Syllabus of

FY – Full Time (4 Years) UG NEP Programme

(SVU 2025 - 26)

Version 1.0

From

Academic Year 2025 - 2028

Somaiya Sports Academy, Mumbai – 77

(A Constituent College of Somaiya Vidyavihar University)

Details Approvals

List of FY – Full Time UG Programmes

SVU – R 3.O

Sr. No.	Name of the Programme	Semester / Year	Date of Faculty Approval	Date of BOS Approval	Date of AC Approval	Page No.
1.	B. Sc. Sports and Exercise Science	All Semesters				

Details of Approvals – Amendments

List of the FY – Full Time UG Programmes

SVU 2025 – R4.0

Sr. No.	Name of the Programme	Semester / Year	Date of Faculty Approval	Date of BOS Approval	Date of AC Approval	Page No.
1.	B. Sc. Sports and Exercise Science	All Semesters				

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PREAMBLE

Sports Science is an interdisciplinary field dedicated to the understanding and enhancement of athletic performance, physical fitness, and overall well – being through the application of scientific principles. It encompasses a broad range of sub – disciplines, including physiology, biomechanics, psychology, nutrition and motor control, among others. The ultimate goal of sports science is to optimize human potential in various physical activities, from recreational sports to elite competitive athletics.

Rooted in empirical research and evidence – based practice, sports science seeks to elucidate the mechanisms underlying physical performance and the effects of exercise on the human body. This involves studying the body's responses to physical activity, the impact of training regimes, and the role of proper nutrition and recovery strategies. Through a comprehensive approach, sports scientists aim to develop methods to enhance performance, prevent injuries, and promote long – term health and fitness.

Central to the field is the integration of theory and practice, where scientific findings are translated into practical applications for athletes, coaches, and fitness enthusiasts. Sports science professionals collaborate with a range of stakeholders, including sports organizations, healthcare providers, and educational institutions, to implement strategies that foster physical excellence and encourage an active lifestyle.

As the field continues to evolve, advancements in technology and research methodologies are providing deeper insights into human performance. This ongoing progression underscores the importance of sports science in contributing to the well-being of individuals and communities, shaping the future of sports and physical activity in society.

Need for Sports Science in Today's Scenario

In today's rapidly evolving world, sports science plays a crucial role in various aspects of human health, performance, and society. Its importance is underscored by several key factors:

1. **Optimizing Athletic Performance:** With the increasing competitiveness in sports at all levels, from youth sports to professional leagues, there is a growing need for scientific approached to enhance athletic performance. Sports science provides athletes and coaches with evidence – based strategies for training, technique improvement, and performance analysis, helping to achieve peak performance while minimizing the risk of injury.

2. **Injury Prevention and Rehabilitation:** Sports science is vital in understanding the biomechanics and physiology of the human body, which helps in designing programs to prevent injury. In the event of injuries, sports scientists collaborate with medical professionals to develop effective rehabilitation protocols, ensuring a safe and efficient return to activity.
3. **Promoting Health and Fitness:** Beyond competitive sports, sports science contributes to public health by promoting physical activity and heathy lifestyles. Through research and education, sports scientists help combat sedentary behaviours and related health issues such as obesity, cardiovascular diseases, and diabetes. They develop fitness programs tailored to diverse populations, encouraging lifelong habits of physical activities.
4. **Technological Advances:** The integration of sports science has revolutionized the way data is collected and analysed. Wearable technology, motion capture systems, and advanced analytics provide real – time feedback and insights into performance, training loads, and recovery. This technological edge helps athletes and coaches make informed decisions and track progress more accurately.
5. **Psychological Well-being:** Mental health is increasingly recognised aspect of overall realm of sports science to address issues such as performance anxiety, motivation and mental resilience. This holistic approach ensures that mental health is prioritized alongside physical health.
6. **Customized Nutrition and Hydration:** Proper nutrition and hydration are fundamental to athletic success and general health. Sports scientist work with detains to develop individualized nutrition plans that meet the specific needs of athletes, enhancing their performance and recovery. This extends to the general population, where nutritional guidance helps improve overall health outcomes.
7. **Youth Development:** Sports science plays as significant role in the development of young athletes. By applying age – appropriate training and development principles, sports scientists ensure that young grow and develop in a healthy and balanced manner, reducing the risk of burnout and overuse injuries.
8. **Ageing Population:** As the global population ages, maintaining physical activity becomes essential for healthy ageing. Sport science offers insights into how exercise can be adapted for older adults to maintain mobility, strength, and independence, thereby improving their quality of life.

9. **Economic Impact:** The sports industries is a significant economic driver, encompassing professional sports, fitness industries, and recreational activities. Sports science supports this industry by enhancing performance, reducing healthcare costs through injury prevention, and promoting community engagement in sports and fitness activities.
10. **Research and Innovation:** Ongoing research in sports science leads to innovation that benefits not only the athletes but also the broader population. From developing new training methodologies to discovering novel ways to enhance recovery, sports science continually pushes the boundaries of what is possible in human performance and health.

In summary, sports science is indispensable in today's scenario for enhancing athletic performance, promoting health and fitness, preventing injuries, and leveraging technology and research to improve overall quality of life. Its multidisciplinary approach addresses the physical, mental, and nutritional needs of individuals, making it a cornerstone of modern sports and health science.

Significance of Sports Science

The significance of sports science extends across various dimensions of society, encompassing health, education, economics, and social well – being. Its multifaceted impact highlights the essential role it plays in modern life:

→ **Enhancement of Athletic Performance**

- **Training Optimization:** Sports Science provides evidence – based methods to optimize training routines, enhancing athletic performance through tailored programs that considers an individual's physiology and biomechanics.
- **Performance Analysis:** Advanced technologies such as motion capture and wearable sensors allow for detailed analysis of movements, helping athletes refine techniques and improve efficiency.

→ **Injury Prevention and Management:**

- **Biomechanical Assessment:** Understanding the mechanics of movement helps in designing protocols that reduce the risk of injury.

- **Rehabilitation Protocols:** Sports scientists work alongside medical professionals to develop effective rehabilitation strategies, ensuring that athletes recover fully and safely return to their sports.

→ **Promotion of Health and Fitness:**

- **Combating Sedentary Lifestyles:** By promoting regular physical activity, sports science helps combat lifestyle - related diseased such as obesity, diabetes and cardiovascular diseases.
- **Public Health Initiatives:** Research in sports science supports public health campaigns that encourage active living contributing to improve overall health outcomes.

→ **Technological Integration:**

- **Innovation in Sports Equipment:** The development of new materials and technologies in sports equipment enhances performance and safety.
- **Data – Driven Decisions:** Real – time data collection and analysis enable more precise monitoring of training loads and recovery, allowing for more informed decision – making by athletes and coaches.

→ **Psychological Benefits:**

- **Mental Health Support:** Sports psychology addresses mental health issues such as anxiety, stress and motivation, contributing to the overall well – being of athletes.
- **Enhanced Focus and Resilience:** Techniques developed through sports science improve mental focus and resilience, which are crucial for both athletic performance and everyday life challenges.

→ **Nutritional Guidance:**

- **Customized Diet Plans:** Sports nutritionists develop diet plans that optimize energy levels, enhance recovery, and improve overall health, tailored to individual needs.
- **Hydration Strategies:** Proper hydration is essential for peak performance, and sports science provides strategies to maintain optimal hydration levels.

→ **Youth Development:**

- **Safe Training Practices:** Age – appropriate training programmes ensure that yoga athletes develop their skills without risking injury or burnout.

- **Long – Term Athletic Development:** Emphasizing the long – term development of skills and physical attributes fosters a sustainable approach to youth sports.

→ **Support for Aging Populations:**

- **Active Aging Programs:** Exercise programs designed for older adult's help maintain mobility, strength and independence, promoting healthy aging.
- **Reduced Healthcare Costs:** Active aging initiatives reduce the incidences of age – related health issues, thereby decreasing healthcare costs.

→ **Economic Impact:**

- **Sports Industry Growth:** The sports industry, supported by advancements in sports science, contributes significantly to the economy through professional sports, fitness training and recreational activities.
- **Job Creation:** The field creates diverse job opportunities in coaching, sports medicine, fitness training and research.

→ **Educational Influence:**

- **Curriculum Development:** Sports Science informs educational programs at various levels, from school physical education to university degrees in sports and exercise science.
- **Lifelong Learning:** Promoting an understanding of the importance of physical activity fosters a culture of lifelong learning and health consciousness.

→ **Social and Cultural Impact:**

- **Community Building:** Sports activities, supported by sports science, play a significant role in building community spirit and social cohesion.
- **Inclusivity in Sports:** Sports science helps create adaptive sports programs for people with disabilities, promoting inclusivity and equal opportunities in physical activities.
- In essence, sports science is significant because it enhances performance, improves health outcomes, supports economic growth, and fosters social well-being. Its comprehensive approach addresses both the physical and psychological aspects of sports and physical activity, making it a vital component of contemporary society.

Programme Objectives (PO)

PO1: Discipline Specific Core Objectives:- The course is so designed that it meets all the demands of the society in disseminating the knowledge of Physical Education & Sports Sciences. This course creates a strong foundation for all forms of training courses in physical education and sport sciences at various levels.

PO2: Academic Excellence: - The program will enable the students to propagate the importance of Physical Education and Sports & Exercise Science at various levels and its requirement for every individual of the society to keep oneself healthy and live a stress free and positive lifestyle.

PO3: Experiential Learning: - To build the capacity of students for dissemination of information and documentation on Physical Education and Sports and Exercise Sciences on the results of research, evaluation studies, concerning program, experiments and activities related to diverse fields, societies and individuals.

PO4: Cater Industrial Needs: - To train the students to meet the challenges faced by the sportspersons with respect to doping, which is both injurious to health and contrary to the sporting ethics, and to protect the physical and mental health of athletes, the virtues of fair play and competition, the integrity of the sporting community and the rights of people participating in it at any level whatsoever.

PO5: Research Aptitude: - Through the research elements of the program the students can develop innovative methods of teaching and increase the standards of performance in sports.

PO6: Social Commitment: - The program helps to develop clear concepts among the students to meet the individual and social needs through Physical Education and Sports program.

PO7: Professional Efficiency: - The students are exposed to various organizational tasks both on field and classrooms during their tenure of study and thus, imbibe leadership qualities in them.

PO8: Professional Ethics: - The students graduating with this program is expected to contribute to the maintenance and improvement of health, provide a wholesome leisure – time occupation and enable man to overcome the drawbacks of modern living, develop the abilities, will – power and self – discipline of every human being as a fully integrated member of society through physical education and sports sciences at the individual and community level. They

enrich social relations and develop fair play which is essential not only to sports itself but also to life in society.

PO9: Critical Thinking and Decision Making: - The students are expected to carter to the development of a scientific program of achieving good health and fitness for the corporate sectors after acquiring knowledge from various allied multidisciplinary fields.

Program Specific Outcomes (PSO'S): (DSC, DSE, AECC, SEC & GE)

Upon completion of the Graduate Program in Sports and Exercise Science, the learner will be able to:

PSO1: The students will acquire the aptitude of teaching in Classroom, field and possible Teaching / Coaching Environment (Theory, Practical and Applications) through various assignments.

PSO2: The program caters to the development of Leadership Qualities, Entrepreneurship, Organizational Abilities and Teamwork among the students.

PSO3: The course provides students with specialized knowledge in the disciplines of physical education, health education, yoga and allied sports sciences and sports in particular.

PSO4: The program will prepare students and athletes to cater to the current market trends and bridge the gap of sports science professionals.

PSO5: The course provides a solution for optimal performance and athletes' necessity to optimize his performance.

Course Outcomes (CO's):

On completion of this course students will be able to:

CO1: After completing the course students will be able to provide knowledge to the public at large about Physical Education, Sports Education, Health Education, and Yoga & Sports Sciences (like – Exercise Physiology, Sports Psychology, Sports Biomechanics, Sports Management, Kinesiology, Applied Anatomy and Physiology and Sports Nutrition) and various sports (like – Team, Individual, Combative, and Dual Sports).

CO2: The AECC Course provides students with specialized knowledge in the discipline of physical education, health education, yoga and allied sports sciences and sports in particular.

CO3: The course has multi – disciplinary competence to identify, analyse, adapt, and provide possible solutions to various stakeholders such as athletes, coaches, academies, investors, and government entities.

CO4: The course enhances the power of individual performance and team players to collaborate with different skill sets and generate desired outcomes.

CO5: The course helps to conduct investigation, testing, assessment, evaluation and use research – based scientific knowledge and research methods to identify a gap or obstacle in optimizing performance.

CO6: The course creates a lifelong learning through recognizing the need for continuous assessment and adaptable changes as per the growing need and changing environment, which helps to create a conducive environment for athletes to perform to their fullest capacity.

Details for B.Sc. Sports & Exercise Science Program

1. Number of Courses Offered:

Sr. No	Course Type	Credits Per Course	No. of Courses
1	Discipline Specific Core Course (DSC)	6	16
2	Discipline Elective Course (DSE)	6	08
3	Skill Enhancement Courses (SEC)	4	06
4	Ability Enhancement Compulsory Courses (AECC)	4	02
	Total number of courses offered		**32**

2. Semester – wise Distribution of Credits

Year	Semester	Courses	Credits	Semester	Courses	Credits
Ist Year	I	4	22	II	4	22
IInd Year	III	4	22	IV	4	22
IIIrd Year	V	4	22	VI	4	22
VIth Year	VII	4	22	VIII	4	22
Total Credits - 176						

Important Information related to the Program

The B.Sc. Sports and Exercise Science contains **16 Discipline Specific Core (DSC)** papers placed from Semester – I to Semester – VIII of 6 credits each labelled from DSC – 1 to DSC – 16. These are listed below:

- **DSC – 1** Anatomy & Physiology: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 2** Sports Proficiency – I (Swimming): 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 3** Computer Applications: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 4** Sports Proficiency – II (Track & Field) 6 Credits (4Th +1P+1 ST)
- **DSC – 5** Exercise Physiology: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 6** Sports Proficiency – III (Racquet Sports): 6 Credits (4Th +1P+1 ST)
- **DSC – 7** Test Measurement & Evaluation: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 8** Sports Proficiency – IV(Ball Games/Sports): 6 Credits (4Th+1P+1 ST)
- **DSC – 9** Yoga Education: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 10** Sports Skill Enhancement: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 11** Introduction to Strength & Conditioning: 6 Credits (4Th+1P+1 ST)
- **DSC – 12** Exercise Prescription: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 13** Research Practices & Statistics: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 14** Advanced Strength & Conditioning: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 15** Kinesiology & Biomechanics: 6 Credits (4 Th + 1P+ 1 ST)
- **DSC – 16** Sports Ethics: 6 Credits (4 Th + 1P+ 1 ST)

The B.Sc. Sports and Exercise Science course contains **2 Ability Enhancement Compulsory Course (AECC)** papers placed in Semester I and Semester II labelled as AECC – 1 and AECC – 2. These papers are listed below:

- **AECC – 1** English Communication: 4 Credits (3Th + 1 ST)
- **AECC – 2** Environmental Studies: 4 Credits (3Th + 1 ST)

The B.Sc. Sports and Exercise Science course contains **6 Skill Enhancement Course (SEC)** papers placed form Semester – III to Semester VIII of 4 credits each labelled from SEC – 1 to SEC – 6. These papers are listed below:

- **SEC – 1** Sports Psychology: 4 Credits (3Th + 1 ST)
- **SEC – 2** Sports & Exercise Nutrition: 4 Credits (3Th + 1 ST)

- **SEC – 3** Posture & Athletic Care: 4 Credits (3Th + 1 ST)
- **SEC – 4** Sports for All: 4 Credits (3Th + 1 ST)
- **SEC – 5** Sports Sociology: 4 Credits (3Th + 1 ST)
- **SEC – 6** Project Work & Internship: 4 Credits (3Th + 1 ST)

The B.Sc. Sports and Exercise Science contains **08 Discipline Specific Elective Course (DSE)** papers placed from Semester – I to Semester – VIII of 6 credits each labelled from DSE – 1 to DSE – 8. These are listed below:

- **DSE – 1** Foundation of Physical Education: 6 Credits (5 Th + 1 ST)
- **DSE – 2** Health Education: 6 Credits (5 Th + 1 ST)
- **DSE – 3** Fundamentals of Sports Training: 6 Credits (5 Th + 1 ST)
- **DSE – 4** Sports Technology: 6 Credits (5 Th + 1 ST)
- **DSE – 5** Olympic Education: 6 Credits (5 Th + 1 ST)
- **DSE – 6** Sports Management & Event Planning: 6 Credits (5 Th + 1 ST)
- **DSE – 7** Fundamentals of Sports Analysis: 6 Credits (5 Th + 1 ST)
- **DSE – 8** Dissertation: 6 Credits (5 Th + 1 ST)

  → As per one month internship:

  i. Gym Operation
  ii. Fitness & Exercise Management
  iii. PE Training at School or College
  iv. Sports Training at Sports Club / Academy
- ** Sports Proficiency: A students must select a game / sport out of the below listed games / sports:

  List of Games / Sports

(i) Badminton (ii) Squash (iii) Cricket (iv) Football (v) Squash (vi) Volleyball

****Note:**

1. The game offered by an institute / college will depend upon the availability of teaching faculty and infrastructure facilities.
2. The institute / college can add a game depending upon the availability of infrastructure and faculty members; however, clearance for the finalization of syllabus will be required from the Committee of Courses.

3. The institute / college will appoint additional coaches / sports trainers for coaching classes / preparation for different Tournament / Practical Classes in different games.

The Sports Specific Skill Enhancement paper will be allotted in accordance with a student's Game of Specialization which was selected by the students in Sports Proficiency and will be taught by sports specialization faculty.

- The B.Sc. Sports and Exercise Science consist of total 176 credits. (22 credits across all semsters)

Marking Scheme

Note:

(a) One (01) Theory (Th) period is equal to 1 hour duration.
(b) One (01) Practical (P) period is equal to 2 hours duration.
(c) One (01) Session Test (ST) is equal to 1 hour duration.

Marking Scheme:

Maximum Marks = 100 / 150 Marks

Theory Examination = 75 Marks

Practical Examination = 50 Marks

Internal Assessment = 25 Marks

Internal Assessment (Maximum Marks – 25)

Session Test = 20 Marks

Attendance = 05 Marks

Instruction for Examiners / Paper

The Examiner is required to set paper of 105 Marks with necessary choice as follows:

- The Examiner is required to set Question No. 1 from all four (04) Units carrying a total of 20 Marks. Question No. 1 will have 20 questions of 1 mark each with a choice of any 15.
- Question No. 2 from Unit I carry a total of 10 Marks. Question No. 2 will have 4 questions of 5 marks each with a choice of any 3.

- Question No. 3 from Unit II carrying a total of 15 Marks. Question No. 3 will have 4 questions of 5 marks each with a choice of any 3.
- Question No. 4 from Unit III carrying a total of 15 Marks. Question No. 4 will have 4 questions of 5 marks each with a choice of any 3.
- Question No. 5 from Unit IV carrying a total of 15 Marks. Question No. 5 will have 5 questions of 5 marks each with a choice of any 3.

Instruction for Session Test of 25 Marks:

Session Test – 20 Marks (All Units)

Marking Scheme for Attendance: (05 Marks)

% of Attendance	Marks
90% and Above	05 Marks
80% – 89%	04 Marks
70% - 79%	03 Marks
60% - 69%	02 Marks
50% - 59%	01 Mark
Less than 50%	0

Marking Scheme for Practical of 50 Marks:

The Practical Examination will be conducted in 3 Heads by an External as well as an Internal Examiner. The Heads are as follows:

Heads	Marks
Examiners Choice	20 Marks
Students Choice	20 Marks
Record Book	05 Marks
Total	**50 Marks**

Provision for New Grace Marks Policy

Sr. No	Section of Exam Manual	Description of Rule / Policy	Rule / Policy
8.	37	Additional internal grace marks for CA for PWD / Sports / NCC / NSS / Home Guard	Not applicable for all examinations – R / KT / SUP / Re – Examination of R / KT / SUP
19.	37	Additional Grace Marks for Sports for R / Re – Examination of R	• Yes, against application received from the concerned student/s. • Who are members of the SVU Team/s reaching Quarter – Final at All India University Level intercollegiate competitions. **OR** • Having secured one of the eight places in order of merit in individual sports event conducted by the university. **OR** • Have represented the University in sports either at interstate or zonal level or at national level or at international level. • Students must produce the necessary merit certificate given by organising secretary with an application forwarded through competent authorities/ principal/director/ HOI/ Head of their respective college **two weeks prior** to the End Semester Examination and forwarded by the Head of concerned Section to the Examination Department before the Examination. • Benefit is applicable for the one Semester Examination of the Academic Year – normally for even semester Examination. • **Grace Marks are for passing subjects/ course/ passing head:** ○ Total grace marks are given for passing / exemption of

			subject's/course/ passing head shall not be more than 10. o In case of failure in one or more heads of passing of an examination, the benefit pf grace marks shall be granted to extent of 5% of maximum marks allotted to a subject/course/ passing head. o the grace marks will be granted for purpose of claiming exemption in the subject/ course/ passing head it shall not exempt 5% of maximum marks allotted to the subject/ course/ passing head. o These grace marks will be additional. • **Grace marks for overall grade improvement:** o The maximum of 10 grace marks shall be added to the grand total. o In case of CBGS system 0.10 will be added to final grade GPA even if the benefit is given to the student for passing subject/ course/ passing head of the said semester R/ Re – Examination of R Examination. o The benefit shall be given to one semester in one academic year against the application received by the student in prescribed format with attached certification from competent authority.

SYLLABUS

SEMESTER I: Two DSC Papers, One DSE Paper & One AECC Paper

Sr. No.	Course Code	Course Title	Credits	Total Marks
			Th / P / ST	
1.	DSC – 1	Anatomy & Physiology	6(3Th+2P+1ST)	150
2.	DSC – 2	Sports Proficiency - Swimming	6(3Th+2P+1 ST)	150
3.	DSE – 2	Foundation of Physical Education	6(5Th+1ST)	100
4.	AECC -1	English Communication	4(3Th+1ST)	100
		Total Credits	**22**	**500**

Note: Th = Theory; P = Practical; ST = Session Test

DSC – 2 ANATOMY & PHYSIOLOGY

Credit = 6 (3Th + 2P + 1ST) Max. Marks = 150

Theory = 75 Marks + Practical = 50 Marks + Internal Assessment = 25 Marks

Objectives:

To introduce fundamental anatomical and physiological concepts relevant to human movement. To understand the structure and function of human body systems with reference to sports performance. To correlate anatomical structures with physiological processes in exercise conditions. To develop basic skills in identifying anatomical features and measuring physiological functions. To build a foundation for further studies.

Learning Outcome:

By the end of the course, students will be able to describe the human body's basic anatomical organisation and physiological mechanisms. Identify bones, muscles and joints and explain their relevance in sports movements. Demonstrate understanding of how various systems (CVS, RS, NS etc.) function during exercise. Perform basic measurements like pulse, BP, and identify anatomical structures using models. Analyse the integrated role of multiple systems during athletic performance.0020

THEORY SYLLABUS (60 Hours)

UNIT – I Introduction to Human Body and Cells (12 Lectures)

(i) Definition of Anatomy and Physiology – scope and relevance to sports.

(ii) Levels of organisations – cell to system

(iii) Cell Structure – organelles and their functions

(iv) Types of tissues – epithelial, connective, muscle, nervous

(v) Anatomical terminology – planes, positions, and directional terms.

UNIT – II Skeletal System and Joints (12 Lectures)

(i) Functions of the skeletal system and classification of bone

(ii) Structure and development of bones (with ossification)

(iii) Major bones of the body – sports relevance

(iv) Classification and structure of Joints – fibrous, cartilaginous, synovial.

(v) Movement at Joints – types and examples from sports.

UNIT – III Muscular System and Movements (12 Lectures)

(i) Classification of muscles – skeletal; smooth, cardiac

(ii) Structure of skeletal muscle – fiber type, motor unit concept

(iii) Types of Muscle Contraction – isometric, isotonic, isokinetic

(iv) Major Muscles involved in Sports actions (throwing, Jumping, Running)

(v) Meuromuscular Coordination and muscular fatigue in athletes.

UNIT – IV Circulatory and Respiratory System (12 Lectures)

(i) Structure and Function of the Heart – chambers, valves, and conduction

(ii) Cardiac cycle, stroke volume, cardiac output, and blood pressure.

(iii) Composition and function of blood – role during exercise

(iv) Composition and function of respiratory organs

(v) Mechanism of breathing – vital capacity, oxygen uptake, second wind.

UNIT V – Nervous, Endocrine, Reproductive & Excretory Systems (12 Lectures)

(i) Structure of brain and spinal cord – role in motor control

(ii) Autonomic nervous system – sympathetic and parasympathetic activity in sports.

(iii) Endocrine system – pituitary, thyroid, adrenal glands and hormones in exercise.

(iv) Reproductive System – basics and hormonal influence on athletes.

(v) Excretory System – kidney and skin in waste removal and thermoregulation

Practical

(i) Pulse Rate – resting and post exercise

(ii) Blood Pressure Measurement – manual and digital

(iii) Study of Human Skeleton – identification of major bones

(iv) Study of Human Systems using Models – Brain, Heart, Lungs etc,

(v) Joint Movement Demonstrations – using sports actions (flexion, rotation etc)

SUGGESTED READINGS:

1. Tortora, G.J. & Derrickson, B.H. – Principles of Anatomy and Physiology
2. Marieb, E.N. & Hoehn, K. – Human Anatomy & Physiology
3. Waugh, A. & Grant, A. – Ross and Wilson: Anatomy and Physiology in Health and Illness
4. Jain, A.K. – Textbook of Anatomy and Physiology
5. Tidy, P.V. & Tidy, M.L. – Anatomy and Physiology for Physiotherapists and Healthcare Professionals
6. Chatterjee, C.C. – Human Physiology
7. Sembulingam, K. & Prema Sembulingam – Essentials of Medical Physiology

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DSC – 2 SPORTS PROFICIENCY - I (SWIMMING)

Credit = 6 (3Th + 2P + 1ST) Max. Marks = 150

Theory = 75 Marks + Practical = 50 Marks + Internal Assessment = 25 Marks

Objectives:

The students will be able to learn and acquaint themselves with the sport of their choice and gain proficiency.

Learning Outcomes:

The student attains knowledge, understanding, interpreting and analysing proficiency in a sport of swimming in the areas of training, talent identification, officiating and coaching.

THEORY SYLLABUS (60 Hours)

UNIT – I (12 Lectures)

(i) Pool rules and safety guidelines

(ii) Entering and exiting the pool safely

(iii) Water acclimatization (splashing, blowing bubbles)

(iv) Floating techniques (front and back)

(v) Submerging the face and opening eyes underwater

(vi) Basic breath control (holding breath, exhaling underwater)

UNIT – II (12 Lectures)

(i) Introduction to kicking (flutter kicks with and without support)

(ii) Arm movement for basic strokes (dog paddle, front crawl)

(iii) Assisted gliding on front and back

(iv) Basic turning in the water

(v) Practicing balance and body position in water

UNIT – III (12 Lectures)

(i) Front Crawl: (Freestyle) arm strokes, breathing techniques, coordinated movement

(ii) Backstroke: body position, arm movements and kicking

(iii) Breaststroke: Leg kick (frog kick) arm movements, breathing

(iv) Elementary survival stroke: sculling and trading water

UNIT – IV (12 Lectures)

(i) Coordination breathing with stroke

(ii) Swimming short distance (5m, 10m, 15m)

(iii) Introduction to changing direction while swimming

(iv) Floating for longer duration

(v) Basic water survival skills (treading water, floating recovery)

Practical (24 Hours)

1. Water Familiarization & Safety
    - Entering and exiting the pool safely
    - Floating (back float, front float)
    - Breath control and submersion
    - Treading water (30 sec to 1 min)
    - Pool safely rules
2. Basic Swimming Skills
    - Gliding (front and back)
    - Kicking techniques (flutter kick, breaststroke kick)

- Arm movement drills
- Combines arm and leg actions
- Push and glide from wall

3. Stroke Development
   - Freestyle: Breathing (side), arm recovery, flutter kick
   - Backstroke: Body position, straight arm recovery, flutter kick
4. Turns & Start
   - Basic poolside start (sitting / Standing)
   - Streamlining from wall
   - Open turns (freestyle)

SUGGESTED READING:

1. Dick Hannula and Nort Thornton, Swim Coaching Bible (Volume 2).
2. Barrow & McGee's Practical Measurement and Assessment.
3. Barrow H.M. and McGee R. (1979) A Practical Approach to Measurement in Physical Education Lea. & Febiger, Philadelphia USA.
4. Vanaik, A. (2017) Officiating and Coaching, Friends Publications, Delhi.

DSE – 1 FOUNDATIONS OF PHYSICAL EDUCATION

Credit = 6 (5 Th + 1 ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

Objectives:

To understand the meaning, scope and significance of physical education. To explore the historical and philosophical foundations of physical education. To understand the relationship between physical education and Allied sciences. To create awareness about values and contributions of physical education to historic development.

Learning Outcomes:

Students acquire the knowledge of history & foundations of Physical Education and understand the purpose & development of Physical Education & Sports.

THEORY SYLLABUS (60 Hours)

UNIT – I Introduction to Physical Education (15 Lectures)

(i) Meaning and Definition of Education and Physical Education
(ii) Aim and Objectives of Physical Education
(iii) Importance and Scope of Modern society
(iv) Different Curriculum modules of physical education
(v) Professional Preparation in Physical Education – YMCA, LNIPE, IGIPESS, SAI, NSNIS Program – NSO, NCC, NSS
(vi) Sports Career Avenues, National Sports Awards and Honors.

UNIT – II Historical Development of Physical Education (15 Lectures)

(i) Origin & Growth of Physical Education in Ancient, Medieval, & Modern Periods.
(ii) Physical Education in Ancient India (Vedic, Epic, Buddhist Period)
(iii) British influence & Post – Independence developments of Physical Education in India.
(iv) Olympic Movement and its influence

UNIT – III Biological, Psychological & Social Aspects (15 Lectures)

(i) Introduction, Growth & Development & Body Types.
(ii) Learning processes, motor learning and theories
(iii) Motivation, Emotion and Personality in sports context
(iv) Sociological Foundation. – Introduction, Socialization process

UNIT – IV Current Trends & Future Prospectus (15 Lectures)

(i) Career opportunities in Physical Education and Sports Science
(ii) Role of Technology and innovation in Physical Education
(iii) Policies and programs promoting physical education in India
(iv) Physical Literacy and life long fitness.

SUGGESTED READING:

1. Gupta, Rakesh (2013), Health and Physical Education, Pinnacle India Education Publisher, New Delhi.
2.
3. Kamlesh ML (2013), Physical Education and Exercise Sciences: An Objective Approach, Friends Publication, Delhi.
4. Lumpkin, A. (2007), Introduction to Physical Education, Exercise Science and Sports Studies, McGraw Hill, New York, USA.
5. Uppal AK & Gautam GP (2008), Health and Physical Education, Friends Publication, New Delhi.
6. Vanaik A. & Tyagi, Sarita (2018), Encyclopaedia of Olympic Movement, Friends Publication, New Delhi.
7. Vanaik A. (2005) Sharirik Shiksha ke Maulik Adhar, Friends Publication, New Delhi.
8. Wuest DA and Bucher CA (2003), Foundations of Physical Education, Exercise Science and Sports, McGraw Hill Companies, Inc., New York, USA.
9. Zeigler EF (2007), History and Status of Physical Education and Educational Sports, Sports Education.

AECC – 1 ENGLISH COMMUNICATION

Credit = 4 (3 Th + 1 ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

Objectives:

To enhance students' proficiency in English language, and to equip students with the awareness and strategies needed to enable the study of English as a lifelong process.

Learning Outcomes:

The students will acquire a basic knowledge of English language which will enable them to – think in English. The students will be able to engage in ongoing professional development with respect to both teaching and research.

THEORY SYLLABUS (48 Hours)

UNIT – I Poetry (12 Lectures)

(i) If – By Rudyard Kipling

(ii) Where the Mind is Without Fear – by Rabindranath Tagore

(iii) The Road Not Taken – By Robert Frost

UNIT – II Prose (12 Lectures)

(i) Of Truth – by Francis Bacon

(ii) Spirit of India – by A P J Abdul Kalam

UNIT – III Short Stories (8 Lectures)

(i) The Bet – by Anton Chekhov

(ii) The Postmaster – by Rabindranath Tagore

UNIT –IV Language Component (8 Lectures)

(i) Tenses

(ii) Focus on Articles, Prepositions, Subject, Verb Agreement

(iii) Comprehension Passage

Note:

Evaluation Scheme for English Communication is IA = 50 Marks & ESE (Th) = 50 Marks.

SUGGESTED READING:

1. Cambridge University Press., Raymond Murphy – Essential Grammar in Use, 3rd Edition 2010.
2. Wren & Martin Multicolour Edition High School English Grammer & Composition Revised by Dr. N. D. V. Prasada Rao.

SEMESTER II: Three DSC Papers & One AECC Paper

Sr. No.	Course Code	Course Title	Credits	Total Marks
			Th / P / ST	
1.	DSC–3	Computer Application	6(3Th+2P+1ST)	150
2.	DSC – 4	Sports Proficiency II – Track & Field	6(3Th+2P+1ST)	150
3.	DSE – 3	Health Education	6(5Th+1ST)	100
4.	AECC - 2	Environmental Science	4(3Th+1ST)	100
		Total Credits	**22**	**500**

Note: Th = Theory; P = Practical; ST = Session Test

DSC – 3 COMPUTER APPLICATION

Credit = 6 (3Th + 2 P + 1 ST) Max. Marks = 150

Theory = 75 Marks + Practical = 50 Marks + Internal Assessment = 25 Marks

Objectives:

To equip the students with the basic knowledge of Computer for the purpose of recordkeeping and presentations in a practical scenario.

Learning Outcomes:

By the end of the course the students will learn how to use computer as a tool to express and record physical education and sports related information.

THEORY SYLLABUS (48 Hours)

UNIT – I Introduction to Artificial Intelligence in Sports (12 Lectures)

(i) Identify and Appreciate Artificial Intelligence and Describe its application in daily life.
(ii) Relate, Apply and Interact with the various domains of AI.
(iii) AI Driven sports analysis
(iv) IoT in Sports

UNIT – II Introduction to Computers (12 Lectures)

(i) Meaning, Need and Importance of Information and Communication Technology (ICT).
(ii) Application of Computer software in Physical Education and Sports

(iii) Introduction to MS Word (MS Word Google Docs.). Creating, Saving and Opening a document.

(iv) Formatting, Editing features, Draw Table and Graph, paragraph alignment, spelling and grammar check, printing option, inserting header and footer.

UNIT – III MS Excel (Google Sheet) (12 Lectures)

(i) Introduction to MS Excel 2020. Creating Saving and Opening a spreadsheet.

(ii) Creating formulas using function library

(iii) Understanding Vlookup and Hlookup. Import External Data (CSV to Excel)

(iv) Understanding charts, Data Tools and Forecast

(v) Using Google sheets or MS Excel to perform Athletes Performance Analysis.

(vi) Introduction to MS PowerPoint, Google Slides. Creating Saving and opening a ppt. file.

(vii) Insert picture, graph and table into slide show.

(viii) Format and editing features slideshow and design. Preparation of PowerPoint presentations.

UNIT – IV Introduction to Software for AI & IoT (12 Lectures)

(i) Under and Appreciate Artificial Intelligence Software

(ii) Interactive scheduler for Sports

(iii) Basic Programming

Practical (12 Lectures)

DSC – 4 SPORTS PROFICIENCY – II TRACK & FIELD

Credit = 6 (3Th + 2 P + 1 ST) Max. Marks = 150

Theory = 75 Marks + Practical = 50 Marks + Internal Assessment = 25 Marks

Objectives:

To provide knowledge and skill of various Track & Field events in Athletics. They will also be equipped with technical and tactical knowledge of all Athletic Events.

Learning Outcomes:

The students will be able to learn and perform all Athletic Events

THORRY SYLLABUS (48 Hours)

UNIT – I Introduction to Track & Field (12 Lectures)

(i) History and Evolution of track & field

(ii) Importance of athletics in physical fitness and sports

(iii) Calculation and marking of track and field events

UNIT – II Track Events (12 Lectures)

(i) Sprints (100m. 200, 400m)
   a. Sprinting techniques: start, drive, acceleration, and finish
   b. Block starts and standing starts
   c. Sprint drills and speed development

(ii) Middle – and Long– Distance Running (800m, 1500m, 5000m 10000m)
   a. Pacing strategies and aerobic conditioning
   b. Energy systems and endurance training
   c. Race tactics and mental preparation

(iii) Hurdles (100m, 110m, 400m)
   a. Hurdling technique: Approach, clearance, and landing
   b. Stride pattern and rhythm drills
   c. Strength and flexibility exercises

(iv) Relays (4x100m, 4 x400m)
   a. Baton exchange techniques
   b. Team coordination and strategy
   c. Relay drills and practice

UNIT – III Field Events (12 Lectures)

(i) Jumps (Long Jump, Triple Jump, High Jump, Pole Vault)
   a. Takeoff, flight and landing techniques
   b. Approach run drills and biomechanics
   c. Event – specific strength and flexibility training

(ii) Throws (Shot Put, Discus, Javelin, Hammer Throw)
   a. Grip, stance, approach and release techniques.
   b. Rotational and glide techniques (for shot put and discus)
   c. Strength and power training for throws

UNIT – IV Training & Conditioning (12 Lectures)

(i) Warm – up and Cool – down routines

(ii) Strength training and injury prevention

(iii) Flexibility and Mobility exercises

(iv) Nutrition and Hydration of athletes

UNIY – V Rules, Officiating and Ethics (12 Lectures)

(i) Rules and regulations of major track and field events (IAAF, World Athletics guidelines)

(ii) Officiating and scoring in track and field.

(iii) Sportsmanship, ethics, and fair play in athletics

Practical (12 Lectures)

1. Practical demonstration of track and field techniques
2. Fitness and endurance assessments
3. Performance evaluation in mock competitons

SUGGESTED READINGS:

1. Chauhan VS (1999) Khel Jagat Mein Athletics, A. P. Pub, Jalandhar.
2. Fox E L (1998), Physiology Basis of Physical Education and Athletics, Brown Pub.
3. Gothi E (2004), Teaching & Coaching Athletics, Sports Pub., New Delhi.
4. Gupta R. (2004) Layout & Marking of Track & Field, Friends Publications. India, New Delhi.
5. Handbook – Rule & Regulations. International Athletic Federation (2018 – 19/ Latest whenever published).
6. Herb Amat, DA ATC et al., (2002) Practical Exam Preparation Guide of Clinical Skills of Athletic Training. Slack Incorporated 1st Ed., USA.
7. Kumar Pradeep (2008) Historical Development of Track & Field, Friends Publications, New Delhi.
8. Maughan R. and Gluson M, (2004) The Biomechanical Basics of Athletic Performance. Oxford University Press. UK.
9. Prentice, W. and Arnheim D. (2005) Arnheim's Principles of Athletic Training 12th Ed McGraw Hill.

10. Renwick G R (2001) Play Better Athletics. Sports Pub, Delhi.
11. Shrivastav A K Abhay Kumar (1997) Athletics S & S Prakashan.
12. Singh Granth (1998) Track and Field, Ashoka, Delhi.
13. Thani Lokesh (1995) Skills and Tactics – Track Athletics, Sports Pub, Delhi.

DSE – 3 HEALTH EDUCATION

Credit = 6 (5Th + 1 ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

Objectives:

To introduce the students to the fundamental concepts of health, hygiene, and wellness. To impart essential knowledge on nutrition, communicable and non – communicable diseases. To educate students about first aid procedures and rehabilitation modalities. To address contemporary health problems and promote preventive practices. To familiarize students with international and school – based health programmes.

Learning Outcomes:

After completing this course, students will be able to explain the key concepts of health and hygiene and their applications in daily life, recommend nutrition and lifestyle strategies for disease prevention and health promotion. Identify communicable and non – communicable diseases and suggest appropriate preventive measures, perform basic first aid procedures and understand rehabilitation methods, and promote healthy practices within different age groups and communities, including youth and families.

THORRY SYLLABUS (48 Hours)

UNIT – I Foundations of Health Education (12 Lectures)

(i) Meaning and dimension of health, fitness and wellness: physical mental social, emotional and spiritual.
(ii) Introduction of Health Education: meaning, aims, principles, methods, and media used.
(iii) The importance of Health for Individuals Families, Communities and Nations.
(iv) Health and determinants influencing health.

(v) Concept and components of wellness. Professional and Paraprofessional organisations for health and wellness.

UNIT – II Hygiene and Nutrition (12 Lectures)

(i) Personal Hygiene: habits and their role in health.
(ii) Food hygiene and environmental hygiene – practices and importance.
(iii) Essential nutrients – functions, sources, and dietary requirements.
(iv) Balanced diet and food myths – planning and misconception
(v) Dietary planning and nutrition in the context of youth and athletes.

UNIT – III Communicable and Non – Communicable Diseases (12 Lectures)

(i) Communicable disease: definition, mode of transmission, prevention
(ii) Specific communicable diseases: diarrhoea, typhoid, malaria, STD's, respiratory infections.
(iii) Non – Communicable diseases causes and prevention (diabetes, CVD, cancer, renal disorders)
(iv) Preventive healthcare practices – immunization, ORS, hygiene.
(v) Mental and Emotional Health – stress management and coping strategies.

UNIT – IV Contemporary Health Problems and Population Education (12 Lectures)

(i) Substance Abuse: Alcohol, drugs, tobacco – effects and prevention
(ii) Population Education: small family norms and contraception methods.
(iii) Signs and symptoms of pregnancy: prenatal and postnatal care
(iv) Importance of breastfeeding and infant care
(v) School health programs and adolescent health concerns.

UNIT – V First Aid, Health Services & Rehabilitation (12 Lectures)

(i) First Aid principles – DRABCH, CPR, Haemorrhage, fracture, PRICER
(ii) First Aid for drowning, snake bite, poisoning, heat stroke, and exhaustion.
(iii) International Health Organisations – WHO, UNICEF. Red Cross and their roles.
(iv) Concept and types of rehabilitation – physical and mental
(v) Modalities in rehabilitation – hydrotherapy, cryotherapy, IR therapy, wax bath, SWD, Microwave, ultrasound, TENS.

SELF – STUDY COMPONENTS

(i) Prepare and present a health education chart or poster on hygiene / nutrition / disease prevention.

(ii) Demonstration of basic first aid: CPR, Bandaging, recovery position.

(iii) Case study presentation on substance abuse or disease outbreak in local community.

(iv) Visit / Report on a school health program or local healthcare center.

(v) Practice session: simulation of emergency first aid scenarios in group.

SUGGESTED READING

1. Anspaugh, D.J., Ezell, G., & Goodman, K.N. (2006). *Teaching Today's Health.* Mosby Publishers, Chicago, USA.
2. Balayan, D. (2007). *Swasthya Shiksha Evam Prathmik Chikitsa.* Khel Sahitya, Delhi.
3. Chopra, D., & Simon, D. (2001). *Grow Younger, Live Longer: 10 Steps to Reverse Aging.* Three Rivers Press, New York.
4. Dewan, A.P. (1996). *School Health Manual.* Nature Cure and Yoga Health Centre, New Delhi.
5. Dixit, S. (2006). *Swasthya Shiksha.* Sports Publication, Delhi.
6. Donatelle, R.J. (2005). *Health: The Basics* (6th Ed.). Oregon State University.

AECC – 2 ENVIORNMENTAL SCIENCE

Credit = 4 (3 Th + 1 ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

Objectives:

To gain in – depth knowledge on natural processes that sustain life and govern economy. To develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.

Learning Outcomes:

The course will help the students to predict the consequences of human actions on the web of life, global economy and quality of life. It was also prepared and make aware the alternative source of resources and methods of environmental conservation.

THEORY SYLLABUS (48 Hours)

UNIT – I Introduction to environmental Studies (02 Lectures)

(i) Multidisciplinary nature of environmental studies.

(ii) Scope and Importance.

(iii) Concept of sustainability and sustainable development.

UNIT – II Ecosystem (11 Lectures)

(i) Definition and concept of Ecosystem.

(ii) Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem – Physical (energy flow), Biological (food chains, food web, ecological succession) and Biogeochemical (nutrient cycling) processes. Concepts of productivity, ecological pyramids and homeostasis

(iii) Types of Ecosystems – Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries) – their importance and threats on them with relevant examples from India (d)Ecosystem services (Provisioning, Regulating, Cultural and Supporting). Basics of Ecosystem restoration.

UNIT – III Natural Resources (11 Lectures)

(i) Land resources and land use change Land degradation, soil erosion and desertification Forest (b)resources and causes of deforestation; impacts of mining and dam building on environment, forests, biodiversity and tribal populations.

(ii) Water resource: Use and over exploitation of surface and ground water, floods, drought conflicts over water (international & inter-state).

(iii) Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs.

(iv) Case studies: National Solar Mission, Cauvery River water conflict etc.

UNIT – IV Biodiversity and Conservation (08 Lectures)

(i) Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity. Biogeographic zones of India.

(ii) India as a mega-biodiversity nation; Endemic and endangered species of India; IUCN Red list; biodiversity hotspots.

(iii) Value of Biodiversity: Ecological, Economic, Social, Ethical, Aesthetic and Informational value of biodiversity with examples; sacred groves and their importance with example.

(iv) Current mass extinction crisis: Threats to biodiversity: Habitat Loss, poaching of wildlife, man – wildlife conflicts, biological invasion with emphasis to Indian biodiversity.

(v) Biodiversity conservation strategies: in-situ and ex-situ methods of conservation; Biosphere reserves; Keystone and Flagship species; Species reintroduction and translocation.

(vi) Case studies: Project Tiger, Vulture breeding program etc.

UNIT – V Environmental Pollution (08 Lectures)

(i) Environmental pollution (Air, water, soil, thermal and noise): causes, effects and controls; Air and water quality standards.

(ii) Nuclear hazards and human health risks.

(iii) Solid waste management: Control measures of urban and industrial waste.

(iv) Pollution case studies: Ganga Action plan (GAP), Delhi air pollution and public health issues etc.

UNIT – VI Global Environmental Issues and Policies (08 Lectures)

(i) Climate change, Global warming, Ozone layer depletion, Acid rain and impacts on human communities and agriculture.

(ii) International agreements: Earth Summit, UNFCCC, Montreal and Kyoto protocols and Convention on Biological Diversity (CBD)

(iii) Sustainable Development Goals and India ‘s National Action Plan on Climate Change.

(iv) Environment legislation in India: Wildlife Protection Act, 1972; Water (Prevention and Control of Pollution) Act, 1974; Forest (Conservation) Act 1980, Air (Prevention & Control of Pollution) Act, 1981; Environment Protection Act, 1986; Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.

Field Visits:

(i) Field visit to any of the ecosystems found in Mumbai or any nearby lake or pond, explaining the theoretical aspects taught in the classroom.

(ii) Visit to any biodiversity park/ reserve forests/ protected area/ zoo/ nursery/ natural history museum in and around Mumbai, explaining the theoretical aspects taught in the classroom

(iii) Visit to a local polluted site (Urban/Rural/Industrial/Agricultural), Wastewater treatment plants Study of common.

SUGGESTED READING:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., and Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleick, P. H. 1993. Water in Crisis. A Guide to the World's Fresh Water Resources. Oxford Univ. Press, USA.Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India‘s Himalaya dams. Science,339: 36-37.
4. Henze, M., Loosdrecht M.C.M., Ekama, G.A., Brdjanovic, D., (Eds). 2008. Biological Wastewater Treatment. IWA Publishing, USA.
5. McCully, P. 1996. Rivers no more:the environmental effects of dams (pp. 29-64),In: Silenced Rivers: The Ecology and Politics of Large Dams, Zed Books, New York, USA.
6. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
7. Brusseau, M.L., Pepper, I.L., and Gerba, C. 2019. Environmental and Pollution Science. Academic Press, USA.
8. Primack R.B. 2014. Essentials of Conservation Biology, Oxford University Press, USA.
9. Raven, P.H, Hassenzahl, D.M., Hager M.C, Gift N.Y, and Berg L.R. (2015) Environment, 9thEdition, Wiley Publishing, USA.
10. Rosencranz, A., Divan, S., and Noble, M. L.
11. Rosencranz, A., Divan, S., and Noble M.L. 2002. Environmental Law and Policy in India: Cases, Material & Statutes. Oxford University Press.
12. Schmidtz, D., Shahar, D.C. 2018. Environmental Ethics: What Really Matters, What Really Works 3rd Edition, Oxford University Press, USA.

13. Sengupta,R.(Ed.) 2013. Ecological Limits and Economic Development. Oxford University Press, New Delhi, India.
14. Singh, J.S., Singh, S.P. and Gupta, S.R. 2017. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
15. StuetzR.M.,and Stephenson T. (Eds.) 2009. Principles of Water and Wastewater Treatment Processes (Water and Wastewater Process Technologies). IWA Publishing,
16. Sodhi, N.S., Gibson, L. and Raven, P.H. (Eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent. University of California Press, USA.
18. Warren, C.E.1971.Biology and Water Pollution Control. WB Saunders.
19. Wilson, E.O.2006.TheCreation: An Appeal to Save Lifeon Earth. W.W. Norton & Company, New York, USA.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press, USA.

SEMESTER III: Two DSC, One DSE & One SEC Paper

Sr. No.	Course Code	Course Title	Credits	Total Marks
			Th / P / ST	
1.	DSC–5	Exercise Physiology	6(3Th+2P+1ST)	150
2.	DSC – 6	Sports Proficiency III – (Racquet Sport)	6(3Th+2P+1ST)	150
3.	DSE – 3	Fundamentals of Sports Training	6(5Th+1ST)	100
4.	SEC – 1	Sports Psychology	4(3Th+1ST)	100
		Total Credits	**22**	**500**

Note: Th = Theory; P = Practical; ST = Session Test

DSC – 5 EXERCISE PHYSIOLOGY

Credit = 6 (3Th + 2P +1ST) Max. Marks = 150

Theory = 75 Marks + Practical = 50 Marks + Internal Assessment = 25 Marks

Objectives:

To provide the students with the knowledge of alternations and adaptations in physiological processes of the body that occurs in Exercise & Training.

Learning Outcomes:

Students shall learn changes / adaptations in body systems in response to Exercise & Training. Such core knowledge and skill will help to create a strong foundation to engage human subject of all ages, sex, etc.

THEORY SYLLABUS (60 Hours)

UNIT – I Fundamentals and Neuromuscular Functions (09 Lectures)

(i) The Focus of Exercise Physiology: Definition, Concept & Significance in the field of Physical Education & Sports, Acute Physiological Response, Chronic Physiological Adaptation.

(ii) The Nature of Skeletal Muscles: Gross & Microscopic structure of skeletal muscles, Sliding Filament Theory, Muscle Fiber types, Acute response & Chronic Adaptation and the muscular C.

UNIT – II Energy & Hormonal Regulation (13 Lectures)

(i) Bio – energetics: Aerobic & Anaerobic Systems & Energy Production, Fat and Protein Metabolism, Basal Metabolic Rate.

(ii) Hormonal Regulation in Exercise & Training: The Endocrine Glands and their hormones, Acute Response & Chronic Adaptation.

UNIT – III Cardiorespiratory System & Training Adaptation (13 Lectures)

(i) Cardiovascular Function during Exercise and Training: Structure & Function of the Heart, Cardiovascular response to exercise & Chronic Adaptation.

(ii) Respiratory Function during Exercise and Training: Respiratory Parameters, Second Wind, Acute Response and Chronic Adaptation.

UNIT – IV Body Composition (13 Lectures)

(i) Understand Body Composition, Obesity and its causes.

(ii) Weight Management, Various methods of Assessing Body Composition, BMI & WHR.

Practical (12 Lectures)

1. Assessment of Resting Heart Rate.
2. Assessment of Blood Pressure.
3. Administering the Harvard Step Test.
4. To measure vital capacity using Spirometer.
5. To Assess the Body Mass Index of the subjects.
6. To assess the Waist Hip Ratio of the subjects.
7. Methods of assessing Body Composition.
8. Assessment of BMR of the subjects.

SUGGESTED READING:

1. Camaione, David N. (1993). Fitness Management. WCB Brown & Benchmark.
2. Jakson, Allen W and James R. Morrow (1999) Physical Activity for Health & fitness. Human Kinetics Publication.
3. Katch F.L and Mc Ardle W.D (2010) Nutrition, Weight Control and Exercise .Philadelphia, Lea & Febiger.
4. Tiwari, Sandhya, (1999). Exercise Physiology. Sports Publications, New Delhi.

5. Wilmore Jack. H and David L. Costill (1994). Physiology of Sport and Exercise Human Kinetics.
6. G.Gregory Half. (2012). Laboratory Manual for Exercise Physiology. USA. Human Kinetics.
7. W. Larry Kenney, Jack H. Wilmore, Devid L. Costil.(2015). Physiology of Sports and Exercise, Second Edition. USA. Human Kinetics.
8. Christophe. Hausswirth, Inigo Mujika. (2013). Recovery for Performance in Sports, USA, Human Kinetics.
9. Inigo Mujika. (2009). Tapering and Peaking for Optimal Performance. USA. Human Kinetics.
10. Per-Olf. Astrand, Kaare Rodahl. (2003). Textbook of Work Physiology: Physiological Basses of Exercise. Fourth Edition, USA, Human Kinetics.
11. Jonathan K. Ehrman, Dennis Kerrigan, et.al. (2017). Advance Exercise Physiology: Essential Concepts and Applications, USA. Human Kinetics

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DSC – 6 SPORTS PROFICIENT – III (Racquet Sports)

Credit = 6 (3Th + 2P +1ST) Max. Marks = 150

Theory = 75 Marks + Practical = 50 Marks + Internal Assessment = 25 Marks

Objectives:

To introduce the basic skills and rules of badminton, develop eye – hand coordination, footwork and fitness, build a strong foundation for competitive play and understanding of the game, and overall fitness.

Learning Outcomes:

The student attains knowledge, understanding, interpreting and analysing proficiency in a game of one's choice in the areas of training, talent identification, officiating and coaching.

List of Games / Sports:

1. Badminton
2. Squash

THEORY SYLLABUS (Badminton)

UNIT – I Introduction to Basics

(i) History and development of Badminton

(ii) Basic rules and scoring system

(iii) Equipment (racquet, shuttle, court dimensions)

(iv) Warm – up and Cool – down importance

(v) Holding the racquet (forehand and backhand grip)

(vi) Basic stance and ready position

(vii) Shuttle control (basic tapping exercise)

UNIT – II Footwork & Movement

(i) Importance of footwork in badminton

(ii) Court lines and their significance

(iii) Basic footwork drills (side step, lunge, split step)

(iv) Movement towards the net and back

(v) Shadow drills (without shuttle)

UNIT – III Basic Strokes – Forehand & BackHand

(i) Types of strokes in badminton

(ii) Importance of proper technique

(iii) Forehand grip and stroke technique

(iv) Backhand grip and stroke technique

(v) Shuttle feed drills for consistency

UNIT – IV Serving Techniques & Strokes

(i) Types of service (high serve, low serve, flick serve, drive serve)

(ii) Service rules and faults

(iii) Practicing high and low serves

(iv) Return of serve techniques

(v) Purpose of overhead strokes

(vi) Strategic use of clear and drop shots

(vii) Forehand overhead clear

(viii) Backhand clear

(ix) Drop shot drills (forehand & backhand)

UNIT – V Smash, Defensive Play, Net Play & Doubles Rotation

(i) Importance of Attacking and defensive strategies

(ii) Positioning during smashes and defence

(iii) Forehand smash technique

(iv) Backhand defensive lifts

(v) Block and counterattack drills

(vi) Net shot techniques and strategies

(vii) Introduction to doubles positioning

(viii) Net shots and net kills

(ix) Double court positioning basics

(x) Rotation drills in doubles play

UNIT – VI Match Play & Strategy

(i) Game strategies (singles & doubles)

(ii) Mental preparation and match tactics

(iii) Half – court and full – court practice matches

(iv) Simulated match scenarios

(v) Feedback and improvement areas

Practical

(i) Practical test on strokes, footwork, and match play

(ii) Theory test on rules, strategies, and court knowledge

SUGGESTED READING

Badminton

1. Bloss, M. V. et.al., (2000) Badminton, McGraw Hills, USA.
2. Downey J (1990) How to coach Badminton, Collins Pub. London.
3. Golds, M. (2002) Badminton: Skills of the Game, Growwood Press USA.
4. Grice, T. (2007) Badminton: Steps to Success, 2ND Edition Human Kinetics, USA.
5. Gupta, R. Kumar P. and Tyagi S. (2008) Textbook on Teaching Skill and Prowess (Part I & II) Friends Publications, New Delhi.
6. Jain D. Teaching and Coaching – Badminton Khel S.K. Delhi.
7. Kumar A. (2003) Badminton: Discovery, New Delhi.
8. Narang P. (2005) Play and Learn Badminton, Khel Sahitya Kendra.
9. Singh M.K. (2007) Comprehensive Badminton, Friends Publication, New Delhi.
10. Singh M.K. (2006) A to Z Badminton, Friends Publication, New Delhi.

11. Vanaik A. (2005) Playfield Manual, Friends Publication, New Delhi.
12. Vanaik A. (2017) Officiating and Coaching, Friends Publication, New Delhi.

THEORY SYLLABUS (Squash)

UNIT – I Introduction to Squash

(i) Introduction to the Game
- (a) History and basic principles
- (b) Equipment: Rackets, ball, shoes, and eyewear
- (c) Court dimensions and markings

(ii) Basic Grip & Stance
- (a) Understanding the continental grip (a.k.a shake – hands grip)
- (b) Correct ready position
- (c) Basic footwork and movement

(iii) Basic Rules & Scoring
- (a) Service rules and let / stroke decisions
- (b) Scoring system (Traditional vs PAR scoring)
- (c) Court etiquettes and safety

UNIT – II Basic Shots & Serving

(i) Forehand Drive & Backhand drive
- (a) Correct swing mechanics
- (b) Follow through and recovery

(ii) Basic Serves
- (a) High serve and low serve
- (b) Serve placement and target areas

(iii) Footwork drills
- (a) Side – to -side movement
- (b) Front – to – back movement
- (c) Recovery to the T – position

UNIT – III Shot Control & Movement

(i) Developing Shot & Control
- (a) Hitting straight VS Cross Court shots
- (b) Adjusting power and angle

(ii) Volleying Basics

(a) Volley forehand and backhand

(b) Importance of volleys in controlling the T

(iii) Solo Practice Routines

(a) Wall drills for accuracy

(b) Drop – and – hit exercises

UNIT – IV Advance Footwork & Strategy

(i) Footwork and Agility Training

(a) Ghosting drills (stimulating shot movements)

(b) Fast recovery techniques

(ii) Understanding court positioning

(a) Dominating the T – position

(b) Moving efficiently between shot0073

(iii) Tactical Basics

(a) When to attack vs When to defend

(b) Controlling rallies

UNIT – V Defensive Shots and Match Play

(i) Defensive shots

(a) Boast (angle shot to side wall)

(b) Lob (high defensive shot)

(ii) Match Play Scenarios

(a) Basic rallying and game situations

(b) Positioning against an opponent

UNIT – VI Match Practice and Fitness

(i) Conditioning & Endurance Training

(a) Squash Specific fitness drills

(b) Strength and flexibility exercises

(ii) Game play and Assessment

(a) Playing structured points

(b) Feedback on strengths and areas of improvement

(iii) Tournament Style play

(a) Simulated match experience

(b) Review of game startegies

Squash

1. Philips Yarrow and Aidan Harrison, Squash Steps to Success.
2. R.B. Hawkey, Squash Coaching and Refereeing.
3. James Zug, Squash, A History of the games.
4. David Pearson, Skills of the game – Squash.

DSE – 3 FUNDAMENTALS OF SPORTS TRAINING

Credit = 6 (5Th + 1ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

Objectives:

To acquaint students with the knowledge of training principles and their application in enhancing the sports performance.

Learning Outcomes:

The students will be able to apply training principles in developing various exercise programme and improving sports performances.

THEORY SYLLABUS (60 Hours)

UNIT – I Introduction to Sports Training (10 Lectures)

(i) Importance, definition, Aim and objectives, Characteristics and Principles of Sports training.

(ii) Training Load, Adaptation and Recovery: Concept of load & Adaptation and Factors affecting of load & adaptation

UNIT – II Strength & Endurance (15 Lectures)

(i) Strength: Types of strength (maximum strength; explosive strength and Strength endurance etc.) & Determining Factors affecting strength performance and Methods of strength training.

(ii) Endurance: Definition and significance of endurance, forms of endurance and Methods to develop endurance

UNIT – III Speed & Flexibility (15 Lectures)

(i) Speed: Definition, types and factors determining speed, Methods to develop speed abilities.

(ii) Flexibility: Definition, Factors affecting flexibility; Methods used to develop flexibility.

UNIT – IV Training Preparation (20 Lectures)

(i) Technical Preparation: Definition and meaning of technique, skill and style.

(ii) Technique training & its implication in various phases; Tactics and its aim, Principal of Tactical Preparation.

(iii) Periodization: Need & types of periodization.

(iv) Competition: Preparation for competition, number & frequency, competition preparation.

SUGGESTED READING:

1. Baechle T R & Earle R W (2000). Essentials of strength training and conditioning. Human Kinetics. USA.
2. Bompa. T.O. (1994). Theory and Methods of Training-A Key to Athletic Performance (3rd Ed.). Kandwall Hunt Publication Co.
3. Bompa. T.O. and G. Gregory Hett. (2009) Periodization: Theory and Methodology of Training.
4. Dick FW (1999). Sport training Principles. A and C Black. London.
5. Newton H (2006). Explosive lifting for sports. Human Kinetics. USA.
6. Singh Hardayal (1991). Science of Sport Training. D.V.S Pub. Delhi.

SEC – 1 SPORTS PSYCHOLOGY

Credit = 4 (3Th + 1ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

Objectives:

To develop the understanding of the nature, scope and importance of Psychology in the field of Sports and Exercise. To acquire the knowledge of facts that impact sports performance and the importance of mental health in sporting environments.

Learning Outcome:

The students will be able to understand the concepts of learning and its types, concepts of motivation, anxiety, aggression, stress and personality. Understand the need and importance of social adjustment

THEORY SYLLABUS

UNIT – I Introduction to Sports and Exercise Psychology (15 Lectures)

(i) Sports and Exercise Psychology: Concept, Nature, Scope, Importance, and Role of Sports, Exercise Psychologist. & Educational Psychologist (Famous Psychologist)

(ii) Historical Development and future of Sports and Exercise Psychology.

(iii) Methods of sports psychology: Observation, Introspection, Experimentation, Clinical Case Study,

(iv) Understanding Human Growth and Development, Heredity and Environment.

UNIT – II Learning (15 Lectures)

(i) Skill acquisition: Principles of motor skill acquisition, stages of skill acquisition.

(ii) Play and Play Theories: Types of play – (Functional, Dramatic, Socio – dramatic, Constrictive, Work and Play)

(iii) Theories of Play – (Surplus Energy Theory, Anticipation Theory, Instinct Practice Theory, Recreational Theory, Cathartic Theory, Psychoanalytic Theory, Cognitive Theory)

(iv) Individual Differences

UNIT – III Motivation, Aggression, Anxiety & Stress, Personality (15 Lectures)

(i) Motivation and Achievement: Concept, Importance and Role of Motivation, Types, Motivation Cycle, Theories (Maslow's Self Actualization Theory,

(ii) Aggression: Concept, Type, theories Instinct Theory of Aggression, Social Learning Theory of Aggression, Rivalry & Retaliation theory of Aggression, Role theories of aggression)

(iii) Anxiety & Stress: Meaning, Nature and Characteristics, Types of anxiety, Meaning of stress, Types of stressors, Coping strategies, Drive theory, Inverted U Theory, IZOF

UNIT – IV Mental Health & Social Adjustment (12 Lectures)

(i) Defence Mechanisms

(ii) Adjustment, Frustration and Conflicts in sports

(iii) Need and Importance of Mental Health in sports

(iv) Group Dynamics and leadership in sports.

SUGGESTED READING

1. S. K. Mangal and Shubhra M., (2021) Sports Psychology, Sage Publications, New Delhi
2. S. K. Ciccarelli and G.E. Meyer (2006) Psychology, Pearson Longman Publication.
3. Dr. M.L. Kamlesh,(2011) Psychology in Physical Education and Sports, Fifth revised edition, Khel Sahitya Kendra, New Delhi.
4. Cohen R. J. and Swerdlik ME (2002) Psychological Testing and Assessment: An Introduction to Test and Measurement. McGraw Hill. New York.U.S.A.
5. Cox RH (2002) Sports Psychology McGraw Hill, London
6. Liukkonen JED (2007) Psychology for Physical Educators , Human Kinetics U.S.A.
7. Mortin GL (2003) Sports Psychology, Sports Science Press U.S.A.
8. Sahni SP (2005) Psychology and Its Application in Sports D.V.S Delhi.
9. Shaw D and others (2005) Sports and Exercise Psychology Bios U.K.
10. Verma V. (1999) Sports Psychology & All – Round Development Sports Pub. New Delhi.
11. Wann DL (1997) Sports Psychology Prentice Hall. New Jerey

SEMESTER IV: Two DSC, One DSE & One SEC Paper

Sr. No.	Course Code	Course Title	Credits	Total Marks
			Th / P / ST	
1.	DSC–7	Test Measurement & Evaluation	6(3Th+2P+1ST)	150
2.	DSC – 8	Sports Proficiency IV – (Ball Games / Sport)	6(3Th+2P+1ST)	150
3.	DSE – 4	Fundamentals of Sports Training	6(5Th+1ST)	100
4.	SEC – 2	Sports & Exercise Nutrition	4(3Th+1ST)	100
		Total Credits	**22**	**500**

Note: Th = Theory; P = Practical; ST = Session Test

DSC – 7 TEST MEASUREMENT & EVALUATION

Credit = 6 (3Th + 2P +1ST) Max. Marks = 150

Theory = 75 Marks + Practical = 50 Marks + Internal Assessment = 25 Marks

Objectives:

The student will acquire the knowledge (theoretical & practical) and importance of Test, Measurement & Evaluation in Physical Education & Sports.

Learning Outcomes:

The students will learn various means to access fitness in Sports & Exercise. Such core knowledge and skill will help create a strong foundation to engage human subject of all ages, sex, and ability.

THEORY SYLLABUS (60 Hours)

UNIT – I Introduction to Test, Measurement & Evaluation (10 Lectures)

(i) Introduction to Test, Measurement &Evaluation and its importance in the field of physical education.

(ii) Test Constructions: a) general considerations b) physical fitness/ efficiency test.

UNIT – II Fitness Components (15 Lectures)

(i) Physical fitness testing: Components of Physical Fitness.

(ii) Strength Test: Kraus Weber Strength Test, Cardio – respiratory Fitness test: 1 Mile Rockport test, Muscular Endurance Test: Bent – Knee Sit ups.

UNIT – III Anthropometric Measurements & Sports Specific Tests (15 Lectures)

(i) Anthropometric Measurements: Weight, height, Sitting Height, Chest Circumference, Thigh Circumference, calf circumference, skinfold measurements (biceps, triceps, subscapular and supra iliac)

(ii) Sports Skill Tests: Johnson Badminton test, Brady Volleyball Test, McDonald Soccer Test, Cornish Handball Test, Hockey Skill Test – SAI Hockey Test.

UNIT – IV Senior Fitness Testing (20 Lectures)

(i) Administration of Senior Fitness Test: Chair Stand Test for lower body strength, Chair Sit and Reach Test for lower body flexibility, Eight foot up and go test for Agility, Six minute walk test.

Practical (24 Hours)

1. Administration of 1 Mile Rockport Test.
2. Administration of Fitness Tests.
3. Measurement of Sports Skill included in theory Course.

SUGGESTED READING:

1. ACSM (2001) Guidelines for Exercise Testing and Prescription by American College of Sports Medicine Human Kinetics USA.
2. Balyan Sunita (2006) Sharirik Shiksha main Parikshan evmn Maapan, Khel Sathitya Delhi.
3. Barrow H. M. and McGee R. (1979) A Practical Approach to Measurement in Physical Education Lea & Febiger, Philadelphia U.S.A.
4. Baumgartner T A Jackson A S Mahar MT and Rowe DA (2007) Measurement and Evaluation in Physical Education, The McGraw Hill Companies. Inc. New York, USA.
5. Kansal D K (2012) A practical Approach to Measurement Evaluation in Physical Education & Sports Selection. Sports & Spiritual Science Publications, New Delhi.
6. Miller David K (2006) Measurement by the Physical Educator: Why and How. McGraw Hill Boston, USA.
7. Mishra Sharad Chandra (2005) Test and Measurement in Physical Education, Sports, Delhi.
8. Sharma J P (2006) Test and Measurement in Physical Education, Khel Sahitya Delhi.

9. Srivastava AK (2006). Sharirik Shhiksha Evam Khel Main Maapan Evam Mullyakan. Sport pub. Delhi.
10. Tritschler K. Barrow & McGee‟s (2000). Practical Measurement and Assessment. Lippincott Williams & Wilkins. Philadelphia. U.S.A.

DSC – 8 SPORTS PROFICIENCY – (BALL GAMES / SPORTS)

Credit = 6 (3Th + 2P +1ST) Max. Marks = 150

Theory = 75 Marks + Practical = 50 Marks + Internal Assessment = 25 Marks

Objectives:

The course is designed to give knowledge and application to beginners the fundamental skills, rules and strategies of the game. It is typically structured to cover technical, tactical, physical and mental aspects of football, basketball and. volleyball

Learning Outcomes:

The student attains knowledge, understanding, interpreting and analysing proficiency in a game of one's choice in the areas of training, talent identification, officiating and coaching.

List of Games / Sports:

1. Football
2. Basketball
3. Volleyball

THEORY SYLLABUS (Soccer/ Football)

UNIT – I Introduction to Football

(i) History and Evolution of Football
(ii) Basic Rules and Regulations (FIFA Laws)
(iii) Field dimensions and marking
(iv) Roles of different positions (goalkeeper, defender, midfielder, forward)

UNIT – II Basic Skills

(i) Dribbling – Ball Control, close control, shielding
(ii) Passing – short and long passes, different passing techniques
(iii) Shooting – inside foot, instep, volleys, heading

(iv) Ball Control – first touch, trapping with feet, thighs and chest

(v) Defensive Skills – tackling, positioning, intercepting

(vi) Goalkeeping Basics – Handling, diving, positioning

UNIT – III Tactical Understanding

(i) Basic formation (4-4-2, 4-3-3, 3-5-2 etc)

(ii) Offensive and defensive strategies

(iii) Transition play (attack and defence and vice versa)

(iv) Understanding pressing and counter – pressing

UNIT – IV Physical Development

(i) Warm – up and cool – down routines

(ii) Agility, balance and co-ordination drills

(iii) Endurance and stamina training

(iv) Strength and flexibility exercises

UNIT – V Mental and Psychological Aspects

(i) Developing discipline and teamwork

(ii) Game awareness and decision making

(iii) Handling pressure and stress management

UNIT – VI Small – Sided Games and Match Play

(i) 3v3, 5v5, 7v7, drills to develop game intelligence

(ii) Match simulations and scrimmages

(iii) Evaluating performance and improving weaknesses

SUGGESTED READING

1. American Football Coaches Association (2002), The Football Coaching Bible, 1st Ed., Human Kinetics, USA
2. Carling, C., Williams, M. and Reiling, T. (2006) Handbook of Soccer Match Analysis: A Systematic Approach to Improving Performance, Routledge Publishers, USA.
3. Ling, H. and Czarnecki, J. (2007) Football for Dummies, Dummies Publisher, USA.
4. N. Kumar (2003) Play and Learn Football K.S.K. New Delhi.
5. Reiley, T. (2006) The Science Training Soccer: A Scientific Approach to Developing Strength, Speed and Endurance, Routledge Publisher, USA.

6. Reilly,T. and J.C.D. Arau (2008) Science and Football V: The Proceedings of the 5th World Congress on Sports Science and Football, Volume 5.
7. Sharma O.P. (2001) Teaching and Coaching – Football, Khel S.K. Delhi.
8. Coaching Successfully Football (2001) K.S.K. New Delhi
9. Vanaik A. (2017) Officiating and Coaching, Friends Publication. New Delhi.

THEROY SYLLABUS (Basketball)

UNIT – I Introduction & Basic Drills

(i) History of Basketball and basic rules
(ii) Understanding the court layout and positions
(iii) Warm – up exercises (dynamic stretches, footwork drills)
(iv) Basic dribbling techniques (stationary and moving)
(v) Fun dribbling drills (cones, Zig zag)

UNIT – II Passing & Ball Handling

(i) Types of passes (chest pass, bounce pass, overhead pass)
(ii) Partner passing drills
(iii) Dribbling with both hand and ball control
(iv) Coordination drills (dribble & pass under pressure)

UNIT – III Shooting Fundamentals

(i) Shooting mechanics (stance, follow – through)
(ii) Layups (dominant and non-dominant hand)
(iii) Free throw techniques
(iv) Spot shooting drills from different court positions

UNIT – IV Defence & Footwork

(i) Defensive stance and movement
(ii) Man – to- man defence vs zone defence basics
(iii) Defensive drills (shadow drills, slide drills)
(iv) Rebounding techniques (offensive and defensive rebounding)

UNIT – V Game Awareness & Strategy

(i) Introduction to offensive strategies (give & go, pick & roll)

(ii) Fast – break basics

(iii) Court spacing and movement without the ball

(iv) Passing and moving drills

UNIT – VI Introduction to Team Play

(i) Half – court practice games

(ii) Communication and teamwork drills

(iii) Decision – making in offence and defence

(iv) Scrimmages with limited rules to reinforce concepts

UNIT – VII Special Situations & Advanced Basics

(i) Understanding fouls and violations

(ii) Press defence and breaking the press

(iii) Shooting under pressure

(iv) Game situation drills

UNIT – VIII Full Game Play & Assessment

(i) Warm – up and skill recap

(ii) Full – court practice

(iii) Individual feedback and skill assessment

(iv) Certificates/ Recognition of course completion

SUGGESTED READING

1. Drewett, J. (2007) How to improve Basketball, Carbtree Publishing Co., USA.
2. Goldstein, S. (1998) basketball fundamentals 2ND Edition Golden Aura Publishing, USA.
3. Jain Naveen (2003) Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
4. Nat B B (1997) Conditioning Coaches Association, NBA Power Conditioning, Human Kinetics
5. Sharma O P (2003) Basketball Skills and Rules, Khel Sahitya Kendra, New Delhi.
6. Thani Lokesh (1995) Skills and Tactics of Basketball, Sports Pub, New Delhi.
7. Thani Lokesh (2002) Coaching Successfully Basketball, Sports Publishers, Delhi.
8. Wilmore J, H. & Costill D.L. (2004) Physiology of Sports & Exercise, Human Kinetics, USA.

THEORY SYLLABUS (Volleyball)

UNIT – I Introduction to Volleyball

(i) Basic Rules & Court Familiarization
   (a) Court Dimensions, positions, and rotations
   (b) game rules (net violation, double hits etc)
   (c) Scoring system (rally points)

(ii) Basic Warm – up & Conditioning
   (a) Dynamic stretching and agility drills
   (b) Footwork exercises

UNIT – II Passing (Forearm & Overhead Pass) Forearm Pass (Bump)

(i) Stance and hand positioning
(ii) Contact point and follow through
(iii) Partner passing drills
(iv) Overhead pass (Set) hand placement and follow through
(v) Accuracy drills

UNIT – III Serving (Underhand & Overhead Serve)

(i) Underhand serve: a) proper grip and stance b) Toss and contact drills
(ii) Overhead serve (Introduction): Toss, contact and follow through

UNIT -IV Attacking (Hitting & Spiking Basics)

(i) Approach and Footwork: i. Three – step / two – step approach ii. Arm swing mechanics
(ii) Spiking techniques: a) contact point and follow through b) controlled hitting drills.

UNIT – V Blocking & Defence

(i) Blocking: a) Positioning at the net b) timing and jump mechanics
(ii) Digging (Receiving attacks): low stance and quick reactions b) basic defensive formation.

UNIT – VI Rotations & Game Strategy

(i) Player Positions & Roles
   (a) Front – row vs back – row responsibilities

(b) Transitioning between positions

(ii) Basic Game Strategies

(a) Offence: Setting up attacks

(b) Defence: Covering the court effectively

UNIT – VII Mini – Games & Tactical Play

(i) Small – sided games (2v2, 3v3)

(ii) Focus on team coordination and communication

(iii) Reviewing weaknesses and reinforcing key skills

UNIT – VIII Full Match Play & Evaluation

(i) 6v6 game play

(ii) Rules enforcement

(iii) Individual and team feedback

(iv) Course wrap-up and progress assessment

SUGGESTED READING

1. Steve Oldenburg (2015) Complete Conditioning for Volleyball, Human Kinetics
2. Donald S. Shondell, Cecile Renaud (2002) Volleyball Coaching Bible, Human Kinetics.
3. Joel B. Dearing (2003) Volleyball Fundamentals, Human Kinetics
4. American Volleyball Coaches Association (2006) Volleyball Skills and Drills, Human Kinetics. Becky Schmidt (2016) Volleyball: Steps to Success, Human Kinetics.

DSE – 4 FUNDAMENTALS OF SPORTS TRAINING

Credit = 6 (5Th +1ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

Objectives:

To acquaint students with the knowledge of training principles and their application in enhancing the sports performance.

Learning Outcomes:

The students will be able to apply training principles in developing various exercise programme and improving sports performances.

THEORY SYLLABUS (60 Hours)

UNIT – I Introduction to Sports Training (10 Lectures)

(iii) Importance, definition, Aim and objectives, Characteristics and Principles of Sports training.

(iv) TRAINING LOAD, ADAPTATION AND RECOVERY: Concept of load & Adaptation and Factors affecting of load & adaptation

UNIT – II Strength & Endurance (15 Lectures)

(iii) STRENGTH: Types of strength (maximum strength; explosive strength and Strength endurance etc.) & Determining Factors affecting strength performance and Methods of strength training.

(iv) ENDURANCE: Definition and significance of endurance, forms of endurance and Methods to develop endurance

UNIT – III Speed & Flexibility (15 Lectures)

(i) SPEED: Definition, types and factors determining speed, Methods to develop speed abilities.

(ii) FLEXIBILITY: Definition, Factors affecting flexibility; Methods used to develop flexibility.

UNIT – IV Training Preparation (20 Lectures)

(v) TECHNICAL PREPARATION: Definition and meaning of technique, skill and style.

(vi) Technique training & its implication in various phases; Tactics and its aim, Principal of Tactical Preparation.

(vii) Periodization: Need & types of periodization.

(viii) Competition: Preparation for competition, number & frequency, competition preparation.

SUGGESTED READING:

7. Baechle T R & Earle R W (2000). Essentials of strength training and conditioning. Human Kinetics. USA.
8. Bompa. T.O. (1994). Theory and Methods of Training-A Key to Athletic Performance (3rd Ed.). Kandwall Hunt Publication Co.

9. Bompa. T.O. and G. Gregory Hett. (2009) Periodization: Theory and Methodology of Training.
10. Dick FW (1999). Sport training Principles. A and C Black. London.
11. Newton H (2006). Explosive lifting for sports. Human Kinetics. USA.
12. Singh Hardayal (1991). Science of Sport Training. D.V.S Pub. Delhi.

SEC – 2 SPORTS & EXERCISE NUTRITION

Credit = 4 (3Th +1ST) Max. Marks = 100

Theory = 75 Marks +Internal Assessment = 25 Marks

Objectives:

To acquaint student with the knowledge of basic nutrition and nutrition in Sports & Exercise and other related aspects important to sports persons.

Learning Outcomes:

The student would be able to apply the knowledge of nutrition in day-to-day life and in sports and training. Such core knowledge and skill help to create a strong foundation to engage human subject of all ages, sexes and abilities.

THEORY SYLLABUS (48 Hours)

UNIT – I (12 Lectures)

(i) Introduction to basic concepts in nutrition-Nutrients of physiological significance their sources, functions and requirements in normal health conditions.

UNIT – II (12 Lectures)

(i) Energy metabolism-BMR, RMR, energy expended on physical activity and TEF.

(ii) Energy requirements of specific sports groups, Energy cost of activities, Energy substrate for activities of different intensity and duration; aerobic.

(iii) Concept of energy balance in maintaining weight.

UNIT – III (12 Lectures)

(i) Basic food groups, Concept of balanced diet, General and specific dietary guidelines in planning meals for children, adolescents, adult men and women, elderly, Nutritional considerations for sports/exercising person (endurance and strength sports/exercise training) during training, pre-event meal, during event and post event meal.

UNIT – IV (12 Lectures)

(i) Concept of Fluid in sports- Hypotonic, Isotonic and Hypertonic. Requirement of fluid for various activities. Fluid balance in sports and exercise- Importance, Symptoms and prevention of dehydration. Normal weight- concept, weight management skills.

(ii) Eating disorders in Sports Persons, Female athletic triad and Sports anemia. Nutrients as ergogenic aids for sports and exercise. Supplements and their role in sports.

SUGGESTED READING:

1. Antoni, J. et al, Editors (2008). Essentials of Sports Nutrition and Supplements. Humana Press, USA.
2. Benardot, D. (2005). Advanced Sports Nutrition. Human Kinetics, USA.
3. Brown Judith E (2002). Nutrition Now. Canada Pub. Peter Marshal
4. Caliendo Mang Alica (1981). Nutrition and Preventive Health Care McMillan Publication Co.
5. Clark, N. (2008). Sports Nutrition. 4th Ed. Human Kinetics, USA.
6. Eberle, S.G. (2007). Endurance Sports Nutrition. Human Kinetics, USA.
7. Finic HH et al (2006), Practical Applications in Sports Nutrition J & B Publisher, USA.
8. Lal PR (2009) Handbook of Sports Nutrition, Friends Publication.
9. McArdle, W.d. & Katch, V.L. (2008). Sports and Exercise Nutrition. 3rd Ed. Lippincott Williams and Wilkins, USA.
10. Meyer, D.E.L. (2006). Vegetarian Sports Nutrition. Human Kinetics Publishers, USA.
11. Whitney E. and Rolfes S.R. (2005). Understanding Nutrition. Thomson Wadsworth. Belmont. California. U.S.A.

SEMESTER V: Two DSC One DSE & One SEC

Sr. No.	Course Code	Course Title	Credits	Total Marks
			Th / P / ST	
1.	DSC–9	Yoga Education	6(3Th+2P+1ST)	150
2.	DSC–10	Sports Skill Enhancement	6(3Th+2P+1ST)	150
3.	DSE – 5	Olympic Education	6(5Th+1ST)	100
4.	SEC – 3	Posture & Athletic Care	4(3Th+1ST)	100
		Total Credits	**22**	**500**

Note: Th = Theory; P = Practical; ST = Session Test

DSC – 9 YOGA EDUCATION

Credit = 6(3Th+2P+1ST) Max. Marks = 150

Theory = 75 Marks +Practical = 50 Marks+ Internal Assessment = 25 Marks

Objectives:

To provide knowledge to Yoga including the various Asanas and Pranayama and their effects as well as its historic background. Students will also be given the knowledge about the yogic diet and understanding its applications and its benefits in the field of physical education, sports and exercise science.

Learning Outcomes:

The students will learn about the various Yogic Asanas, Shatakarma's, Pranayama's, Bandhas and Yogic Diet. This will help the students to lead a happy, healthy and satisfied life. Also, the students will gain awareness of the rich ancient scientific approaches and benefits derived from the practice and application of yogic education.

THEORY SYLLABUS (60 Hours)

UNIT I - Origin of Yoga (10 Hours)

(i) Origin of Yoga, Definition & Scope of Yoga

(ii) Importance of Yoga in Physical Education, Sports and Exercise Science

(iii) Limitations and Misconceptions of Yoga

UNIT II – History & Types of Yoga (15 Lectures)

(i) Historical Development of Yoga in India.

(ii) Types of Yoga: Hatha Yoga, Laya Yoga, Mantra Yoga, Bhakti Yoga, Karma Yoga, Jnana Yoga and Raj Yoga.

UNIT III – Patanjali Yoga (15 Lectures)

(i) Patanjali Yoga Sutra – Yama, Niyama, Asana, Pranayama and Pratyahar – Benefits and Utilities of these.

(ii) Ashtanga Yoga – Definition, objectives, Dharna, Dhyan, Samadhi & their psychological impact.

(iii) Shatakarmas / Cleansing process / yogic methods and personal hygiene.

UNIT IV – Asana & Pranayama (20 Lectures)

(i) Asana: Types, Importance of asanas with special reference to physical education, sports and exercise science.

(ii) Differentiate between Asanas and Exercise

(iii) Pranayama & Importance of pranayama with special reference to physiological effects.

(iv) Importance of Vegetarianism in yogic diet.

(v) Bandhas, Mudras and their physiological effects.

Practical (24 Hours)

(i) Practice of Shatakarmas: Neti, Dhauti, Nauli, Basti, Kunjal & Kapal Bhati

(ii) Practice of Pranayama: Anulom – Vilom, Bhastrika, Naddi Shodhan, Sheetali, Sheetkari, Bharmari, & Ujjayi

(iii) Practice of Bandhas: Jalandhar, Uddyana, Mool Bandha.

SUGGESTED READING

1. Day P. (1986) Yoga Illustrated Dictionary, Jaico Pub. House, New Delhi.
2. Debnath M. (2007) Basic Core Fitness through Yoga and Naturopathy, Sports Publication, New Delhi.
3. Kumar E. R. (1988) Heal Yourself with Yoga: Specific Diseases, Taraporwala, Bombay.
4. Sharma Jai Prakash and Rathore Bhupender Sing (2007) Yoga Ke Tatva, Friends Publication, New Delhi.

5. Shanti K Y (1987) The Science of Yogic Breuthiay (Pranayama) D.B. Bombay.
6. Sharma J. P. and Ganesh S (2007) Yog Kal ek Parichay (Friends Publication, New Delhi.
7. Sharma J. P. (2007) Manav Jeevan Evam Yoga, Friends Publication, New Delhi.
8. Sharma Jai Prakash and Sehgal Madhu (2006) Yog – Shiksha, Friends Publication, New Delhi.
9. Singh M. K. and Jain P. (2008) Yoga aur Manoranjan, Khel Sahitya Kendra, New Delhi.
10. Vyas S. K. (2005) Yog Shiksha, Khel Sahitya Kendra, New Delhi.
11. Certification of Yoga Professionals Official Guidebook for Level I and Level II, Ministry of Ayush.

DSC – 10 SPORTS SKILL ENHANCEMENT

Credit = 6(3Th+2P+1ST) Max. Marks = 150

Theory = 75 Marks +Practical = 50 Marks+ Internal Assessment = 25 Marks

Objectives:

To improve the student's proficiency in the Practical aspects of the chosen Game / Sport which s/he has already studied in Sports Proficiency.

Learning Outcomes:

Student's will learn the theoretical and practical aspects of the Game / Sport of his / her choice to apply various levels for teaching, learning and coaching purposes efficiently.

THEORY SYLLABUS (48 Hours)

UNIT I (12 Lectures)

(i) Advance Skills and their stages of perfection: Tactical Skills with perfection drills, Technical Skills with perfection drills.

UNIT II (12 Lectures)

(i) Team Building and Development: Selection of Players.
(ii) Specific Training as per positions of the players.

(iii) Short Term and long-term training plan, psychological skills for relaxation and arousal.

UNIT III (12 Lectures)

(i) Officiating in Sports: Officiating signals Interpretation of rules, Knowledge of Scoring & Score sheet, Match Analysis.
(ii) Psychological skills / qualities of officials.
(iii) Organisation of a Tournament.
(iv) Drawing of fixtures for knock – out and league tournament.

UNIT IV (12 Lectures)

(i) Analysis of teams: Fitness & Sports Skills.
(ii) Testing Tactical Aspects of Sports
(iii) Analysis of Technical & Tactical skills of a team scouting.

Practical (24 Hours)

1. Demonstration of Tactical and Technical Drills.
2. Preparation of Psychological techniques of relaxation and arousal.
3. Preparing knock – out and League fixtures.
4. Officiating a Match Scoring in a match.
5. Demonstrating Various Motor Fitness Test and Sports Skill Tests.

SUGGESTED READING

1. American Volleyball Coaches Association (2005) Volleyball: Skills & Drills, Human Kinetics, Champaign U.S.A.
2. Barrow & McGee's Practical Measurement and Assessment.
3. Barrow H.M. and McGee R. (1979) a Practical Approach to Measurement in Physical Education Lea & Febiger, Philadelphia, U.S.A.
4. FIVB (1996) Backcourt Spiking in Modern Volleyball FIVB, Chennai.
5. Vanaik A. (2017) Officiating and Coaching, Friends Publication, New Delhi.

DSE – 5 OLYMPIC EDUCATION

Credit = 6(5Th+1ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

SEC – 3 POSTURE AND ATHLETIC CARE

Credit = 4(3Th+1ST) Max. Marks = 100

Theory = 75 Marks + Internal Assessment = 25 Marks

Objectives:

To impart the knowledge about the various physical postures, athletic care and first aid in case of sports injuries and rehabilitation.

Learning Outcomes:

The students will learn the science of posture, athletic care and first aid in case of sports injuries and rehabilitation. Such core knowledge and skills help to create a strong foundation for to correct different postures, athletic care and first aid, especially persons with special needs.

THEORY SYLLABUS (48 Hours)

UNIT – I Postures (12 Lectures)

(i) Posture – Concept, Significance and Benefits, Characteristics and Effect.

(ii) Static and Movement Postural Assessments.

(iii) Bad Posture – Sitting, Standing, Walking, Laying down, Effect of bad posture on the body.

(iv) Postural Deformities: Types & Causes of Kyphosis, Scoliosis, Lordosis, Knock knee, Bow Leg, Flat foot and their corrective exercises.

(v) Illnesses due to improper Posture – Back Pain, Neck Pain and their Corrective Exercises.

UNIT – II Athletic Care (12 Lectures)

(i) Sports Medicine and Athletic Care: Concept, Significance, Factors Causing Injuries & General Principles of Injury Prevention.

(ii) Common Sports Injuries (Strain, Muscle and Ligament Sprain, Frozen Shoulder, Lower Back Strain, Tennis & Golfer's elbow, Runner's Knee, Shin Pain (Splint),

Blister, Concussion, Abrasion, Laceration, Hematoma, Fracture, Bone & Muscle Dislocation) Ligament Tears, Oedema.

UNIT – III First Aid, Ergogenic Aids and Rehabilitation (12 Lectures)

(i) Sports Injuries and First Aid (P.R.I.C.E)

(ii) Rehabilitation – Aim and Objective, Recovery (Ice Bath, Contrast Bath, Hot Fermentation)

(iii) Management of Injuries (Strain, Muscle and Ligament Sprain, Frozen Shoulder, Lower Back Strain, Tennis Elbow, Runners Knee, Shin Pain (Splint), Blister, Concussion, Abrasion, Laceration, Hematoma, Fracture, Bone & Muscle Dislocation) Ligament Tears, Oedema.

UNIT – IV Therapeutic Modalities and Rehabilitation (12 Lectures)

(i) Therapeutic Modalities (Therapeutic Ultrasound, Interferential Therapy Unit, T.E.N.S, Infrared Lamp, Wax Bath, Short Wave Diathermy)

(ii) Muscle Strengthening through Active and Passive Exercise.

(iii) Therapeutic value with Yogasanas for rehabilitation and strengthening of the muscles.

SUGGESTED READING:

1. ACSM'S Guideline for Exercise Testing and Prescription (2001), American College of Sports Medicine, New York, U.S.A.
2. Anspaugh, D J., G. Ezell and K.N. Goodman (2006) Teaching Today Health, Mosby Publishers, Chicago (USA).
3. Beotra, Alka (2001-02) Drug Education Handbook on drug Abuse in Sports, Applied Nutrition Sciences, Mumbai.
4. Donatella, R.J. and Ketcham P. (2007) Access to Health, Benjamin Cummings, Boston, USA.
5. Fahey, T.D., M.P. Insel and W. T. Rath (2006) Fit & Well: Core Concepts and Labs in Physical Fitness, McGraw Hill, New York, USA.
6. Flyod P.A., S.E. Mimms and C. Yeilding (2003) Personal Health: Perspectives and Lifestyles, Thomson, Wadsworth, Belmont, California, USA.
7. Hoegar, W K and S. A. Hoegar (2004) Principles and Labs for Fitness and Wellness, Thomson Wadworth, California, USA.

8. Kumari Sheela, S., Rana, Amita, and Kaushik, Seema, (2008), Fitness, Aerobics and Gymn Operations, Khel Sathiya, New Delhi.
9. Jain J. (2004) Khel Dawaon Ka (New Delhi: Delhi University Press).
10. Pande, P.K. (1987) Outline of Sports Medicine (New Delhi: Jaypee Brothers).
11. Roy, Steven and Richard, (Irvin (1983) Sports Medicine, Benjamin Cummings, Boston, USA.
12. Schindler, J.A. (2003) How to live 365 days in a year (Boston Running Press).

SEMESTER VI: Two DSC One DSE & One SEC Paper

Sr. No.	Course Code	Course Title	Credits	Total Marks
			Th / P / ST	
1.	DSC–11	Introduction to Strength & Conditioning	6(3Th+2P+1ST)	150
2.	DSC –12	Exercise Prescription	6(3Th+2P+1ST)	150
3.	DSE – 4	Sports Technology	6(5Th+1ST)	100
4.	SEC – 4	Sports for All	4(3Th+1ST)	100
		Total Credits	**22**	**500**

Note: Th = Theory; P = Practical; ST = Session Test

SEMESTER VII: Two DSC One DSE & One SEC Paper

Sr. No.	Course Code	Course Title	Credits	Total Marks
			Th / P / ST	
1.	DSC–13	Research Practices & Statistics	6(3Th+2P+1ST)	150
2.	DSC –14	Advanced Strength & Conditioning	6(3Th+2P+1ST)	150
3.	DSE – 5	Fundamentals of Sports Analysis	6(5Th+1ST)	100
4.	SEC – 5	Sports Sociology	4(3Th+1ST)	100
		Total Credits	**22**	**500**

Note: Th = Theory; P = Practical; ST = Session Test

SEMESTER VIII: Two DSC One DSE & One SEC Paper

Sr. No.	Course Code	Course Title	Credits	Total Marks
			Th / P / ST	
1.	DSC–15	Kinesiology & Biomechanics	6(3Th+2P+1ST)	150
2.	DSC –16	Sports Ethics	6(3Th+2P+1ST)	150
3.	DSE – 6	Dissertation	6(5Th+1ST)	100
4.	SEC – 6	Project Work & Internship	4(3Th+1ST)	100
		Total Credits	**22**	**500**

Note: Th = Theory; P = Practical; ST = Session Test