

**General Instructions for Question Settlers for conducting the
written tests for recruitment of Junior Scientific Assistant in**

SPORTS AUTHORITY OF INDIA

(Common for all streams)

1. The Entrance Test Examination for conducting the written tests for recruitment of Junior Scientific Assistant in SAI will be of 2 hours duration.
2. There will be an objective type Question Paper consisting of 80 questions carrying one marks each.
3. Total marks of 80, has been divided into two sections viz. Section A of 30 marks and Section B of 50 marks.
4. Section A will consists of 30 objective type question of General Aptitude, Mental Analysis & Reasoning, questions from Mathematics, General English, and General Knowledge in Sports.
5. Section B will consist of 50 objective type question covering all syllabus of the concerned stream.
6. There will be a negative marking and each wrong answer will deduct half-a-mark.

SYLLABUS FOR THE POST OF JSA IN BIOMECHANICS

1. Introduction to Biomechanics

Introduction, definition of Biomechanics and its applications

2. Forms of motion

- i. Linear motion
- ii. Angular motion
- iii. General motion

3. Linear motion

Definition, units and explanation of different values in linear motion viz distance, displacement, speed, velocity, acceleration, acceleration due to gravity, inertia, mass, force, weight, momentum, impulse, pressure and relationship between pressure and area, implications between their relationship.

4. Angular motion

Definition, units and explanation of different values in angular motion like angular distance, angular displacement, angular velocity, angular acceleration, relationship between angular linear motion, eccentric force, couple, torque, moment of inertia and interrelationship between moment of inertia, angular momentum and angular velocity.

5. Newton's Laws of Motion

- Law of Inertia
- Law of Acceleration
- Law of Action and Reaction

6. Projectile motion

- i. Fundamental definition of trajectory, range, angle of release, point of release, velocity of release, point of landing, height of projectile, time of ascent, time of descent, time of flight, relative height of release.
- ii. Various situations of projectile motion

7. Levers

1. Type of levers
2. Anatomical levers of body
3. Principle of leverage

8. Equilibrium and Stability

- i. Definition and explanation
- ii. Center of gravity and its importance
- iii. Factors affecting stability in equilibrium and their implications

9. Concept of Force

- i. Definition and explanation
- ii. Effect of characteristics of force
- iii. Types of forces, internal and external forces
- iv. Summation of forces
- v. Centripetal and centrifugal force
- vi. Frictions: its cause types and factors affecting different types of friction and its implications
- vii. Gravitational force

SYLLABUS FOR THE POST OF JSA IN PHYSIOLOGY

Time allotted : 2 hrs

1. **Structural organization of body:**
Structure and functions of plasma membrane, nucleus, different cell organelle, Endoplasmic reticulum, Golgi bodies, mitochondria, lysosome and peroxisomes
2. **Digestive system:**
Structure & function of alimentary canal, Digestion and absorption of carbohydrates, protein and lipids.
3. **Blood and body fluids:**
Composition and functions of blood, hemoglobin, coagulation mechanism of blood, lymph and tissue fluids: composition and their functions.
4. **Cardiovascular Physiology:**
Anatomy and histology of heart, properties of cardiac muscle, origin and propagation of cardiac impulse, cardiac cycle, events and heart sound , heart rate, cardiac output, structure of arteries, arterioles, capillaries.
5. **Respiratory Physiology:**
Anatomy and histology of respiratory passage and organs, role of respiratory muscles in breathing, dead space, lung volume and capacities, exchange of gases between lungs & blood and between blood & tissues, Transport of carbon dioxide in blood
6. **Muscular System:**
Structure and function of skeletal muscle, Mechanism of muscle contraction, role of slow twitch muscle and fast twitch muscle fibers, types of muscle contraction
7. **Energy System:**
The aerobic and anaerobic pathways of energy release, Lactic acid, Physiological basis of fatigue, Effect of exercise on energy system.

8. Nervous System:

Structure and classification of nerves, Mechanism of impulse transmission, Different type of nervous, motor unit, neuromuscular junction.

9. Skin and regulation of Body Temperature:

Structure and functions of Skin, Regulation of body temperature, Training in hot and cold environment.

10. Age, sex and performance:

Changes in physiological profile during growth and development, physiological basis of selection and training of children, Women and Sports performance.

11. Measurement of work, power and energy:

Energy, work and power, ergometry, Direct and indirect estimation of energy expenditure, Measurement of energy cost of exercise, During actual activity by telemetry



SYLLABIUS FOR THE POST OF JSA IN PSYCHOLOGY

1. Introduction to Psychology:

- a.) Nature, Scope, Branches and Historical Background of Psychology.
- b.) Methods of Psychology (Observation, Introspection, Case Study, Experimental and Survey).

2. Growth and Development:

- a.) Concept of Growth and Development
- b.) Characteristics of Development
- c.) Difference between growth and development.
- d.) Factors affecting growth and development
- e.) Role of heredity and environment.

3. Personality:

- a.) Nature and Determinants of personality
- b.) Personality Theories-Freud, Allport, Cattell.
- c.) Assessment of Personality.
- d.) Personality Development.

4. Sensations and its types

- a. Visual Sensation: Structure and Function of the Eye.
- b. Theories of colour vision
- c. Auditory Sensation: Structure and Function of Ear.

5. Perception:

- a) Nature and Its Determinants,
- b) Selective Perception;
- c) Perception of Form,
- d) Perception of Depth
- e) Perception of Movement.

6. Attention:

- a. Nature of attention
- b. Selective and Divided Attention

7. Thinking:

- a) Concept Formation,
- b) Reasoning,
- c) Problem Solving
- d) Language in Thinking
- e) Creative Thinking
- f) Decision making

8. Attitudes:

- a.) Definition and Concept
- b.) Consistency between Attitude and Behaviour.
- c.) Formation of Attitudes
- d.) Theories of Attitude Change.
- e.) Measurement of Attitudes.
- f.) Interests and Values

9. Group Psychology:

- a.) Types of groups
- b.) Nature, Structure and Functioning of groups,
- c.) Group Dynamics
- d.) Social Facilitations/Social Loafing.

10. Leadership and Communication:

- a) Concept and Functions of Leaders.
- b) Theories of Leadership (Trait, Behavioural, Fiedler's Contingency)
- c) Leadership styles
- d) Characteristics of Effective Communicator
- e) Types of Interpersonal Communication Skills
- f) Verbal skills and non-Verbal Communication Skills
- g) General Characteristics, Functions and Improvement
- h) Barriers to effective communication

11. Motivation:

- b. Nature and Theories of Motivation.
- c. Theories (Maslow, Herzberg, Murray and McClelland)
- d. Goal setting styles and benefits
- e. Guidelines for setting goals

12. Intelligence:

- a.) Nature of Intelligence,
- b.) Theories-Spearman, Thurstone, Guilford.
- c.) Types of Intelligence Tests-Verbal, Non-Verbal, Performance.

13. Emotions:

- a.) Concept of emotions,
- b.) Theories of emotions-James-Lange, Cannon-Bard and activation
- c.) Physiological manifestations of emotions
- d.) Measurement of emotions

14. Memory:

- a. Sensory memory, Short term and long term memory
- b. The levels of processing model and multi store model.
- c. Theories of forgetting, decay and interference

15. Learning:

- i. Definition and concept of learning
- ii. Classical conditioning
- iii. Instrumental and operant conditioning
- iv. Trial and Error learning
- v. Insight learning
- vi. Primary and secondary laws of learning

16. The Nervous System:

- i. Structure and functioning of the neuron
- ii. Divisions of nervous system-Central and peripheral
- iii. Structure and Functioning of the brain

17. Psychotherapies:

- b) Behavioural,
- c) Cognitive-behavioural, Humanistic

18. Applied Psychology:

- a) Introduction to Sport Psychology
- b) Nature and Scope
- c) Objectives of Sport Psychology

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5. Section B will consist of 50 objective type question covering all syllabus of the concerned stream.
6. There will be a negative marking and each wrong answer will deduct half-a-mark.

SYLLABUS FOR THE POST OF JSO IN BIOMECHANICS

Time allotted : 2 hrs

1. Introduction to Biomechanics

- i. Introduction and definition of sports biomechanics
- ii. Role of sports biomechanics and its contribution in the field of sports.

2. Forms of motion

- i. Linear motion
- ii. Angular motion
- iii. General motion

3. Linear motion

Definition, units and explanation of different values in linear motion viz distance, displacement, speed, velocity, acceleration, acceleration due to gravity, inertia, mass, force, weight, momentum impulse, pressure and relationship between pressure and area, implication between their relationship.

4. Newton's laws of motion

- Law of inertia
- Law of acceleration
- Laws of action reaction

5. Projectile motion and its implication in sports

- i. Fundamental definition of trajectory, range, angle of release, point of release, velocity of release, point of landing, height of

projectile, time of ascent, time of descent, time of flight, relative height of release.

- ii. Various situations of projectile motion and their characteristics and implication in sports.

6. Angular motion

Definition, units and explanation of different value in angular motion like angular distance, angular displacement, angular velocity, angular acceleration, moment of inertia and interrelationship between moment of inertia, angular momentum and angular velocity.

7. Levers

- i. Types of levers
- ii. Anatomical levers of body
- iii. Principle of leverage

8. Equilibrium and stability

- i. Definition and explanation
- ii. Deter of gravity and it's importune
- iii. Factors affecting stability in equilibrium and their implications.

9. Concept of force

- i. Definition and explanation
- ii. Effect of characteristics of force
- iii. Types of forces, internal and external forces
- iv. Summation of forces
- v. Centripetal and centrifugal forces
- vi. Friction: its cause types and factors affecting different ties of friction and its implications
- vii. Gravitation force

10. Fluid mechanics

- i. Water resistance in swimming
- ii. Air resistance during throws
- iii. Drag, various forms of drag and their effects on throws
- iv. Lift
- v. Reduction in air resistance
- vi. Friction
- vii. Impact and elasticity

11. Biomechanical Principles

- i. Biomechanical principles of action and reaction
- ii. Biomechanical principles of conservation of angular momentum
- iii. Biomechanical principles of optimum path of acceleration
- iv. Biomechanical principles of optimum tendency in acceleration
- v. Biomechanical principles of coordination of partial impulses.

SYLLABUS FOR THE POST OF JSO IN PHYSIOLOGY

Time allotted : 2 hrs

1. Basic physiology

1.1 Membrane Physiology, Nerve & Muscles - Transportation of row molecules through cell membrane, diffusion, active transport, membrane potential and action potential, motor unit, proprioception.

1.2 The skeletal muscle- The physiologic anatomy of skeletal muscles, prosperities of skeletal muscles, role of muscles spindle, stretch reflex, importance of Golgi tendon organs.

1.3 Cardiovascular system- Structure & function if cardiac muscle, properties of Cardiac muscle. The cardiac cycle. Regulation of cardiac output, sympathetic & parasympathetic control systemic & pulmonary circulations, factors controlling circulation.

1.4 Pulmonary ventilation- Mechanical of respiration, pulmonary volumes and capacities and their significance, Principal of gas exchange transport of oxygen & carbon dioxide in blood, stitch in side, second wind, ventilation during exercise.

1.5 The nervous system- General design of nervous system, motor function of spiral cord, cord reflexes, organization of autonomic nervous system, motor control.

2. Exercise Physiology

2.1 High Altitude Physiology- Effects of low oxygen pressure on body, acute effects of hypoxia, acclimatization to low partial and its effects on work capacity.

2.2 Regulation of body temperature- Mechanism of regulation of body temperature, heat & cold acclimatization.

2.3 Process of recovery- Lactate & alactate phase. Oxygen debt, modern concept of excess post exercise oxygen consumption, factors controlling recovery processes, removal and fate of lactic acid.

3. Applied aspect of Physiology

3.1 The anaerobic threshold- Theoretical concept of anaerobic threshold, the ventilatory threshold and lactate threshold, physiological changes at anaerobic threshold.

3.2 Maximum oxygen uptake capacity- The early and recent concept of VO_2 max, relevance of O_2 component in different games & sports.

3.3 Nervous system & exercise- Mechanism of autonomic nervous system of during rest and exercise.

3.4 Exercise training in females- Body size & composition, structure difference, strength difference, effects of weight of training.

3.5 Exercise and training for health & fitness- Cause and risk factors of cardiovascular diseases, effects of exercise and training on health and fitness, aging and longevity.

SYLLABUS FOR THE POST OF JSO IN ANTHROPOMETRY

Time allotted : 2 hrs

1. Kinanthropometry of athletes

- 1.1 Introduction, scope and general considerations.
- 1.2 Application of anthropometric data in sports.
- 1.3 Analysis within and between sports.
- 1.4 Static and Dynamic body measurements pertinent to Sports Anthropometry.

2. Body proportions and indices

- 2.1 Sport Specific body proportion and indices
- 2.2 Body mass index and its importance in sports
- 2.3 The phantom stratgem and sports
- 2.4 The O-scale system and sports

3. Physical growth, Maturation and Sports Performance.

- 3.1 Introduction
- 3.2 Standard of normal growth
- 3.3 Growth at Adolescence and Motor performance
- 3.4 Chronological age-based Distance and Velocity curves. Hormonal, genetic and environmental factors, Controlling growth.

- 3.5 Disorder of Growth.
- 3.6 Organization of Growth process
- 3.7 Sex differentiation up to puberty
- 3.8 Developmental age, and the problems of Early and late matures.
- 3.9 Growth and development of the Brain

4. Physiological Maturation

- 4.1 Decimal age and concept of Physiological maturity in sports.
- 4.2 Measures of maturity.
- 4.3 Assessment of skeletal maturity of athletes.
- 4.4 Age-based competitions and the maturity status.
- 4.5 Prediction of adult height and its applications.

5. Body Composition: Athletes' body composition and performance

- 5.1 Introduction, Definition and Scope in sports.
- 5.2 Anthropometric determination of body composition.
 - (i) Metiegka's Method
 - (ii) Drinwater tactic for estimating fractional masses.
 - (iii) Density estimation from skinfold measurements.
 - (iv) Water displacement method and under water weighing method.

6. Somatotyping-Its relevance in sports

- 6.1 The Heath-Carter method of somatotyping.
- 6.2 Classification of somatotypes.
- 6.3 Somatochart and somatoplot.
- 6.4 Somatotypes of athletes.

7. Body composition methods

- 9.1 Hydrometry method
- 9.2 Vague's method
- 9.3 Martin Method
- 9.4 Circumference method evaluate body composition
- 9.5 Muscle cross sectional area of athletes
- 9.6 Fat free mass, obesity, and age.
- 9.7 Reversibility of body composition
- 9.8 Exercise and body composition

8. Other methods to analysis of body composition

DEXA, CT SCAN, MRI , Bioelectrical impedance, BIOSCAN Analyzer
Bod pod body Analyzer

SYLLABUS FOR THE POST OF JSO IN FOOD & NUTRITION

Time allotted : 2 hrs

1. **Introduction-** Food groups, functioning of food, balanced diet.
2. **Components of food.**
 - 2.3 **Carbohydrates:** Classification, sources requirements Digestion, absorption and utilization of carbohydrates, Dietary fibres, Glycemic index of food.
 - 2.4 **Lipids:** Classification, sources requirements, Digestion absorption & utilization, Essential & non- Essential fatty acids.
 - 2.5 **Proteins-** Classification, sources requirements, Digestion absorption & utilization, Essential & non –Essential amino acids.
 - 2.6 **Vitamins-** Fat soluble & water soluble vitamins- sources requirements, function & deficiency disorders.
 - 2.7 **Minerals-** Sources, deficiency disorder & preservative measures.
 - 2.8 **Fluids & Electrolytes**
3. **Assessment of Nutritional Status.**
4. **Weight Management** – Under weight & Obesity, Body Weight control, Associated disorders, causes & risk factors & Cardiovascular diseases.
5. **Eating Disorders-** Anorexic & Bulimic
6. **Energy & Nutritional Require mental in sports**
7. **Dietary Modification in Sports-** Pre Competition & Post Competition diet.

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SYLLABUS FOR THE POST OF JSO IN BIOCHEMISTRY

Time allotted : 2 hrs

1. Cell, Biomolecules and Endocrinology

- 1.1 Definition, Structure and functions of cellular organelles of human cell
- 1.2 Types and functions of carbohydrate, fat, protein and nucleic acid.
- 1.3 Types of hormones
- 1.4 Mechanism of action of hormones
- 1.5 Major hormones and their role in sports performance

2. Exercise metabolism

- 2.1 Bioenergetics- ATP as the "energy currency" of the body
- 2.2 The Phosphogen system
- 2.3 Energy substrates: overview of carbohydrate, protein and fat metabolism: effects of exercise on the energy system
- 2.4 The aerobic and anaerobic pathways of energy release
- 2.5 Aerobic and anaerobic energy production during exercise
- 2.6 Glycogen metabolism, cori cycle, lactic acid metabolism and its relevance in sports
- 2.7 Creatine metabolism
- 2.8 Carnitine and fat metabolism
- 2.9 Role of exercise intensity and duration on the choice of oxidative substrate utilization

3. Muscle contraction and acid base balance:

- 3.1 Structure and function of skeletal muscle
- 3.2 Mechanism of muscular contraction
- 3.3 Role of Fast twitch and Slow Twitch fibres in high performance sports
- 3.4 Types of muscle contraction
- 3.5 Adaptation in the musculo-skeletal system to training.
- 3.6 Respiratory and renal regulation of pH during exercise

4. Metabolic adaptation to various types of sports training

- 4.1 Metabolic adaptation to aerobic training
- 4.2 Effects on cytosolic enzymes
- 4.3 Effects on mitochondrial enzymes
- 4.4 Hormonal adaptation

5. Metabolic adaptation to anaerobic training

- 5.1 Effects on fuel availability
- 5.2 Effects on glycolytic capacity
- 5.3 Effects on buffer capacity

6. Biochemical assessment of athletes

- 6.1 The blood and its biochemical function
- 6.2 Liver Function Test
- 6.3 Kidney Function Test
- 6.4 Endocrine status
- 6.5 Iron status
- 6.6 Metabolic end products
- 6.7 Oxidative and metabolic stress during exercise and its role

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SYLLABUS FOR THE POST OF JSO IN PSYCHOLOGY

Time allotted : 2 hrs

1. Introduction to Sports Psychology.

- 1.1 Scope of Sports Psychology
- 1.2 Sports Psychology as an applied branch of Psychology.
- 1.3 Dimensions of Human Behavior.
- 1.4 Methods of assessing sports behavior
- 1.5 Current concerns and future directions in Sports Psychology.

2. Psychology of Motor Learning

- 2.1 Learning and its definition.
- 2.2 The concept of motor learning.
- 2.3 Stages in acquisition of motor skills.
- 2.4 Primary and secondary laws of learning.
- 2.5 Factors affecting motor learning
- 2.6 Transfer of learning, its types and its applications in sports.
- 2.7 Measurement of motor learning and learning curves.
- 2.8 The phenomenon of plateau in motor learning, its causes and remedies.

3. Cognitive Processes in Sports.

- 3.1 Meaning and mechanism of cognitive processes.

- 3.2 Role of sensation, perception, thinking, attention, concentration, intelligence and decision making in sports
- 3.3 Techniques of cognitive control and cognitive behavior modifications.

4. Emotional Processes in Sports.

- 4.1 Meaning and behavioral manifestations of emotion.
- 4.2 Psycho physiology of emotions.
- 4.3 Arousal performance relationship in sports-theories and applications.
- 4.4 Pre-Competition anxiety-assessment and remedies.

5. Motivation of Sports

- 5.1 Meaning of Sports Motivation.
- 5.2 Types of motivation- Intrinsic and extrinsic and achievement motivation.
- 5.3 Maslon's need hierarchy theory of motivation.
- 5.4 Techniques of motivation.
- 5.5 Goal Setting.

6. Personality

- 6.1 Development through Sports
- 6.2 Meaning, Definition and structure of personality.
- 6.3 Concepts of athletic personality.
- 6.4 Traits of athletes.

7. Stress

- 7.1 Mechanism of Stress.

- 7.2 Causes and Symptom of stress.
- 7.3 Techniques of stress management
- 7.4 Meaning and importance of Psycho-regulation in sports
- 7.5 Conditioning methods: Systematic Desensitization Thought stopping, Flooring and Modeling
- 7.6 Relaxation Techniques- Progressive muscular relaxation training.
- 8. Psychological preparation in Sports.**
 - 8.1 Meaning and importance of psychological preparation in sports.
 - 8.2 Short term and long term preparation.
- 9. Sociological issues for optimizing.**
 - 9.1 Group processes.
 - 9.2 Team Cohesiveness.
 - 9.3 Leadership style and communication in teams.

SYLLABUS FOR THE POST OF JSO IN SPORTS MEDICINE

Time allotted : 2 hrs

A.	<p>INTRODUCTION</p> <ul style="list-style-type: none"> • Definition and Scope of Sports Medicine. • History, development aim & objective • Olympic movement • Role & activities of IOC Medical commission. • Development objectives and activities of FIMS. • Role of NSF's, ISF's IOA, OCA & Olympic Movement • Importance and multidisciplinary approach in high performance sports. • Role of sports medicine in general population and mass fitness.
B	<p>EXERCIS PHYSIOLOGY</p> <p>(i) <u>Muscular System</u></p> <ul style="list-style-type: none"> • Microscopic structure of muscle fiber and mechanism of contraction. • Type of contraction and its implications on training. • Type of muscle fibers, classification and recruitment pattern in different sports, macro and microscopic metabolic differentiation and muscle biopsy. • Motor units and its relation to physical performance. • Adaptation changes in skeletal muscles due to strength speed and endurance training. • Evaluation of static and dynamic muscular strength. • Electromyography (EMG) and its importance in high performance sports. <p>(ii) <u>Bioenergetics</u></p> <ul style="list-style-type: none"> • Energy cost in different sports activities. • Aerobic and interaction of release of energy in different sports disciplines • Maximum aerobic capacity, anaerobic threshold, oxygen pulse, oxygen debt determination and importance in high performance • Acid base balance response to exercise. • Homeostasis changes in muscle and blood pH during exercise. • Blood lactate and its implication in sports training • Onset of blood lactate accumulation (OBLA) and its importance in sports. • Buffer capacity, effect of acidosis on metabolism • Limitations of energetic processes.

	<p>Asthma, cardiomyopathy, cardiac arrhythmias, induced asthma, cardiomyopathy, cardiac arrhythmias, mitral valve prolapsed, essential hypertension, athletic pseudonephritis, epilepsy and sports muscular dystrophy, exercise induced hyperacidity, ECG changes in sportsperson endurance vs strength sports, sudden death in sports.</p>
C	<p>WEIGHT CONTROL</p> <ul style="list-style-type: none"> • Importance in combat sports. • Means and methods of weight reduction. • Weight loss and athletic performance. • Gradual and rapid weight reduction. • Practical recommendations for athletes and coaches.
D	<p>SPORTS AND ENVIRONMENT</p> <ul style="list-style-type: none"> • Thermoregulation. • Physiological and clinical consequences of exercise in heat and humidity- heat acclimatization and adaptation, heat cramps heat stroke, heat exhaustion, pathophysiology prevention and management. • Acclimatization to altitude- physiological response to hypoxia, altitude training, acute mountain sickness, high altitude pulmonary odema, frost bite, high altitude cerebral odema, chronic mountain sickness, management and treatment. • Scuba diving, effects of submersion-decompression illnesses, treatment and management.
E	<p>SPORTS NUTRITION</p> <ul style="list-style-type: none"> • Quantitative and qualitative aspects of sports nutrition. • Nutritional factors affecting performance. • Carbohydrate protein and fat metabolism. • Role of vitamins and minerals in sports performance. • Pre competition diet, competition and post competition replenishment and recovery. • Glycogen and water loading. • Fluid and electrolyte balance. • Nutritional supplements. • Eating disorders in athletes.
F	<p>DOPING IN SPORTS</p> <ul style="list-style-type: none"> • IOC Prohibited drugs- groups and classifications • IOC rules and regulations on doping in sports.

	<p>(iii) <u>Respiratory System:</u></p> <ul style="list-style-type: none">• Respiratory response of athlete to exercise.• Neurohumoral regulation of respiration• Mechanic of breathing• Static and dynamic lung capacities• Determination of ventilatory parameters• Ventilatory costs.• Mechanical and metabolic profusion• Adaptation of respiratory system to training• Limitation of respiratory system on performance. <p>(iv) <u>Cardiovascular System:</u></p> <ul style="list-style-type: none">• Response of cardiovascular system to training• Regulation and mechanism of cardiovascular system at rest and during exercise.• Circulatory haemodynamics during rest, exercise and recovery.• Long term adaptational changes in cardiac parameters and structure.• Evaluation of cardiovascular system during training and its implication in the training process.• Electrocardiographic changes attributed to training.• Athlete's heart <p>(v) <u>Nervous System:</u></p> <ul style="list-style-type: none">• Control and response of nervous system• Acute CNS adaptations to exercise• Automization & neuromuscular coordination.• ECG <p>(vi) <u>Endocrine System:</u></p> <ul style="list-style-type: none">• Regulation during exercise-sympathoadrenal response and regulation• Sex and growth hormones-pituitary-gonadal axis.• Glycoregulatory hormones.• Thyroid & thyroid stimulating hormones• Adaptation changes in humoral system due to exercise.• Neurotransmitters and exercise-endorphins and sports
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c.	BIOMECHANIC AND KINESIOLOGY <ul style="list-style-type: none"> • Introduction –fundamental mechanics, statics, dynamics, kinematics and kinetic values • Newton’s law of motion and their application in sports. • Human posture, causes of poor posture and corrective exercises • Biomechanical aspects of sports injuries • Basic movement structure, classification of different phases, function and relationship important qualities of movement. • Functional anatomy in different skills and techniques. • Involvement of muscles. • Bone and cartilage- Physical properties-genetic components, stress and load during exercise.
D	SPORTS ANTHROPOMERTY <ul style="list-style-type: none"> • Body composition. • Somatotype • Growth and development • Evaluation of biological age. • Anthropometric techniques, instrumentation and measurements. • Bioelectrical impedance analysis. • Physique and its importance in different games and sports.

MEDIAL ASPECTS OF SPORTS

A	TEAMS MEDICAL CARE <ul style="list-style-type: none"> • Role of team physician • Relation with coach, athlete and sports management. • Sports medical evaluation and performance diagnostics. • Vaccinations and inoculations, safety and hygiene. • First-aid management and care of the athlete in training and competitions. • Circadian rhythm, travel and acclimatization. • Legal aspects of sports medicine.
B	MEDICAL PROBLEMS <ul style="list-style-type: none"> • Exercise, stress and immunity. • Bacterial fungal, viral and protozoal diseases. • Infectious diseases, prevention, management and treatment. • Hygiene of sport fields and installations. • Personal hygiene –effects of smoking, drinking and sex. • Clinical hazards of exercise –athletic anemia, exercise induced

SURGICAL DISCIPLINES, SPORTS INJURIES, PHYSIOTHERAPY AND REHABILITATION

<p>A.</p>	<p>SPORTS TRAUMATOLOGY</p> <ul style="list-style-type: none"> • Clinical examination of hip, knee, foot and ankle, shoulder and wrist, neck and lower back, lower limb in relation to mal-alignments. • Factors predisposing sports injuries • Soft tissue injuries- skin fascia, muscles, tendons and ligaments. • Acute and chronic overuse injuries- intrinsic and extrinsic factors. • Radioimagine techniques-MRI, CTG & Bone Scan. • Arthrography and Arthroscopy. • Adaptation to training load on skeletal system. • Protective equipment-design of shoe and safety factors in equipments.
<p>B.</p>	<p>SPORTS PHYSIOTHERAPY AND REHABILITATION</p> <ul style="list-style-type: none"> • Role of Physiotherapy in sport specific injuries and rehabilitation. • Principles of physiotherapy and its application in the management of sports injuries. • Cryotherapy, cryokinetics, hydrotherapy, sauna and steam bath. • Electrotherapy-Low, Medium and high frequency currents, nerve and muscle stimulators, magneto therapy, laser therapy, phonophoresis and iontophoresis. • Massage - physiological effects, types, indications and contraindications. • Active and passive rehabilitation exercises. • Alternative exercises for maintaining cardiorespiratory fitness • Isokinetic rehabilitation.
<p>C.</p>	<p>SPORTS SPECIFIC INJURIES AND THEIR MANAGEMENT</p> <ul style="list-style-type: none"> • <u>Acute and chronic overuse injuries</u> • Jogging and running injuries • Injuries related to weight training and lifting • Swimming and diving injuries • Injuries in combat injuries\Injuries in racket sports. • Field game injuries • Head injuries in athletics • Cardiopulmonary and abdominal emergencies. • Spine injuries • Maxillofacial injuries.
<p>D</p>	<p>THERAPEUTIC SPORTS</p> <ul style="list-style-type: none"> • Sports for disabled • Sports for age • Physical work capacity of handicapped

	<ul style="list-style-type: none"> • Exercise prescription for various psychosomatic and non communicable diseases-bronchial asthma, diabetes, obesity, hypertension, IDH, cerebral stroke, muscular dystrophy and posttraumatic muscular atrophies. • Yoga and exercise. • Hazards of prohibited substances • EPO and blood doping • Drug analysis, methods of sampling estimation
E.	FATIGUE AND RECOVERY IN SPORTS <ul style="list-style-type: none"> • Etiology of fatigue- central and peripheral. • Theory of supercompensation, fatigue and recovery. • Medicobiological means of recovery. • Staleness and overtraining-etiology – sympathetic and parasympathetic domination. • Training mean and management for chronic overtraining syndrome.
F.	WOMEN IN SPORTS <ul style="list-style-type: none"> • Biological factors affecting sports performance in female athletes-anatomical, physiological, biochemical, biomechanical, psychological, sociological and genetics. • Hormonal changes in the menstrual cycle due to physical stress. • Special problems- delayed menarche, athletic amenorrhea, athletic triad and athletic anemia. • Physical exercises in pregnancy, lactation and menstruation. • Gender verification and XY females in sports.
G.	<ul style="list-style-type: none"> • Introduction- cognitive process in sports attention, perception, memory and intelligence in sports. • Motivation and sports performance. • Motivational techniques • Mental hygiene • Psychoregulation psychotherapy behavior. • Conditioning and relaxation techniques.
H.	MEDICAL ASPECTS OF TRAINING METHODS <ul style="list-style-type: none"> • Introduction to sports training • Principles of training load. • Motor abilities, determining factors type and development. • Periodisation and long term planning of training process • Selection of talent. • Functional dynamics of sports.