

**पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवा आयोग**  
**प्राज्ञिक सेवा, शरीर क्रिया समूह, सहायक प्राध्यापक पद, नौ ख (९ ख) तहको**  
**खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम**  
**एवं परीक्षायोजना**

यस पाठ्यक्रमयोजनालाई दुई चरणमा विभाजनगरिएको छ :

**प्रथम चरण :-** लिखित परीक्षा(Written Examination)

पूर्णाङ्क :- २००

**द्वितीय चरण :-**अन्तर्वार्ता (Interview)

पूर्णाङ्क :- ३०

**प्रथम चरण(First Phase) :लिखित परीक्षा योजना(Written Examination Scheme)**

Paper	Subject		Marks	Full Marks	Pass Marks	No. Questions & Weightage		Time Allowed
I	General Subject	Part I: Management, General Health Issues, Academic Research and Teaching-Learning Practices	50	100	40	10 × 5 = 50 (Subjective)	1.30 hrs	2.15 hrs
		Part II: Technical Subject (Relevant Subject)	50			50 × 1 = 50 (Objective Multiple Choice)	45 min	
II	Technical Subject (Relevant Subject)			100	40	7 × 10 = 70 (Long answer) 2 × 15 = 30 (Critical Analysis)		3.00 hrs
<b>द्वितीय चरण(Second Phase)</b>								
	Interview			30		Oral		

**द्रष्टव्य :**

- लिखित परीक्षाको माध्यमभाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
- प्रतिष्ठानको प्राज्ञिक सेवा अन्तर्गतका सबै समूह/सवै उपसमूहहरूको लागि प्रथमपत्रको Part I को पाठ्यक्रमको विषयवस्तु एउटै हुनेछ । तर प्रथमपत्रको Part II र द्वितीयपत्र Technical Subject को पाठ्यक्रम समूह/उपसमूह अनुरूप फरक फरक हुनेछ ।
- प्रथम र द्वितीयपत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ । प्रथमपत्रको Part II र द्वितीयपत्रको विषयवस्तु एउटै समूहको हकमा समान हुनेछ । परीक्षामा सोधिने **प्रश्नसंख्या र अङ्कभार** यथासम्भव सम्बन्धित पत्र, विषयमा दिईए अनुसार हुनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
- वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small letter) a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- विषयगत प्रश्नहरूको हकमा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

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९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ।
१०. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ।
११. पाठ्यक्रम लागु मिति : २०७४/६/२९
१२. पाठ्यक्रम परिमार्जन मिति : २०७९/१२/

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**Paper I: General Subject**

**Part I:**

**(Management, General Health Issues, Academic Research and Teaching-Learning Practices)**

**Section (A) - 25 Marks**

**1. Management**

- 1.1. Health care management system in Nepal and other parts of the world
- 1.2. Fundamental principles of healthcare institution and hospital management.
- 1.3. Effective hospital management principles
- 1.4. Purpose of medical and non-medical data and records
- 1.5. Ethics and responsibility of management
- 1.6. Concept of management and its application in health care including hospital
  - 1.7.1 Management: Concept, principles, functions, scope and role, level and skills of manager
  - 1.7.2 Planning: Concept, principles, nature, types, instruments and steps
  - 1.7.3 Leadership: Concept, function, leadership styles, leadership and management
  - 1.7.4 Coordination: Concept, types, techniques of effective coordination
  - 1.7.5 Communication and counselling: Concept, communication processes and barrier to effective communication, techniques for improving communication
  - 1.7.6 Decision making: Importance, types, rational process of decision making, problem solving techniques, improving decision making
  - 1.7.7 Participative management: Concept, advantage and disadvantage, techniques of participation
  - 1.7.8 Time management: Concept, essential factors and strategies for effective time management
  - 1.7.9 Conflict management: Concept, approaches to conflict, levels of conflict, causes of conflict and strategies for conflict management
  - 1.7.10 Stress management: Concept, causes and sources of stress, techniques of stress management
  - 1.7.11 Change management: Concept, sources of organizational change, resistance to change, management of resistance to change
  - 1.7.12 Appreciative inquiry: Concept, basic principle and management
  - 1.7.13 Human resource management: Concept, functions and different aspects
  - 1.7.14 Health manpower recruitment and development
  - 1.7.15 Financial management: Concept, approaches, budget formulation and implementation, Auditing and topics related to fiscal administration

**2. General Health Issues**

- 2.1. Present constitution of federal republic of Nepal (including health and welfare issues)
- 2.2. Organizational structure of Ministry of Health at national/federal, regional/state, district (if applicable), municipal and village council level
- 2.3. Professional council and related regulations
- 2.4. National Health Policy
- 2.5. Health Service Act and Regulation
- 2.6. Second Long term health plan
- 2.7. Health Management Information System, forms, indicators, annual reports

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- 2.8. Human Development Indices, Sustainable Development Goals
- 2.9. Health volunteers in the national health system, its rationale, use and effectiveness
- 2.10. Local governance and community participation in health service delivery
- 2.11. Health Insurance and financing in health care
- 2.12. Alternative health care system: Ayurveda, homeopathy, Unani, Chinese etc.
- 2.13. Indigenous and traditional faith health and health practices
- 2.14. International Health Agencies: Roles and responsibilities of WHO, UNICEF, UNFPA, Inter-agency relationships, Government-agency coordination: Joint Annual Review meeting
- 2.15. Supervision, types and its usage in health sector
- 2.16. Monitoring and evaluation system in health sector
- 2.17. National Health Training Centre
- 2.18. National and International Disaster Plan, Coordination
- 2.19. Patan Academy of Health Sciences Act, Mission, Goals, Organogram
- 2.20. Scope and function of Patan Academy of Health Sciences executive bodies (senate, executive committee, academic council, faculty board, hospital management committee, subject committee), various other committees

**Section (B) - 25 Marks**

**3. Academic Research**

- 3.1 Ethics, Bio-ethics and Professionalism
- 3.2 Human dignity and Human Right
- 3.3 Benefit and Harm
- 3.4 Autonomy and Individual responsibility
- 3.5 Consent and capacity to consent
- 3.6 Privacy and confidentiality
- 3.7 Respect for humans and personal integrity
- 3.8 Non-discrimination and non-stigmatization
- 3.9 Respect for cultural diversity and pluralism
- 3.10 National Health Research Council (NHRC) and its guidelines
- 3.11 Research process: ethical research proposal development, research principles, methods and materials, conclusion/recommendation/lesson learnt, commonly used referencing styles
- 3.12 IRB/IRC forms, types, use, importance; getting IRB/IRC clearance
- 3.13 Ethics on research methodology: sample selection, sample size calculation, ensuring reliability and validity of the instruments as well as methods proposed for health research
- 3.14 Quantitative and Qualitative studies
- 3.15 Data analysis (data visualization, descriptive statistics, inferential statistics with statistical hypotheses and appropriate tools/methods for quantitative studies; theme and code generation, thematic analysis, content analysis, grounded theory for qualitative and triangulation for mixed method studies)
- 3.16 Research ethics on vulnerable and non-vulnerable population
- 3.17 Research proposal/protocol/publication:
- 3.18 Publication ethics, plagiarism including self-plagiarism

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**4. Teaching-Learning, Assessment and Evaluation**

- 4.1 Lancet Commission Report on Education of Health Professionals
- 4.2 Adult learning: Theories, principles, use, importance and outcomes, Andragogyvs. Pedagogy
- 4.3 Conventional teaching-learning: Didactic lectures, Teacher centred approaches, use and importance
- 4.4 Surface learning, deep learning and metacognition
- 4.5 Integrated teaching: Genesis, use, importance and outcomes
- 4.6 Problem-based learning: Genesis, use, importance and outcomes
- 4.7 SPICES model its use, importance and outcomes
- 4.8 Socialization, self-directed learning, mentoring, role model
- 4.9 Community orientation/community posting, re-orientation of medical education camp, community based learning and community engaged teaching-learning methods/models, use, importance and outcomes
- 4.10 Outcome Based Education (Competency-based Medical/Health Professions Education): Genesis, use, importance and outcomes
- 4.11 Experiential learning, Reflective practice, Feedback and feed-forward, Situated learning, Co-operative learning, Communities of practice
- 4.12 Assessment of students
  - 4.12.1 Blueprinting(Table and specification) : use, importance and outcomes
  - 4.12.2 Bloom's taxonomy of cognitive, psychomotor and affective domains, use and importance
  - 4.12.3 Diagnostic, Formative, Summative and Professional exams
- 4.13 Assessment of knowledge: Selection methods like Multiple Choice Questions, Extended Matching Items and supply methods like Short Answer Question, Problem Based Question, Long Answer Question with or without model answers and marking schemes, unstructured, semi-structured and structured viva-voce examination, advantages and limitations, use and importance, outcomes and its use in quality control
- 4.14 Assessment of performance (in-vitro): Direct observation of skills in the simulated setting, lab, ward etc. with or without checklist, Objective Structured Practical Examination, Objective Structured Clinical Examination, Standardized patients, use and importance, analysis, quality assurance, outcomes and its use in quality control
- 4.15 Assessment of performance (in-vivo): Mini-Clinical Evaluation Exercise (Mini-CEX), Direct Observation of Procedural Skills (DOPS), Case-Based Discussion (CbD), OSATS/ PBA, Multi-Source feedback (360 degree evaluation) use and importance for competency based health professions education, analysis, quality assurance, outcomes and its use in quality control
- 4.16 Assessment of observable behaviours in small groups e.g. Problem Based Learning sessions, Community Based Learning and Education sessions, Clinical clerkship rotations
- 4.17 Evaluation: Difference between assessment and evaluation, theory of change and its use in health professions education, process and outcome evaluation, qualitative, quantitative and mixed methods used in evaluation of health professions education

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**Paper I**

**Part II: Technical Subject**

**Section (C) - 25 Marks**

**1. General and Cellular Physiology**

- 1.1. General functional organization of human body
- 1.2. Cell-organelles and their functions.
- 1.3. Cell to cell and local communications, Transport across cell membrane
- 1.4. Body fluid compartments : Define and explain
- 1.5. Homeostasis: Definition, maintenance, control of internal environment, different regulatory systems in homeostasis.
- 1.6. Principles of control systems :
  - 1.6.1. General characteristics and components of biological control system.
  - 1.6.2. Concept of negative and positive feedback
  - 1.6.3. Correction, error and feedback gain
  - 1.6.4. Hormonal control mechanism: Definition of hormones, receptors and target cells. Role of hormones in homeostasis.
  - 1.6.5. Neural control of mechanism: Role in homeostasis.
- 1.7. Membrane Potential:
  - 1.7.1. Resting membrane potential and action potential
  - 1.7.2. Receptor generator potential, properties and transduction
- 1.8. Synapses ultrastructure, properties, synaptic plasticity, neurotransmitters and mode of transmission.

**2. Nerve and muscle physiology**

- 2.1 Structure and functions of a neuron and neuroglia.
- 2.2 Nerve fibre types, function and nerve injury.
- 2.3 Molecular basis of resting membrane and action potential, compound action potential, Recording.
- 2.4 Structure and transmission across neuro-muscular junction.
- 2.5 Neuro-muscular blocking agents.
- 2.6 Skeletal Muscle:
  - 2.6.1 Functional anatomy and organization of skeletal muscle
  - 2.6.2 Skeletal muscle: properties, fiber types and applied aspects
  - 2.6.3 Molecular mechanism of skeletal muscle contraction-Membrane excitation; Excitation-contraction coupling; Sliding filament mechanism
  - 2.6.4 Mechanics of single fiber contraction
  - 2.6.5 Skeletal muscle energy metabolism
  - 2.6.6 Whole muscle contraction
  - 2.6.7 Characteristics of muscle contractility
    - 2.6.7.1 Contractile and elastic components of a muscle
    - 2.6.7.2 Concepts about muscle length
    - 2.6.7.3 Motor unit
    - 2.6.7.4 Contractile response
  - 2.6.8 Electromyography
  - 2.6.9 Disorders of skeletal muscles
  - 2.6.10 Muscle cramps, hypocalcemic tetany, muscular dystrophy, myasthenia gravis
- 2.7 Smooth Muscle

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- 2.7.1 Functional anatomy and organization
- 2.7.2 Types of smooth muscles
- 2.7.3 Innervation and neuromuscular junction of smooth muscles
- 2.7.4 Process of excitability and contractility
- 2.7.5 Characteristics of smooth muscle excitation and contraction
  - 2.7.5.1 Slow excitation–contraction coupling
  - 2.7.5.2 Plasticity
  - 2.7.5.3 Latch phenomenon
  - 2.7.5.4 Marked shortening of a smooth muscle during contraction
  - 2.7.5.5 Energy required to sustain smooth muscle contraction
- 2.7.6 Excitation and inhibition of smooth muscles

**3. Autonomic nervous system**

- 3.1. Anatomical organization of nervous system
- 3.2. Functional organization of nervous system: Divisions, distribution and functions.
- 3.3. Higher control of autonomic nervous system.
- 3.4. Physiological role of autonomic nervous system.

**4. Blood, reticulo-endothelial and immune system**

- 3.5. Blood as a body fluid: Composition and functions of blood.
- 3.6. Plasma: Normal constituents.
- 3.7. Plasma Proteins: Types, concentrations, properties and functions.
- 3.8. Blood cells: Types, distribution and overview of haematopoiesis.
- 3.9. Erythrocytes - morphology, functions, fate, normal count, PCV, ESR, Fragility, haemolysis.
- 3.10. Erythropoiesis: Definition, stages and regulating factors.
- 3.11. Blood indices and their clinical usefulness.
- 3.12. Anemias and polycythemia
- 3.13. Leukocytes classification, morphology, normal counts, functions, development and related applied aspects.
- 3.14. Platelets morphology, functions, development and related applied aspects.
- 3.15. Blood groups
  - 3.15.1. Agglutinogens and agglutinins, Landsteiner's law, ABO and Rh group, minor blood groups
  - 3.15.2. Blood transfusion relation of blood groups, indications, hazards and storage of blood, inheritance, hemolytic disease of the new born.
- 3.16. Haemostasis: Physiology of coagulation, tests for clotting, clot retraction, and anticoagulation, Bleeding and coagulation disorders.
- 3.17. Reticuloendothelial system: Functions of spleen and lymph nodes.
- 3.18. Lymph and tissue fluids: Formation and functions.
- 3.19. Immunity and its disorders.

**5. Respiratory system:**

- 5.1. Functional anatomy of respiratory system
- 5.2. Mechanics of breathing: Movements of thoracic cage during respiration, muscles involved and their nerve supply, intrapleural and pulmonary pressure and volume changes, pressure-volume inter-relationships, lung compliance - surfactant, airway

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resistance, work of breathing.

- 5.3. Spirometry, lung volumes & capacities: Definitions, normal values, significance and special features.
  - 5.4. Pulmonary gas exchange: Alveolar-capillary membranes, diffusion capacities, partial pressure gradients and factors influencing diffusion of gases, measurement of diffusion capacity using carbon monoxide.
  - 5.5. Applied physiology shunt and alveolar-capillary block
  - 5.6. Ventilation perfusion ratio and its importance in respiratory diseases.
  - 5.7. Gas Transport
    - 5.7.1. Oxygen transport - factors influencing the combination of hemoglobin with oxygen, oxygen-hemoglobin dissociation curve- plotting, features, physiological advantage of its shape, factors affecting its shift and Bohr's effect.
    - 5.7.2. Carbon dioxide transport - tissue uptake, carriage in blood and release at the lungs importance of red blood cell, chloride shift, role in acid base balance, Haldane effect.
  - 5.8. Regulation of respiration :
    - 5.8.1. Nervous mechanism: Respiratory centers-Medullary centers, Pontine centers, Connections of respiratory centers, Integration of respiratory centers, Factors affecting respiratory centers
    - 5.8.2. Chemical mechanism: Central chemoreceptors, Peripheral chemoreceptors, chemical and non-chemical influences on respiration, integrated response
  - 5.9. Respiration in unusual environments :
    - 5.9.1. High altitude hypoxia and space flight
    - 5.9.2. Deep sea diving: nitrogen narcosis, hyperbaric oxygen and oxygen toxicity.
  - 5.10. Abnormal breathing: Apnoea, hyperpnoea, tachypnoea, dyspnoea, Chyner- stokes breathing and Biot's breathing- definition, features and physiological basis.
  - 5.11. Hypoxia, cyanosis and their types.
  - 5.12. Artificial respiration: Definition, types, principles, indications, advantages and disadvantages.
  - 5.13. Pulmonary function tests
    - 5.13.1. Measurement of lung volumes and capacities
    - 5.13.2. Measurement of functional residual capacity and residual volume
    - 5.13.3. Vital capacity
    - 5.13.4. Forced expiratory volume or timed vital capacity
    - 5.13.5. Respiratory minute volume
    - 5.13.6. Maximum breathing capacity or maximum ventilation volume
    - 5.13.7. Peak expiratory flow rate
    - 5.13.8. Restrictive and obstructive respiratory diseases
  - 5.14. Pulmonary abnormalities.
- 6. Cardiovascular system :**
- 6.1. Heart as a mechanical pump: Design of systemic and pulmonary circulation. Introduction of the venous pressure, flow and resistance. Types of blood vessels and their functions.
  - 6.2. Properties of myocardial cells: Site of generation of cardiac impulse- pace maker tissue.
  - 6.3. Mechanisms of spontaneous generation of impulses.
  - 6.4. Specialized conducting system and its importance
  - 6.5. Electrical properties of working myocardial cells.
  - 6.6. Molecular basis of contraction and excitation contraction coupling (in brief)

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- 6.7. All or none phenomenon, length-tension relationship.
  - 6.8. Frank-Starling Law, neural influences.
  - 6.9. Effect of ions and chemicals on myocardial contractility.
  - 6.10. Cardiac cycle : Mechanical and electrical events, pressure volume relationship
  - 6.11. Electrocardiography: Definition, uses, principle, waves and their explanations. ECG recording techniques
  - 6.12. Cardiac arrhythmias and their ECG interpretation
  - 6.13. Cardiac output : Definition, normal values and variations, major determinants of cardiac output and regulation, Heart-lung preparation - measurement of cardiac output, Fick's principle and its application, indicator dye methods of measurement, Regulation of heart rate and stroke volume.
  - 6.14. Hemodynamics: Definition of terms- pressure, flow, resistance, velocity etc. Laminar and turbulent flow, Poiseuille law, factors affecting blood flow and resistance, critical closing pressure
  - 6.15. Various types of circulation, local regulation of blood flow to tissues.
  - 6.16. Arterial Blood Pressure: Definition, normal value, variations, measurement, mean arterial pressure (MAP) and its determinants.
  - 6.17. Regulation of arterial blood pressure:
    - 6.17.1. Short term reflex control: baroreceptors and their significance. Mechanism of reflex control and its limitations.
    - 6.17.2. Long term control: renal body fluid - pressure control mechanism,
    - 6.17.3. Hormonal mechanism
    - 6.17.4. Local mechanism
  - 6.18. Regional circulation: Coronary, cerebral, cutaneous, splanchnic, skeletal muscle and fetal. Normal values, special features and regulation.
  - 6.19. Cardiovascular changes during exercise.
  - 6.20. Applied physiology: Cardiac failure, circulatory shock, hypertension, hypotension
- 7. Gastrointestinal system :**
- 7.1. Introduction to gastrointestinal Physiology: Functions of GI System - individual parts. Innervation of the gut, regulation of GI functions - general overview.
  - 7.2. Oral Cavity: Mastication and digestion in mouth and its importance.
  - 7.3. Salivary secretion: mechanism, composition, functions and regulation.
  - 7.4. Physiology of deglutition: Definition, stages and neural control and applied aspects.
  - 7.5. Stomach : Overview of functions
    - 7.5.1. Physiology of gastric secretion - mechanism, composition, function and control.
    - 7.5.2. Experimental procedures to elucidate and phases of gastric secretion.
    - 7.5.3. Gastric motility - characteristics and control, gastric emptying and antral pump mechanism, peptic ulcer.
  - 7.6. Pancreatic secretions: Composition, mechanism, functions and control.
  - 7.7. Small intestine: Secretion, movement and control.
  - 7.8. Large intestine: Functions, secretions, movements.
  - 7.9. Gastrointestinal hormones and their role in secretomotor functions of the gut.
  - 7.10. Defecation: Mechanism and control.
  - 7.11. Physiology of vomiting, diarrhea and constipation.
  - 7.12. Digestion, absorption and metabolism of carbohydrate, protein and lipid
  - 7.13. Nutrition and vitamins.
  - 7.14. Obesity and starvation.

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**8. Hepatobiliary system :**

- 8.1. Liver : Functions
- 8.2. Entero-hepatic circulation
- 8.3. Bile formation, secretion, regulation and jaundice
- 8.4. Physiological basis of liver function tests
- 8.5. Gall bladder: Functions, Mechanism and regulation of gall bladder contraction, applied aspects and Oral cholecystography

**Section (D) - 25 Marks**

**9. The Body Fluids and Renal Physiology**

- 9.1. Body fluid compartments and its regulation.
- 9.2. Renal circulation.
- 9.3. Urine formation involving processes of filtration, tubular reabsorption, secretion and concentration.
- 9.4. Water diuresis and osmotic diuresis.
- 9.5. Regulation of acid base balance.
- 9.6. Structure and function of a Juxta glomerular apparatus.
- 9.7. Renal mechanisms for the control of volume, blood pressure and ionic composition.
- 9.8. Innervations of bladder, micturition and abnormalities of micturition.
- 9.9. Artificial kidney, dialysis and renal transplantation.
- 9.10. Renal Function test: Properties and composition of normal urine, examination of urine – urinalysis, physical examination, microscopic examination, chemical analysis, examination of blood, examination of blood and urine
- 9.11. Diuretics, Renal failure.

**10. Endocrinology**

- 10.1. General Endocrinology
- 10.2. Mechanism of action and Regulation of hormones
- 10.3. Physiological actions and applied aspects of pituitary gland, Thyroid gland, Parathyroid gland, Adrenal gland, Pancreas and hypothalamus, Growth Hormone.
- 10.4. Estimation and assessment of Hormones.
- 10.5. Local hormones.
- 10.6. Endocrine functions of other organs: Pineal gland, thymus, kidneys, heart

**11. Reproductive System**

- 11.1. Introduction: Sexual differentiation and development.
- 11.2. Male reproductive system :
  - 11.2.1. Primary and accessory organs and their functions.
  - 11.2.2. Spermatogenesis and its regulation
  - 11.2.3. Testosterone- secretion, transport, metabolism, mechanism and physiological actions
  - 11.2.4. Control of testicular function - feedback mechanism and abnormalities.
- 11.3. Female reproductive system :
  - 11.3.1. Physiology of menstrual cycle
  - 11.3.2. Ovarian cycle, Uterine cycle, vaginal and cervical cycle
  - 11.3.3. Physiology of ovulation and its detection
    - 11.3.3.1. Ovarian hormones - Estrogen and progesterone - physiological actions and mechanism of action

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- 11.3.4. Control of ovarian function: feedback mechanism, menopause and abnormalities
- 11.3.5. Physiology of fertilization and implantation.
- 11.3.6. Physiology of pregnancy : Endocrine changes, foeto-placental unit, changes in mother during pregnancy, tests for pregnancy
- 11.3.7. Physiology of parturition : Role of oxytocin
- 11.3.8. Physiology of lactation : Role of oxytocin and prolactin
- 11.3.9. Infertility, contraception

## **12. Growth, Development and Genetics**

- 12.1. Growth and development : Definition
  - 12.1.1. Physical growth - prenatal & postnatal period, pubertal growth, skeletal age and physical maturity
  - 12.1.2. Organ growth - differential growth of specific organs and tissues (Brain, head, lymphoid tissue, visceral and reproductive organs at various ages)
  - 12.1.3. Growth spurts in human's life-infancy and late puberty.
  - 12.1.4. Growth rates in boys and girls, mental growth and factors influencing growth-genetic, nutritional and hormonal
- 12.2. Disorders of normal growth
- 12.3. Abnormalities of foetal and postnatal growth
- 12.4. Hereditary short stature.
- 12.5. Physiology of ageing :
  - 12.5.1. Changes in various systems and mechanisms involved
  - 12.5.2. Factors affecting ageing.
- 12.6. Apoptosis.
- 12.7. Genetic control of protein synthesis, genetic code and regulation of gene expression, cell cycle and its regulation.
- 12.8. Applied genetics

## **13. Integumentary System**

- 13.1. Skin: Functions
- 13.2. Sweat glands: Types, secretion and functions.
- 13.3. Thermoregulation: Mechanism, receptors
- 13.4. Hypothalamic thermostat
- 13.5. Acclimatization
- 13.6. Disorders of thermoregulation

## **14. Central Nervous System :**

- 14.1. Introduction: Organization of the nervous system
  - 14.1.1. The structural and functional unit of nervous system.
  - 14.1.2. Neurons - types, functional components and morphology
- 14.2. Neuroglia - types, morphology, functions and classification of nerves
- 14.3. Signal transmission in the nervous system :
- 14.4. Graded potential - definition, characteristics and physiological significance
  - 14.4.1. Resting membrane potential - ionic basis
  - 14.4.2. Action potential - definition
  - 14.4.3. Ionic basis for electrical, chemical and excitability changes
  - 14.4.4. Propagation, mechanism and factors influencing the same.
- 14.5. Response of neurons and nerve fibers to injury
- 14.6. Types of injuries.

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- 14.7. Types of changes - Wallerian degeneration and regeneration
- 14.8. Factors influencing regeneration
- 14.9. Microenvironment of the neuron: CSF-composition, formation & circulation, Blood brain barrier and its importance
- 14.10. Synapse : Definition and types, structure, mechanism of transmission and properties
- 14.11. Sensory receptors : Definition, classification and properties
- 14.12. Reflexes : Definition and classification
  - 14.12.1. Reflex arc and stretch reflex
  - 14.12.2. Properties of reflexes and their clinical significance.
- 14.13. Somato-sensory system :
  - 14.13.1. Classification and characteristics of difference sensations
  - 14.13.2. Sensory pathways and regulation at the higher level
  - 14.13.3. Physiology of pain including referred pain
- 14.14. Control of posture and movement
  - 14.14.1. General Principles of organisation of motor control
  - 14.14.2. Effects of complete transection and hemisection of spinal cord
  - 14.14.3. Descending pathways involved in motor control
  - 14.14.4. Corticospinal (pyramidal) system and
  - 14.14.5. Corticobulbar (extrapyramidal) system
  - 14.14.6. Cortex, basal ganglia and cerebellum- motor control and their disorders
- 14.15. Reticular formation : Definition, connections and functions
- 14.16. Physiological basis of consciousness and sleep
- 14.17. EEG: Evoked potentials and their clinical significance.
- 14.18. Hypothalamus : Components, connections and functions
- 14.19. Thalamus : Components, connections, functions, thalamic syndrome
- 14.20. Limbic system : Components, connections and functions
- 14.21. Frontal, parietal, occipital and temporal lobe: components, connections, functions and effects of lesions
- 14.22. Higher cortical functions
- 14.23. Learning, memory, language and speech.

**15. Special Senses**

- 15.1. Visual system :
  - 15.1.1. Structure of eye and overview of functions
  - 15.1.2. Structure and function of cornea
  - 15.1.3. Aqueous humor - formation, circulation and drainage
  - 15.1.4. Intraocular pressure and functions
  - 15.1.5. Optics of vision - image forming mechanism
  - 15.1.6. Pupil and its functions
  - 15.1.7. Light reflex and accommodation
  - 15.1.8. Binocular and monocular vision
  - 15.1.9. Common errors of refraction
  - 15.1.10. Visual acuity and visual fields - clinical importance
  - 15.1.11. Ophthalmoscopy, retinoscopy and perimetry
  - 15.1.12. Photoreceptors - distribution, visual pigments and their functions
  - 15.1.13. Light and dark adaptation : photopic and scotopic vision
  - 15.1.14. Visual pathway - transduction, transmission, synaptic modulation and visual cortex.
  - 15.1.15. Effects of transection of visual pathway at various levels.

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- 15.1.16. Eye movements - neurophysiological basis of fixation of gaze and conjugate movements.
- 15.1.17. Physiology of colour vision - theories and electrophysiological aspects
- 15.1.18. Colour blindness - classification and tests.
- 15.2. Auditory system:
- 15.2.1. Functional anatomy of ear and general properties of sound
- 15.2.2. External ear - functions
- 15.2.3. Middle ear - functions of tympanic membrane and ossicles,
- 15.2.4. Mechanism of sound transmission, impedance matching, function of eustachian tube.
- 15.2.5. Internal ear - structure and function of cochlea, sound transduction, electrical potentials from cochlea, pitch and intensity discrimination.
- 15.2.6. Auditory pathway - receptive fields and tonotopic maps, binaural interactions, nerve pathway from the cochlea to the auditory cortex.
- 15.2.7. Organization of auditory cortex and functions, sound localization
- 15.2.8. Deafness : types, tests to diagnose deafness
- 15.2.9. Audiometry and its clinical applications.
- 15.2.10. The Vestibular System : Structure of labyrinth
- 15.2.10.1. Vestibular transduction - response to rotational and linear acceleration.
- 15.2.10.2. Central vestibular pathway
- 15.2.10.3. Vestibulo-ocular reflex and its clinical importance
- 15.2.11. Clinical tests for vestibular integrity, disorders of labyrinth
- 15.3. The Olfactory System: Location of receptors and pathways, physiology of olfaction and disorders of olfactory sensation.
- 15.4. The Gustatory System: Location of receptors and pathways, physiology of gustation and disorders of gustatory sensation.

**16. Recent advances in physiology**

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