetron, Travelling and Standing wave Acceleration. Interactions of radiation with matter.

Unit - II

Radiation quantities and units, linear and mass attenuation coefficients, charge particle equilibrium, ion chambers- parallel plate, cylindrical and spherical, Bragg-Gray-cavity theory, beam quality index. Diodes, MOSFET, Operation amplifier and their characteristics, theory and design of a condenser type ion chambers and thimble chambers, proportional and GM counters, Scintillation and semiconductor detectors, radiographic and radiochromic films, thermoluminescent dosimeters (TLD), optically stimulated luminescence dosimeters (OSLD), pocket dosimeters, farmer dosimeters, well type chamber, radiation field analyzer and water phantom dosimetry system, gamma zone monitor, contamination monitor, personal monitoring dosimeters.

Unit - III

Construction and working of a tele-cobalt unit and a medical linear accelerator, output calibration of Co-60 gamma rays, high energy X-rays and electron beams, CT and virtual simulation, central axis dosimetric parameters, beam modifying and shaping devices, energy specification and depth dose characteristics of electron beams, QA in radiation therapy. Definitions and classification of brachytherapy techniques- surface mould, intracavitary, interstitial and intraluminal techniques, properties of commonly used brachytherapy sources, dose rate considerations and classification of brachytherapy techniques, Paterson Parker and Manchester doses systems, afterloading techniques, ISO requirements and QA of brachytherapy sources.

Unit - IV

Conventional radiography and fluoroscopy techniques, filters and collimators, devices and methods to reduce scatter, image quality, digital and computed radiography, mammography and computed tomography, magnetic resonance imaging and medical ultrasound equipment, QA of conventional radiography system and CT equipment. Techniques and instruments in radionuclide imaging- radionuclide generator and their operational principles, gamma camera and its system components, physics and instrumentation of positron emission tomography and single photon emission computed tomography, image quality parameters and quality control in nuclear medicine.

Unit -V

Anatomy and physiology as applied to radiodiagnosis and radiotherapy, action of radiation in living cells, survival curve and its parameters, target theory, LET, RBE, dose rate and dose fractionation, somatic and genetic effects of ionizing radiation, physical and biological factors affecting cell

survival, 5 R's of radiobiology, dose fractionation and linear quadratic model. ICRP principles of radiation protection, ALARA, dose limits, equivalent dose and effective dose, effect of distance, time and shielding on dose, personal and area monitoring, categories of exposures- occupational, public and medical exposure, safety in handling of radionuclides and disposal of radioactive waste, radiation legislation and radiation protection rules.

Ph.D. Syllabus for Entrance Examination - Microbiology

Unit - I: General Microbiology

Major contribution of scientists and development of microbiology, distinguishing characteristics between prokaryotic and eukaryotic cells, Structure and function of Cell wall of bacteria. Methods of sterilization, Staining methods, Microbiological media, Preservation and Maintenance of Microbial cultures Bacterial nutrition, Endospore, exospore.

Unit - II: Microbes and application

Production of alcoholic beverages, organic acids, Types of fermentor/bioreactors; Types of fermentation (Solid state, surface and submerged fermentation). Cultivation of fungi for food-mushrooms, mycorrhizae and their application, mycotoxins. Biofertilizers and biopesticides;

Unit - III: Microbes and ecosystem

Solid wastes; sources and management (composting, vermiculture and methane production). Single cell protein, Waste water treatment-physical, chemical and biological treatment processes; algal blooms and human health, biotechnological application of microbes from extreme environment. Microbial degradation of hydrocarbons, xenobiotics; Bio-deterioration of paper-leather-wood- textiles-cosmetics; Metal corrosion and control, Global warming and possible control measures.

Unit - IV: Food and dairy microbiology

Microbiology of milk and milk products: Sources of contamination of milk; Fermented dairy foods – cheeses, acidophilus milk, kefir and yoghurt; Nutritional and therapeutic benefits of fermented milk products; Probiotic foods; Spoilage of fermented dairy products; Quality control in dairy industry. Food fermentations: Food spoilage and prevention; genetically modified foods. Foods produced by Microbes - Fermented foods. Enzymes and their uses in food industry, Food borne infections and intoxications.

Unit - V: Recombinant DNA Technology

Introduction to DNA technology and application, Cloning vector (characteristics applications), Preparation of cloning vectors, suitable markers, Isolation of nucleic acids. Basic steps of gene cloning, Cloning Strategies, Screening strategies of recombinants, Synthesis of cDNA, Construction of cDNA and genomic libraries, Blotting techniques: southern, northern and western blotting, Probe labeling and hybridization.

Ph.D. Syllabus for Entrance Examination - Oncological Sciences

Unit - I

Introduction, growth characteristics of cancers cells; Morphological and ultrastructural properties of cancer cells. Types of growth: hyperplasia, dysplasia, anaplasia and neoplasia. Nomenclature of neoplasms. Differences between benign and malignant tumors. Epidemiology of cancer, common cancer worldwide, India.

Unit - II

Cancer biology and biochemistry-Biological basis of cancer/Molecular biology of cancer Aberrant metabolism during cancer development; Tumor markers; cellular proto-oncogenes- oncogene activation. Growth factors-EGF, TNF- and TGF- and growth factor receptors. Signal transduction in cancer. Role of transcription factors.

Unit - III

Etiology/Carcinogens: Oncogenic Viruses, Physical factors, Chemical Factors, Dietary Factors, Life Style, carcinogenesis- Initiation, promotion and progression. Free radicals, antioxidants in cancer; Hormone mediated carcinogenesis in humans.

Unit - IV

Cell Cycle Regulation-Tumor suppressor genes p53, p21, Rb, BRACA1 and BRACA2. Telomeres, Telomerase, and Immortality; cell- cell interactions, cell adhesion-invasion And metastasis - VEGF signaling, angiogenesis; Apoptosis in cancer-Cell death by apoptosis, role of caspases; Death signaling pathways: mitochondrial and death receptor pathways.

Unit - V

Cancer Control strategies: Primary prevention, Early Diagnosis, Common Symptom, Prediction of aggressiveness of Cancer, Cancer treatment Modalities: Palliative care, pain control, end of life care, Different forms of therapy: advantages and limitations. Common anticancer drugs, Psychosocial issues in cancer care.

Ph.D. Syllabus for Entrance Examination - Pharmacology

Unit - I: Basic & Systemic Pharmacology

General Pharmacology:

- Pharmacology –history and development
- Pharmacokinetics
- Pharmacodynamics
- Adverse drug reactions
- Drug interactions and iatrogenic disorders
- Pharmacogenetics & genomics

Autonomic nervous system:

- Anatomical and physiological considerations of the autonomic nervous system
- Cholinergic system- Cholinergic agonists, anticholinesterases and antimuscarinic drugs
- Adrenergic system- Adrenergic drugs, Alpha adrenergic blocking agents, Beta adrenergic blocking agents

Autacoids & related drugs

- Prostaglandins & prostaglandin analogues
- Histamine & antihistaminics
- Pharmacology of serotonin & drug therapy of migraine
- NSAIDs & drug therapy of Rheumatoid arthritis & gout

Central Nervous system:

- Physiology and pharmacology of neurohumoral transmission in the central nervous system
- Anaesthetic agents used in general anaesthesia
- Central & peripheral analgesics- Opioids & NSAIDs
- Psychopharmacology- Antipsychotics, Antidepressant drugs & Antianxiety drugs
- Sedative-hypnotics & antiepileptics

Unit - II: Systemic Pharmacology

Cardiovascular system

- Basic physiology of cardiovascular system including electrophysiology of the heart, mechanics of myocardial contraction and RAAS system
- Anti hypertensive agents
- Antiarrhythmic drugs
- Drugs for CHF
- Angina pectoris & MI
- Hypolipidemic drugs
- Drugs acting on coagulation system
- Antiplatelet drugs

Endocrinology:

- Physiological considerations of endocrine system in relation to pharmacological actions of drugs & drug targets
- Antidiabetic drugs
- Thyroid and anti thyroid drugs
- Corticosteroids
- Sex Steroids & related drugs

- Drugs affecting calcium homeostasis

Chemotherapy

- Introduction to mechanism of action and principles of anti microbial therapy
- Antimicrobial agents
- Antibacterial agents
- Antifungal agents
- Antiviral agents
- Antimalarial agents
- Antiamoebic agents
- Antineoplastic agents & immunomodulators

Respiratory Pharmacology

- Respiratory physiology in relation to pharmacological actions of drugs & drug targets
- Drugs used in Bronchial Asthma
- Drugs used in the treatment of cough

GIT Pharmacology

- Physiology of GI system in relation to pharmacological actions of drugs & drug targets
- Antiulcer drugs
- Antiemetics
- Drugs used in diarrhea & constipation

Unit - III: Clinical & Applied Pharmacology

- Clinical pharmacokinetics, concentration effect relationship, pharmacokinetic parameters, target concentration strategies, plateau principle and population pharmacokinetics
- Bioavailability & Bioequivalence studies
- Therapeutic drug monitoring
- ADR monitoring and prevention
- Bioavailability and bioequivalence studies
- Pharmacoeconomics and pharmacoepidemiology
- Principles of rational drug therapy with emphasis on antimicrobial chemotherapy
- Concept of essential drugs
- Drug therapy in extremes of age (Neonatal/Geriatric)
- Drug therapy in pregnancy and lactation
- P drug & P-medicine
- Prescription auditing and critical evaluation of research papers, promotional materials / drug advertising materials etc.
- Evidence based medicine
- Recent advances

Unit - IV: Research Methods in Pharmacology

- Keeping and breeding of laboratory animals
- Drug regulations
- Bioassay and its importance
- Drug development (Pre clinical and clinical)
- Drug discovery & evaluation through pharmacological assays
- Screening methods in pharmacology for evaluation of drug activities
- Acute/ subacute and chronic toxicity studies on animals
- Clinical trials

- Design, implementation and evaluation
- Phase 0, I, II, III, IV
- Ethical and legal aspects in clinical trials and drug therapy
- Basic Biostatistics
- Research protocol and thesis writing, offline and online literature search and basics of MS-PowerPoint

Unit - V: Recent advances in Pharmacology

- Recent advances in ANS Pharmacology
- Recent advances in CNS Pharmacology
- Recent advances in CVS Pharmacology
- Recent advances in Endocrine Pharmacology
- Recent advances in antimicrobial and antineoplastic Pharmacology
- Recent advances in Respiratory Pharmacology
- Recent advances in GIT Pharmacology
- Recent advances in drug discovery & development

Ph.D. Syllabus for Entrance Examination - **Physiology**

Unit-I: Neurophysiology

- Experimental basis of action potential (AP) recording in nerve & ionic basis of its generation.
- Understanding neuromuscular transmission & mechanisms of contraction of muscles.
- Understanding the organization of the nervous system.
- Basic functions of synapses & neurotransmitters.
- Concept of various sensory receptors, ascending & descending tracts of spinal cord.
- Functional aspects of autonomic nervous system, hypothalamus, cerebellum & basal ganglia.
- Recent advances in neurophysiology.

Unit-II: Endocrinology

- General principles of endocrinology including classification.
- Mechanism of actions and feedback control of hormones.
- Hormonal aspects of growth, development & obesity
- Concept of insulin, pathophysiology of Diabetes Mellitus
- Understanding hormonal regulation of calcium balance.

Unit-III: Cardiovascular System, Exercise Physiology & Yoga

- Physiological anatomy of cardiac muscle including excitation contraction coupling.
- Control of excitation by autonomic system.
- Concept of ECG & cardiac vector.
- Basic concept of cardiac cycle and cardiac output
- Biophysical aspect in circulatory system.
- Concept of blood pressure, its measurement & various mechanisms that control blood pressure.
- Exercise physiology.
- Yoga and lifestyle modification

Unit-IV: Respiratory Physiology

- Understanding the mechanics of respiration including concept of compliance
- Understanding pulmonary volumes-capacities & their measurement by spirometer
- Concept of gaseous exchange in lungs & how transport of gases occur in blood.
- Basic understanding of chemical & neuronal control of respiration.
- High altitude pulmonary physiology, respiratory alteration in deep-sea diving & space physiology.

Unit-V: Renal and Gastrointestinal physiology

- Concept of body fluid & its regulation.
- Functional anatomy of Kidney
- Urine formation mechanisms
- Urinary concentration mechanisms including countercurrent system
- Concepts of acid base balance.
- Functional anatomy of gastrointestinal tract (GIT).
- Concept of various types of motility & its regulation
- Overview of various secretions, including digestion & absorption of various nutrients.

Ph.D. Syllabus for Entrance Examination - Yoga Sciences

UNIT-I: Fundamentals of Yoga: History and Various Schools of Yoga

History and Development of Yoga; Meaning & Definitions, Misconceptions, Aim and Objectives of Yoga. Introduction to Vedas, Upanishads and Prasthanatrayee; Concept of Purushartha Chatushtaya .Basic concepts of Shad-darshanas-Epistemology, Metaphysics, Ethics and Liberation with special emphasis to Samkhya, Yoga and Vedanta Darshana. Introduction to Epics and Smriti- yoga in Ramayana (Aranyakand), Mahabharata (Shantiparva) and Yajnavalkya Smriti .Brief introduction and yogic contribution of Maharshi Patanjali and Guru Gorakshanath Traditions. Yoga in Narada Bhakti Sutra and Yoga in the Literature of Saints- Kabirdas, Tulasidas and Surdas.

UNIT-II: Yogic Texts: Principal Upanishads, Bhagavad Gita, Yoga Vasishtha

Brief Introduction of Ten Principal Upanishads. General Introduction to Bhagavad Gita, Definitions of Yoga, their relevance & Scope; Essentials of Bhagavad Gita - meanings of the terms Atmaswarupa, Stithaprajna, Sankhya Yoga. Salient features of Yoga Vasishtha, Concept of Adhis and Vyadhis. Patanjala Yoga Sutra: SAMADHI PADA : Yoga, meaning & Nature of yoga; Concept of Chitta, Chitta-Bhumis, Chitta-Vrittis, Chitta-Vrittinirodhopaya, Abhyasa and Vairagya as the tools. SADHANA PADA: Concept of Kriya Yoga , theory of Kleshas ; Concept of Karmashaya and Karmvipaka, VIBHUTI PADA: Introduction of Dharana, Dhyana and Samadhi, Nature of Sanyama; Concept of Chitta samskara, Parinamatraya and vibhutis. KAIVALYA PADA: Five means of Siddhis, concept of Nirman Chitta.

UNIT-III: Hatha Yoga Texts

Introduction to Hatha Yoga and Hatha Yoga Texts. Yoga Beeja, Goraksha Samhita, Vashishtha Samhita, Shiva Samhita, Siddhasiddhantapaddhati, Hatha Pradeepika, Gheranda Samhita and Hatha Ratnavali. Aims & objectives, misconceptions about Hathayoga, prerequisites of Hathayoga (dasha yama and dasa niyama), Sadhaka and Badhaka tattvas in Hathayoga; Concept of Ghata, Ghatashuddhi, Concept and importance of Shodhana kriyas in Hathayoga; Importance of Shodhana kriyas in health and disease; Concept of Matha, Mitaahara; Rules & Regulations to be followed by Hatha Yoga Sadhakas.

UNIT-IV: General Psychology & Human Anatomy and Physiology

Introduction to Altered States of Consciousness. Sleep: Stages of sleep, Sleep disorders; Behavioural Psychology: Psychology as a science of behaviour; Psychological basis of behaviour; Personality: Nature and Types of Personality; Determinants of Personality: Heredity and Environment; Facets and Stages of Personality Development; Cognitive Psychology: Sensation, Perception, Attention, Memory, Learning: Their definitions and types.

Introduction to Human Anatomy and Physiology Introduction to cell, tissue, organs and systems; Basic cell physiology-Cell Introduction, Cell Organelles, Cell membrane, Movement of the substances and water through the cell membrane, Bioelectric potentials.

UNIT-V: Diet and Nutrition & Yoga and Health

Basic concepts and components of food and nutrition Understanding Nutrition, Basic Terminology in Relation to Nutrition Requirement, Yogic concept of diet and its relevance in the management of lifestyle. Definition & Importance of Health According to WHO; Dimensions of Health: Physical, Mental, Social and Spiritual; Concepts of Trigunas, Pancha-mahabhutas, Pancha-prana and their role in Health and Healing; Concept of Pancha-koshas & Shat-chakra and their role in Health and Healing; Role of Yoga in preventive health care – Yoga as a way of life, Heyamdukhmanagatam; Potential causes of Ill-health: Tapatrayas and Kleshas, Physical and Physiological manifestation of Disease: Vyadhi, Alasya, Angamejayatva and Svasa-prashvasa.



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