



# SCHOOL OF AGRICULTURE

- Programme Educational Objectives (PEOs)**
- Program Outcomes (POs)**
- Program Specific Outcomes (PEOs)**
- Course Outcomes (COs)**

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## Vision and Mission

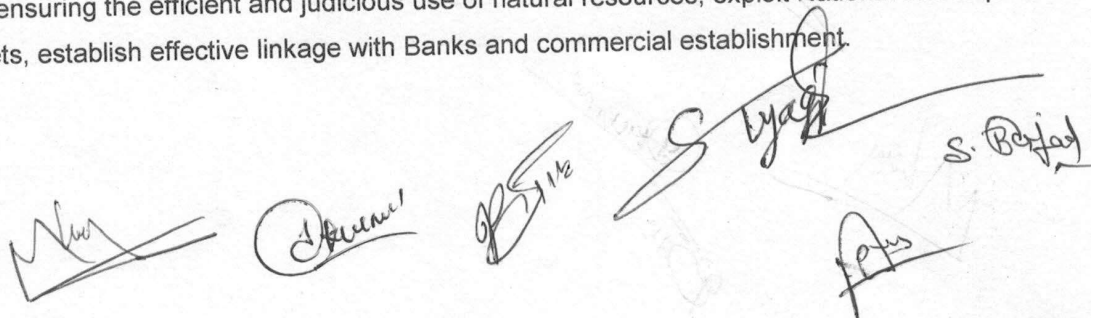
### Vision

Now a days, challenges of global warming, food security, nutritional security, sustainable development, degradation of natural resources and low profitability to small and marginal farmers demand attention towards global economy. Therefore, the research vision of University has been targeted towards:

- Generating technologies to provide food and nutrition security by using crop improvement and genetic engineering for high productivity and quality traits; conservation and development of bio-diversity
- Conservation and optimal utilization of natural resources with focus on soil health, input use efficiency, production technique to mitigate climate change, cropping and farming system development under resource constraints focusing on water resource management, organic pest and disease management, crop modeling, use of remote sensing and Geographical Information System (GIS)
- Postharvest process and value addition of crops, fruit and vegetables to minimize losses and enhance commercialization of products through appropriate packaging, handling and storage techniques.
- Enhancing profitability of small land holders through appropriate techniques, farming system and processes, service and commercialization of agriculture by involving entrepreneurs, minimizing of market chain and emphasis on patent, IPR management, International trade and exports.
- Developed ICT based extension and communication networks for farmers and extension personnel and for knowledge based agricultural development.

### Mission

- To contribute to the improvement of livelihoods of the rural and urban communities in Madhya Pradesh by enhancing food and nutritional security and improving livelihoods through research to achieve sustainable increases in agricultural productivity and income, while ensuring the efficient and judicious use of natural resources, exploit National and Export markets, establish effective linkage with Banks and commercial establishment.



**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

- PEO1 Imparting subject-related knowledge along with developing a connection between practical solutions and theory
- PEO2 Encourage personal growth among students and boost their self-confidence, which will give them opportunities to be an integral part of the agro-industry
- PEO3 Making the agriculture-related subjects interesting through scientific and experimental evidence.
- PEO4 Develop problem-solving skills through practical applications and research

**PROGRAMME OUTCOMES (POs)**

- PO1 Imparting detailed knowledge of Agriculture and its allied branches
- PO2 Facilitating detailed study of various agriculture forestry, Livestock and other allied branches required to raise the income of farmers
- PO3 Providing detailed knowledge of agriculture in India and Indian farmers income generating enterprises
- PO4 Knowledge dissemination regarding various technique of farming and farming system in India
- PO5 Study of market and marketing of agricultural produce

**PROGRAM SPECIFIC OUTCOMES (PSOs)**

- PSO1 Understand the impact of the professional agricultural solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
- PSO2 To demonstrate research based knowledge of the legal and ethical environment impacting agriculture organizations and exhibit an understanding and appreciation of the ethical implications of decisions
- PSO3 To demonstrate an understanding of and appreciation for the importance of the impact of globalization and diversity in modern agriculture organizations. Understanding of globalization, and NGO working

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S. Bhatnagar

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- PSO4** To demonstrate an ability to engage in critical thinking by analyzing situations and constructing and selecting viable solutions to solve problems. Ability to work effectively with others. To develop analytical ability and team work spirit
- PSO5** To understand and analyze the current events and issues that are occurring in agriculture and how they affect futuristic agriculture
- PSO6** Enable to recognize and examine the relationships between inputs and outputs in their agricultural field to make effective and profitable decisions. To understand mechanics of agripreneurship.
- PSO7** Understand how all aspects of agriculture combine and are used by scientists, marketers, producers and understand how employer characteristics and decision-making at various levels enhance the success of an agricultural enterprise. To understand components of agri business and economics of market.
- PSO8** Able to demonstrate critical thinking and problem solving skills as they apply to a variety of animal and or plant production systems .To understand problem solving skills in crop production and animal husbandry.
- PSO9** Knowledge of Weather codes and Symbols, Reading and Recording of weather and climatic data. To get trained for climatologically records, Soil data, and Plant nutrition.
- PSO10** To develop critical and self-critical opinion and approach aiming at solving the most important practical problems in the field of plant protection by applying gained competencies and in accordance with high standards of academic integrity (ethics and moral) both in the profession and in society as a whole. To develop competence to work in Government, public and private sectors.
- PSO11** Demonstrate knowledge and understanding in the horticulture section: The breadth and depth of the profession of horticulture. Basic horticulture biology: taxonomy, anatomy, morphology, and physiology. The characteristics of the environment and their influence on plant growth and development. Current applications of horticultural principles and practices: propagation, pest management, production, maintenance, and business practices. Comprehensive knowledge of horticultural production.
- PSO12** This programme will also help students to enhance their employability for jobs in different sectors

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S. Bajaj


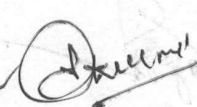

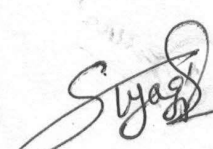
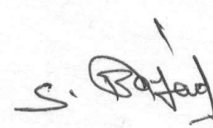


**Discipline-wise summary of credit hours**

S.No.	GROUP	CREDITS
1.	Agronomy	21(10+11)
2.	Genetics & Plant Breeding	13(7+6)
3.	Soil Science & Agricultural Chemistry	8(6+2)
4.	Entomology	9(6+3)
5.	Agricultural Economics	10(7+3)
6.	Agricultural Engineering	8(4+4)
7.	Plant Pathology	13(9+4)
8.	Horticulture	10(5+5)
9.	Food Science	2(2+0)
10.	Agricultural Extension	9(6+3)
11.	Biochemistry / Physiology / Microbiology/ Environmental Sciences	12(7+5)
12.	Statistics, Computer Application and I.P.R.	5(3+2)
13.	Animal Production	4(3+1)
14.	English	2 (1+1)
15.	Remedial Courses	03 (Biol/ Math); 01 (Agriculture)
16.	NSS/NCC/Physical Education & Yoga Practices	2(0+2)
17.	Human Values and Ethics	1(1+0)
18.	Educational Tour	2(0+2)
<b>Total</b>		126 + 3 (for Bio/Math)/ 01(Agri) + 5, NC126 +3+ 1+5+ 9 credits elective
		<b>20 +20</b>
<b>RAWE +ELP</b>		144+20+20=184
<b>Grand Total</b>		<b>24+4 (remedial)+1 NC)</b>
<b>New Courses</b>		

**Elective Courses:** A student can select three elective courses out of the following and offer during 4th, 5th and 6th semesters.

S. No.	COURSES	CREDIT HOURS
1.	Agribusiness Management	3(2+1)
2.	Agrochemicals	3(2+1)
3.	Commercial Plant Breeding	3(1+2)
4.	Landscaping	3(2+1)
5.	Food Safety and Standards	3(2+1)
6.	Bio pesticides & bio fertilizers	3(2+1)
7.	Protected Cultivation	3(2+1)
8.	Micro propagation Technologies	3(1+2)
9.	Hi-tech. Horticulture	3(2+1)
10.	Weed Management	3(2+1)
11.	System Simulation and Agro-advisory	3(2+1)
12.	Agricultural Journalism	3(2+1)

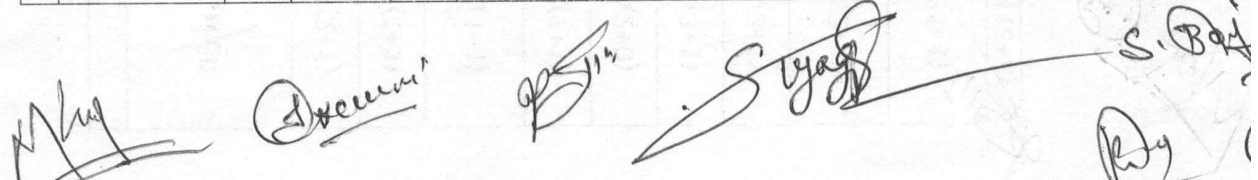






# EKALAVYA UNIVERSITY, DAMOH (M.P.)

Scheme of Examination B.Sc. (Hons.) Agriculture I Year

/For batch in Admitted in Academic Session 2023-24/

Semester - I												
S. No.	Subject Code	Subject Name	Sessional					Contact Periods Per Week			Credit	
			Theory	Mid Sem.	Class Assignment	Practical	Total	L	T	P		
1	BAGRI20S101	Fundamentals of Horticulture	50	30	5	15	100	1	0	1	2(1+1)	
2	BAGRI20S102	Fundamentals of Plant Biochemistry and Biotechnology	50	30	5	15	100	2	0	1	3(2+1)	
3	BAGRI20S103	Fundamentals of Soil Science	50	30	5	15	100	2	0	1	3(2+1)	
4	BAGRI20S104	Introduction to Forestry	50	30	5	15	100	1	0	1	2(1+1)	
5	BAGRI20S105	Comprehension & Communication Skills in English	50	30	5	15	100	1	0	1	2(1+1)	
6	BAGRI20S106	Fundamentals of Agronomy	50	30	5	15	100	3	0	1	4(3+1)	
7	BAGRI20S107(A)	Elementary Mathematics*	50	40	10	0	100	2	0	0	2(2+0)	
	BAGRI20S107(B)	Introductory Biology*	50	30	5	15	100	1	0	1	2(1+1)	
8	BAGRI20S108	Agricultural Heritage*	50	40	10	0	100	1	0	0	1(1+0)*	
9	BAGRI20S109	Rural Sociology & Educational Psychology	50	40	10	0	100	2	0	0	2(2+0)	
10	BAGRI20S110	Human Values & Ethics (non gradial)	50	40	10	0	100	1	0	0	1(1+0)**	
11	BAGRI20S111	NSS/NCC/Physical Education & Yoga Practices**	0	0	0	100	100	0	0	2	2(0+2)**	
<b>Total</b>												<b>26(17+9)</b>



Class			B.Sc. (Hons.) Agriculture	
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester	
Subjects			Agriculture	
Paper Name			Fundamentals of Plant Biochemistry and Biotechnology	
Subject Code			BAGRI20S102	
L	T	P	Credit Total	3 (2+1)
2	0	1		
<p><b>Course Objectives:</b> The course is aimed at</p> <ol style="list-style-type: none"> <li>1. Imparting knowledge on the structure and function of biomolecules.</li> <li>2. Illustrating primary metabolic pathways in plants.</li> <li>3. Describing basic plant biotechnological applications viz., tissue culture, transgenics and marker assisted breeding.</li> </ol> <p><b>Expected Course Outcome:</b> At the end of the course the student should be able to</p> <ol style="list-style-type: none"> <li>1. Interpret the importance of biomolecules.</li> <li>2. Describe the role and metabolism of lipids.</li> <li>3. State the structure and functions of nucleic acids.</li> <li>4. Develop interest in micropropagating plants.</li> <li>5. Define biotechnological techniques involved in breeding plants.</li> <li>6. Analyze and interpret biochemical data.</li> </ol>				
UNIT		SYLLABUS		PERIODS
UNIT 1		Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Poly saccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids.		8
UNIT 2		Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes.		4
UNIT 3		Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.		7
UNIT 4		Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule culture and their applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; somatic hybridization and cybrids; Somaclonal variation and its use in crop improvement.		6
UNIT 5		Cryo-preservation; Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breeding in crop improvement; Biotechnology regulations.		5

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**Practical (30 periods)**

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of amino acids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paper chromatography/ TLC demonstration for separation of amino acids/Monosaccharides. Sterilization techniques. Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various explants. Micro-propagation, hardening and acclimatization. Demonstration on isolation of DNA. Demonstration of gel electrophoresis techniques and DNA finger printing.

**Text Books**

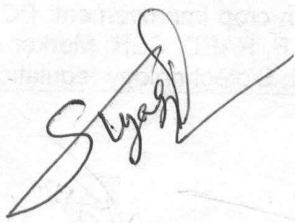
1. David L. Nelson and Michael M. Cox. 2017. Lehninger Principles of Biochemistry: International Edition. 7<sup>th</sup> edition, W.H. Freeman. USA.
2. Adrian Slater, N W Scott, M Fowler. 2014. Plant Biotechnology: The Genetic Manipulation of Plants, second Edition, Oxford University Press. UK.

**Reference Books**

1. Lincoln Taiz, Eduardo Zeiger, Ian M. Moller, and Angus Murphy. 2018. Plant Physiology and Development, International Sixth Edition. Sinauer; Oxford University Press; USA.
2. Sawhney, S.K. and R. Singh. Introductory Practical Biochemistry. 2014 Reprint. Narosa Publishing House, India.
3. Michael R. Green and Joseph Sambrook. 2012. Molecular Cloning A Laboratory Manual. 4<sup>th</sup> edition. Cold Spring Harbor Laboratory Press. USA.
4. M.K. Razdan. 2014. Introduction to Plant Tissue Culture. 2<sup>nd</sup> Edition, Oxford and IBH Publishing Company, India.






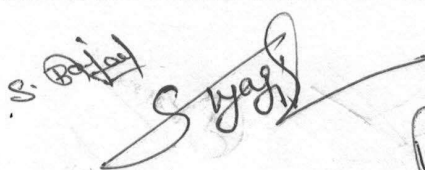





S. B. Jha



Class			B.Sc. (Hons.) Agriculture		
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester		
Branch			Agriculture		
Paper Name			Fundamentals of Soil Science		
Subject Code			BAGRI20S103		
L	T	P	Credit Total	3(2+1)	
2	0	1			
<p><b>Course Objectives:</b> The course is aimed at</p> <ol style="list-style-type: none"> <li>1. Describing the fundamental concepts of soil science.</li> <li>2. Imparting the knowledge on soil properties, soil water plant relationship and its importance.</li> <li>3. Stating the various aspects of soil science and substantiating through laboratory experiments.</li> </ol> <p><b>Expected Course Outcome:</b> At the end of the course the student should be able to</p> <ol style="list-style-type: none"> <li>1. Acquire knowledge on the importance of soil to agriculture.</li> <li>2. Value the physical properties of soil.</li> <li>3. Classify soil type, soil texture and soil structure required for an agricultural field.</li> <li>4. Analyze soil, water and nutrients related to crop growth.</li> <li>5. State techniques to mitigate soil pollution.</li> <li>6. Identify soil related problems in agricultural fields and provide suitable solutions.</li> </ol>					
<b>UNIT</b>	<b>SYLLABUS</b>				<b>PERIODS</b>
UNIT 1	Soil- Pedological and edaphological concepts. Soil Science-scope and branches of soil science. Earth spheres and composition of earth crust. Minerals-classification, formation and properties of silicate and non silicate minerals, Rocks-classification, formation and properties of igneous, sedimentary and metamorphic rocks.				5
UNIT 2	Weathering-type, factors of weathering, products of weathering; Soil formation-soil forming factors and soil forming processes. Soil profile-master horizons, subordinate horizons. Soil physical properties-Soil texture-classification of soil separates, properties of soil separates, Particle size analysis- Stokes law-assumptions and limitations, textural classes.				6
UNIT 3	Soil structure-classification, soil aggregates, evaluation of soil structure, significance. Pore space-types, factors affecting porosity, manipulation. Bulk density and particle density-relationships, factors, significance and manipulation. Soil colour-factors, attributes and significance. Soil consistency-forms, factors, limits and significance.				4
UNIT 4	Soil crusting- factors and significance. Soil temperature-thermal properties of soils, flow of heat, soil temperature regimes, influence of soil temperature on plant growth. Soil air-composition, gaseous exchange, influence of soil air on plant growth.				12
UNIT 5	Soil water-classification, potentials, soil moisture constants, movement of soil water, infiltration, percolation, hydraulic conductivity. Soil survey- types and methods. Soil classification-systems of classification. Soil taxonomy-advantages, structure, formative elements, diagnostic horizons, keys to soil orders. Soils of Karnataka and India.				3

**Practical (30 periods)**

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil texture by feel and Bouyoucos Methods. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Determination of soil colour.

**Text Books**

1. Raymond R. Weil and Nyle C. Brady. 2016. The Nature and Properties of Soils. Pearson, UK.
2. Biswas. T.D and S.K. Mukherjee. 2017. Text book of Soil Science. 2<sup>nd</sup> Edition, McGraw- Hill Education. USA.

**Reference Books**

1. HenryD. Foth. 1990. Fundamentals of Soil Science. 8<sup>th</sup> Edition. John Wiley & Sons. USA.
2. Soil Science-An Introduction. 2015. Indian Society of Soil Science. India.
3. Martin Alexander. 1991. Introduction to Soil Microbiology. 2<sup>nd</sup> Edition, Krieger pub.Co. USA.

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Class			B.Sc. (Hons.) Agriculture		
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester		
Branch			Agriculture		
Paper Name			Introduction to Forestry		
Subject Code			BAGRI20S104		
L	T	P	Credit Total	2(1+1)	
1	0	1			
<p><b>Course Objectives:</b> The course is aimed at</p> <ol style="list-style-type: none"> <li>1. Imparting knowledge on the concepts of forestry.</li> <li>2. Describing the techniques of natural and artificial regeneration of forests.</li> <li>3. Discussing the methods of forest mensuration and agroforestry.</li> </ol> <p><b>Expected Course Outcome:</b> At the end of the course the student should be able to</p> <ol style="list-style-type: none"> <li>1. Recognize the importance of forestry.</li> <li>2. Explain and appreciate the techniques involved in forest regeneration.</li> <li>3. Describe mensuration techniques to quantify forests data.</li> <li>4. Plan to regenerate a forest.</li> <li>5. Prepare an agroforestry system to support human sustenance.</li> </ol>					
UNIT			SYLLABUS		PERIODS
UNIT 1			Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, and salient features of Indian Forest Policies.		3
UNIT 2			Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.		4
UNIT 3			Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations.		3
UNIT 4			Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning.		2
UNIT 5			Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method; Instrumental methods of height measurement - geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.		3

**Practical (30 periods)**

Identification of tree-species; Diameter measurements using calipers and tape; Diameter measurements of forked, buttressed, fluted and leaning trees; Height measurement of standing trees by shadow method, single pole method and hypsometer; Volume measurement of logs using various formulae; Nursery lay out, seed sowing, vegetative propagation techniques; Forest plantations and their management; Visits of nearby forest based industries

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**Text Book**

1. Grebner, D.L. and Bettinger, P. and Siry, J.P. 2013. Introduction to Forestry and Natural Resources. Academic Press. USA.
2. Kershaw, J.A. and Ducey, M.J. and Beers, T.W. and Husch, B. 2016. Forest Mensuration. Wiley. USA.

**Reference Books**

1. Nair, P.K.R. and Garrity, D. 2012. Agroforestry - The Future of Global Land Use. Springer Netherlands.
2. Montagnini, F. and Ashton, M.S. 1999. The Silvicultural Basis For Agroforestry Systems. CRC Press. USA.
3. Fournier, M.V. 2009. Forest Regeneration: Ecology, Management and Economics. Nova Science. USA.

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Class			B.Sc. (Hons.) Agriculture		
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester		
Branch			Agriculture		
Paper Name			Comprehension & Communication Skills in English		
Subject Code			BAGRI20S105		
L	T	P	Credit Total	2(1+1)	
1	0	1			
<p><b>Course Objectives:</b> The course is aimed at</p> <ol style="list-style-type: none"> <li>1. Enhancing communication skills in English.</li> <li>2. Developing writing skills and improving vocabulary.</li> <li>3. Imparting knowledge on developing presentation skills.</li> </ol> <p><b>Expected Course Outcome:</b> At the end of the course the student should be able to</p> <ol style="list-style-type: none"> <li>1. Analyze grammatical errors.</li> <li>2. Identify correct pronunciation.</li> <li>3. Express writing skills.</li> <li>4. Comprehend course materials of courses and improve oral communication skills.</li> <li>5. Demonstrate presentation skills.</li> <li>6. Illustrate communication skills.</li> </ol>					
<b>UNIT</b>	<b>SYLLABUS</b>				<b>PERIODS</b>
UNIT 1	War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English Spoken English and broken English G.B. Shaw.				4
UNIT 2	Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations.				4
UNIT 3	Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration.				2
UNIT 4	Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing.				3
UNIT 5	Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.				2

**Practical (30 periods)**

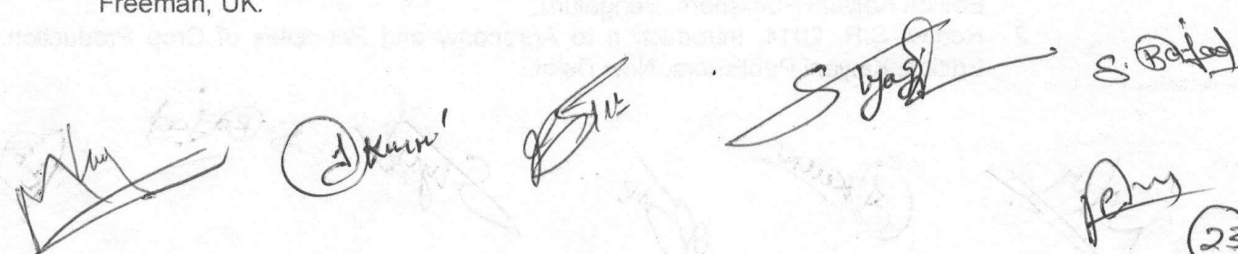
Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness & Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability, Group discussions.

**Text Books**

1. Raymond Murphy. 2015. Essential grammar in use. 3<sup>rd</sup> edition. Cambridge University Press. UK.
2. Kenneth Anderson, Joan Maclean, Tony Lynch. 2013. Study Speaking. 2<sup>nd</sup> Edition. Cambridge University Press, UK.

**Reference Books**

1. Karin Knisely. 2017. A Student Handbook for Writing in Biology. 5<sup>th</sup> Edition. W. H. Freeman, UK.



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Class			B.Sc. (Hons.) Agriculture	
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester	
Branch			Agriculture	
Paper Name			Fundamentals of Agronomy	
Subject Code			BAGRI20S106	
L	T	P	Credit Total	4(3+1)
3	0	1		
<p><b>Course Objectives:</b> The course is aimed at</p> <ol style="list-style-type: none"> <li>1. Imparting knowledge on different crops, crop nutrition and growth.</li> <li>2. Describing crop-water relations in association to crop growth and development.</li> <li>3. Illustrating crop management, cropping pattern and weed management.</li> </ol> <p><b>Expected Course Outcome:</b> At the end of the course the student should be able to</p> <ol style="list-style-type: none"> <li>1. Express knowledge gained on the principles of agronomy.</li> <li>2. Recognize the various nutrients and their effects on plant health.</li> <li>3. Plan irrigation measures for plant growth and development.</li> <li>4. Manage weeds in a field.</li> <li>5. Plan for sustainable agricultural production.</li> <li>6. Apply scientific methods and tools in field preparation and for designing cropping.</li> </ol>				
<b>UNIT</b>		<b>SYLLABUS</b>		<b>PERIODS</b>
UNIT 1	Agronomy and its scope, seeds and sowing, tillage and tith, crop density and geometry.			10
UNIT 2	Crop nutrition, manures and fertilizers, nutrient use efficiency.			3
UNIT 3	water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, logging.			12
UNIT 4	Weeds- importance, classification, crop weed competition, concepts of weed management principles and methods, herbicides- classification, selectivity and resistance, allelopathy.			12
UNIT 5	Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.			8

**Practical (30 periods)**

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agroclimatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk density and infiltration rate, Measurement of irrigation water.

**Text Books**

1. Yellamanda Reddy, T. and Sankara Reddy, G.H. 2015. Principles of Agronomy. 1<sup>st</sup> Edition Kalyani Publishers, Bengaluru.
2. Reddy, S.R. 2014. Introduction to Agronomy and Principles of Crop Production. 1<sup>st</sup> Edition. Kalyani Publishers, New Delhi.

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**Reference Books**

1. Craig C. Sheaffer and Kristine M. Moncada. 2011. Introduction to Agronomy. 2<sup>nd</sup> Edition, Delmar Cengage Learning, Australia.
2. ArunKatyayan. 2017. Fundamentals of Agriculture. Volume 1 and 2. Kushal Publications and Distributors, India.

UNIT	TOPICS	PERIODS
1	Introduction to Agriculture	2
2	Soil Science and Fertilizers	4
3	Water and Irrigation	4
4	Plant Nutrition	4
5	Plant Growth and Development	4
6	Plant Physiology	4
7	Plant Pathology	4
8	Plant Breeding and Genetics	4
9	Plant Biotechnology	4
10	Plant Ecology	4
11	Plant Conservation	4
12	Plant Utilization	4
13	Plant Biotechnology	4
14	Plant Biotechnology	4
15	Plant Biotechnology	4
16	Plant Biotechnology	4
17	Plant Biotechnology	4
18	Plant Biotechnology	4
19	Plant Biotechnology	4
20	Plant Biotechnology	4

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Class	B.Sc. (Hons.) Agriculture		
Year/Semester	1 <sup>st</sup> Year, 1 <sup>st</sup> Semester		
Branch	Agriculture		
Paper Name	Introductory Biology*/Elementary Mathematics*		
Subject Code	BAGRI20S107		
L	T	P	Credit Total
1	0	1	
			2(1+1)

**Course Objectives:** The course is aimed at

**Introductory Biology**

1. Imparting knowledge on the mechanisms of natural selection and their impact on evolution.
2. Discussing the fundamentals of plant biology and taxonomy.
3. Differentiating prokaryotes from eukaryotes.

**Elementary Mathematics**

1. Improving the mathematical knowledge of students who have come from a science background.
2. Imparting higher secondary level mathematics so that they can understand mathematical formulas applicable for other courses.
3. Interlinking mathematics with science.

**Expected Course Outcome:** At the end of the course the student should be able to

**Introductory Biology**

1. Compare living organisms.
2. Classify and name living beings.
3. Describe cell and its division.
4. Interpret flowering plants and state the role of animals in agriculture.
5. Illustrate theory of life.
6. Describe plant organs and gain interest in learning biological sciences.

**Elementary Mathematics**

1. Devise formulas for straight lines.
2. Comprehend the use of Slope-Intercept.
3. Apply the knowledge gained in designing fields.
4. Acquire interest to utilize calculus in agriculture.
5. Integrate product of functions and define matrices and determinants.
6. Link mathematics with agricultural engineering.

UNIT		SYLLABUS	PERIODS
	Introductory Biology	Introduction to the living world, diversity and characteristics of life, origin of life.	2
UNIT 1	Elementary Mathematics	Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point for of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral.	3

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## SCHOOL OF AGRICULTURE

UNIT 2	Introductory Biology	Evolution and Eugenics.	1
	Elementary Mathematics	Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points $(x^1, y^1)$ & $(x^2, y^2)$ , Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$ .	2
UNIT 3	Introductory Biology	Binomial nomenclature and classification, cell and cell division.	1
	Elementary Mathematics	Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of $x^n$ , $e^x$ , $\sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form $y=f(x)$ (Simple problems based on it).	2
UNIT 4	Introductory Biology	Morphology of flowering plants. Seed and seed germination. Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae.	1
	Elementary Mathematics	Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).	1
UNIT 5	Introductory Biology	Role of animals in agriculture.	1
	Elementary Mathematics	Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.	1

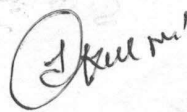
### Practical (30 periods)

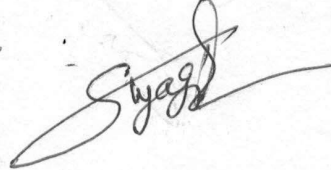
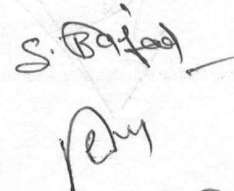
Morphology of flowering plants – root, stem and leaf and their modifications. Inflorescence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides. Description of plants - Brassicaceae, Fabaceae and Poaceae.

### Introductory Biology

#### Text Books

1. Raven P, Mason Johnson G.B, Losos, J. B and S.S. Singer. 2013. Biology, 10<sup>th</sup> edition, McGraw Hill Publications. U.K.
2. Neil A. Campbell, Urry, L.A., Cain, M.I., Wasserman, S.A., P. V. Minorsky and J.B. Reece. 2018. Biology: A Global Approach, Pearson Education Ltd, Essex, England. UK.

**Reference Books**

1. James D. Mauseth Botany: 2016. An Introduction to Plant Biology. 6<sup>th</sup> Edition. Jones and Bartlett Learning Inc. Burlington, Wall street, MA, USA.
2. Bidlack, J., S. Jansky and K. Stern. 2017. Stern's Introductory Plant Biology. 14<sup>th</sup> edition. McGraw-Hill Publishing Company. UK.

**Elementary Mathematics**

**Text Book**

1. Stroud, K.A. and Dexter J. Booth. 2013. Engineering Mathematics. 7<sup>th</sup> edition. Industrial Press. USA.
2. Lewingdon Parsons, G. 2016. Elementary Differential and Integral Calculus. Cambridge University Press Publishing Company, UK

**Reference Book**

1. Grewal, B.S. 2015. Higher engineering mathematics. 43<sup>rd</sup> edition. Khanna Publishers. India.
2. Aitken, A.C. 2012. Determinants and Matrices. Brousson Press, US.

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Class			B.Sc. (Hons.) Agriculture		
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester		
Branch			Agriculture		
Paper Name			Agricultural Heritage		
Subject Code			BAGRI20S108		
L	T	P	Credit Total	1(1+0)	
1	0	0			
<p><b>Course Objectives:</b> The course is aimed at</p> <ol style="list-style-type: none"> <li>1. Discussing the importance and relevance of agriculture across civilizations.</li> <li>2. Illustrating a lucid picture on Indian agriculture.</li> <li>3. Imparting knowledge on historical best agricultural practices relevant to today's agriculture.</li> </ol> <p><b>Expected Course Outcome:</b> At the end of the course the student should be able to</p> <ol style="list-style-type: none"> <li>1. Appreciate agriculture practiced throughout the world.</li> <li>2. Understand the rich agricultural heritage of India.</li> <li>3. Integrate judicious traditional agricultural practices with modern methods.</li> <li>4. Plan on using agricultural resources.</li> <li>5. Comprehend agricultural issues.</li> </ol>					
<b>UNIT</b>	<b>SYLLABUS</b>				<b>PERIODS</b>
UNIT 1	Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society.				5
UNIT 2	Journey of Indian agriculture and its development from past, to modern era; Plant production and protection through indigenous traditional knowledge.				3
UNIT 3	Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India.				2
UNIT 4	Crop significance and classifications; National agriculture setup in India.				4
UNIT 5	Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.				1

**Text Books**

1. Parviz Koohafkan and Miguel A. Altieri. 2016. Forgotten Agricultural Heritage: Reconnecting food systems and sustainable development. Taylor & Francis Group. UK.
2. Kumari, D. and M. Veeral. 2012. A Text Book on Agricultural Heritage of India. Agrotech Publishing Academy, Udaipur, India.

**Reference Books**

1. Jana, B.L. 2015. Introductory Agriculture: Ancient Heritage, Agricultural Scenario & Gender Equity in Agriculture. Pointer Publishers, Jaipur, India.
2. Introductory Agriculture 2016. <http://www.agrimoon.com/introductory-agriculture-icar-course-pdf-books>.

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Class			B.Sc. (Hons.) Agriculture		
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester		
Branch			Agriculture		
Paper Name			Rural Sociology & Educational Psychology		
Subject Code			BAGRI20S109		
L	T	P	Credit Total	2(2+0)	
2	0	0			
<p><b>Course Objectives:</b> The course is aimed at</p> <ol style="list-style-type: none"> <li>1. Explaining the structure and functioning of rural societies in India.</li> <li>2. Discussing the role of human behavior in effecting constructive changes for rural development.</li> <li>3. Imparting knowledge on education psychology.</li> </ol> <p><b>Expected Course Outcome:</b> At the end of the course the student should be able to</p> <ol style="list-style-type: none"> <li>1. Classify rural social groups of India.</li> <li>2. Describe social values.</li> <li>3. Plan social change using agricultural based development programs.</li> <li>4. Assess farmers based on personality determinants.</li> <li>5. Plan to bring in a behavioral change.</li> <li>6. Bring in new extension activities suitable for the society.</li> </ol>					
<b>UNIT</b>		<b>SYLLABUS</b>			<b>PERIODS</b>
UNIT 1		Sociology and Rural sociology: Definition and scope, its significance in agriculture extension,			6
UNIT 2		Social Ecology: Rural society, Social Groups, Social Stratification, Culture concept, Social Institution, Social Change & Development.			8
UNIT 3		Educational psychology: Meaning & its importance in agriculture extension.			4
UNIT 4		Behavior: Cognitive, affective, psychomotor domain, Personality, Learning,			6
UNIT 5		Motivation, Theories of Motivation, Intelligence.			6

**Text Books**




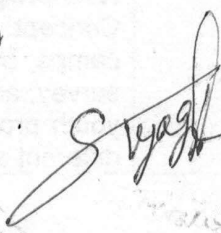
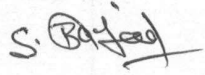

1. Chitambar, J.B. 2018. Introductory rural sociology. 3<sup>rd</sup> edition. New Age International Private Limited, India.
2. Anita. Woolfolk and VijShivani. 2017. Educational Psychology. 13<sup>th</sup> edition. Pearson Education, India.

**Reference Books**

1. Bettina B. Bock and Sally Shortall. 2016. Gender and Rural Globalization: International Perspectives on Gender and Rural Development. CABI Publishing, UK.
2. Ashok K. Singh. 2014. Extension Strategies for Agriculture and Rural Development. Daya Publishing House, India.

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Class			B.Sc. (Hons.) Agriculture		
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester		
Branch			Agriculture		
Paper Name			Human Values & Ethics (non gradial)		
Subject Code			BAGRI20S110		
L	T	P	Credit Total	1(1+0)	
1	0	0			
UNIT	SYLLABUS				PERIODS
UNIT 1	Values and Ethics-An Introduction.				2
UNIT 2	Goal and Mission of Life. Vision of Life. Principles and Philosophy.				4
UNIT 3	Self-Exploration, Self-Awareness, Self-Satisfaction, Decision Making.				2
UNIT 4	Motivation, Sensitivity, Success, Selfless Service, Case Study of Ethical Lives, Positive Spirit.				4
UNIT 5	Body, Mind and Soul, Attachment and Detachment. Spirituality Quotient, Examination.				3

Class			B.Sc. (Hons.) Agriculture		
Year/Semester			1 <sup>st</sup> Year, 1 <sup>st</sup> Semester		
Branch			Agriculture		
Paper Name			NSS/NCC/Physical Education & Yoga Practices		
Subject Code			BAGRI20S111		
L	T	P	Credit Total	2(0+2)	
0	0	2			

**Course Objectives:** The course is aimed at

1. Evoking social consciousness among students through various working together activities and constructive and creative social work.
2. Imparting knowledge on executing democratic leadership, programme development and self-employment.
3. Reducing the gap between the educated and uneducated and increase awareness and desire to help sections of society.

**Expected Course Outcome:** At the end of the course the student should be able to

1. Infer physical and mental discipline.
2. Practice the gained skills to stay physically fit.
3. Develop stamina and improve health and hygiene.
4. Improve inter personal skills and work well in a group.
5. Develop self-confidence.
6. Plan in achieving goals.

UNIT	SUBJECT	SYLLABUS	PERIODS
UNIT 1	NSS	<b>Orientation:</b> history, objectives, principles, symbol, badge; regular programs under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health.	4
	NCC	Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline. Drill- aim, general words of command, attention, stands at ease, stand easy and turning. Sizing, numbering, forming in three ranks, open and close order march and dressing.	
	Physical education & Yoga practices	Teaching of skills of Football – demonstration, practice of the skills, correction, and involvement in game situation (For girls teaching of Tennikoit). Teaching of different skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit).	
UNIT 2	NSS	<b>NSS programs and activities</b> Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analyzing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary.	3



	NCC	Saluting at the halt, getting on parade, dismissing and falling out. Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear. Turning on the march and wheeling. Saluting on the march. Marking time, forward march and halt.	
	Physical education & Yoga practices	Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation.	
UNIT 3	NSS	<b>Understanding youth</b> Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change.	2
	NCC	Changing step, formation of squad and squad drill. Command and control, organization, badges of rank, honours and awards. Nation Building- cultural heritage, religions, traditions and customs of India. National integration. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizen.	
	Physical education & Yoga practices	Teaching of skills of Basketball – demonstration, practice of the skills, involvement in game situation. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game.	
UNIT 4	NSS	<b>Community mobilization</b> Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilization involving youth-adult partnership.	5
	NCC	Leadership traits, types of leadership. Character/personality development. Civil defense organization, types of emergencies, firefighting, protection. Maintenance of essential services, disaster management, aid during development projects.	
	Physical education & Yoga practices	Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation.	
UNIT 5	NSS	<b>Social harmony and national integration</b> Indian history and culture, role of youth in nation building, conflict resolution and peace building.	3
	NCC	Basics of social service, weaker sections of society and their needs, NGO's and their contribution, contribution of youth towards social welfare and family	

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		planning.	
	Physical education & Yoga practices	Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation, Teaching of skills of Ball Badminton – involvement of all the skills in game situation with teaching of rule of the game.	
UNIT 6	NSS	<b>Volunteerism and shramdan</b> Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism.	4
	NCC	Structure and function of human body, diet and exercise, hygiene and sanitation. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health.	
	Physical education & Yoga practices	Teaching of some of Asanas – demonstration, practice, correction and practice. Teaching of some more of Asanas – demonstration, practice, correction and practice.	
UNIT 7	NSS	<b>Citizenship, constitution and human rights</b> Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information	5
	NCC	Adventure activities, Basic principles of ecology, environmental conservation, pollution and its control.	
	Physical education & Yoga practices	Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation. Teaching of skills of Table Tennis – involvement of all the skills in game situation with teaching of rule of the game.	
UNIT 8	NSS	<b>Family and society</b> Concept of family, community (PRIs and other community based organizations) and society.	4
	NCC	Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, self-defense.	
	Physical education & Yoga practices	Teaching – Meaning, Scope and importance of Physical Education. Teaching – Definition, Type of Tournaments. Teaching – Physical Fitness and Health Education. Construction and laying out of the track and field (*The girls will have Tennikoit and Throw Ball).	

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