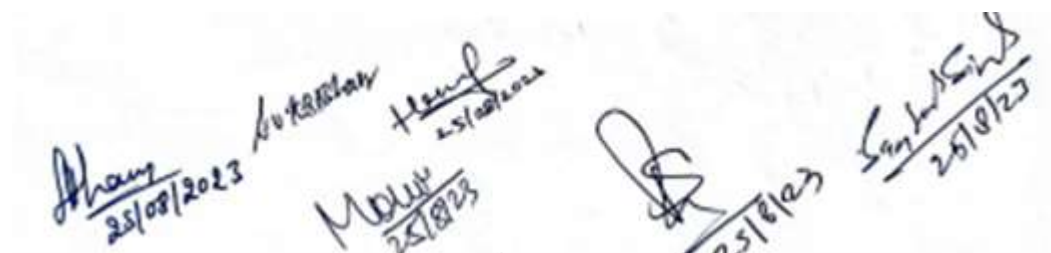


## List of New Course(s) Introduced

<b>Department: Zoology</b>		
<b>Programme Name: B.Sc.</b>		
<b>Academic Year : 2023-24</b>		
<b>List of New Course(s) Introduced</b>		
Sr. No.	Course Code	Name of the Course
01.	Major	<b>Animal diversity of non-chordates (Protista to Pseudocoelomate)</b>
02.	Minor	<b>Animal diversity of non-chordates (Protista to Pseudocoelomate)</b>
03.	Multid.	<b>Elementary Biology -I</b>
04.	SEC	<b>Aquaculture</b>
05.	VAC	<b>History of Indian science (Understanding India)</b>
06.	Major	<b>Animal diversity of non-chordates (Coelomates)</b>
07.	Minor	<b>Animal diversity of non-chordates (Coelomates)</b>
08.	Multid.	<b>Elementary Biology -II</b>
09.	SEC	<b>Apiculture</b>
10	VAC	<b>Food nutrition and health (Health &amp; wellness)</b>


  
 Approved by: *[Signature]* 25/08/2023
   
 Approved by: *[Signature]* 25/08/2023
   
 Approved by: *[Signature]* 25/08/23
   
 Approved by: *[Signature]* 25/8/23

## Minutes of Meetings (MoM) of Board of Studies (BoS)

**Academic Year : 2023-24**

**School : Life Sciences**

**Department : Zoology**

**Date and Time : 25/08/2023**

**Venue : Meeting room Zoology**

### DEPARTMENT OF ZOOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.) - 495009

#### Minutes of the Meeting of the Board of Studies (Zoology) held on 25.08.2023

A meeting of Board of Studies (Zoology) was held on 25.08.2023. Following matters were resolved in the meeting.

As per UGC guidelines and ordinance 97 of the Guru Ghasidas Vishwavidyalaya, four year degree program curriculum based on NEP 2020 was designed and approved. The courses introduced in this curriculum are all new and introduced first time as follows:

- Major courses (Core courses) will be offered to the students of Zoology department.
- Multidisciplinary courses, Minor course, AEC, SEC, Vocational and Value added courses were given to the pool of the university to offer to the students based on their choice.
- Vocational courses introduced in this curriculum will be offered to the students upon exiting the course after 2<sup>nd</sup> semester or 4<sup>th</sup> semester. For rest of the students these courses will be offered as an internship after 5<sup>th</sup> semester.

Following members were present in the meeting:

1. Prof. LVKS Bhaskar	Chairman, BOS
2. Prof. Poonam Sharma	Member (External)
3. Dr. Hasansab Nadaf	Member (Industry Expert)
4. Prof. Seema Rai	Member
5. Prof. Monika Bhaduria	Member
6. Dr. Rohit Seth	Member (on leave)
7. Dr. Santosh Singh	Member

Signature

*LVKS Bhaskar* 25/8/2023

*Poonam Sharma*  
25/08/2023

*Hasansab Nadaf*  
25/08/2023

*Seema Rai*  
25/08/23

*Monika Bhaduria*  
25/8/23

*Santosh Singh*  
25/8/23

## Scheme and Syllabus

### SCHEME AND SYLLABUS

#### FOR

- UG Certificate in Zoology: 1 year
- UG Diploma in Zoology: 2 years
- UG Degree in Zoology: 3 years
- UG (honours with research) in Zoology: 04 years
- UG (honours) in Zoology: 04 years

#### Under

National Education Policy 2020

Department of Zoology, School Of Life Sciences  
Guru Ghasidas Vishwavidyalaya, Bilaspur (CG)

2023-2024

*Handwritten signatures and dates:*  
A. Nayak 25/08/2023  
A. K. Nayak  
M. Nayak 25/8/23  
[Signature] 25/8/23  
S. Nayak 25/8/23

### Scheme and Syllabus for UG Courses in Zoology

**Department of Zoology, School of Life Sciences,  
Guru Ghasidas Vishwavidyalaya, Bilaspur**

Semester	Courses	Name of courses	Number of courses	Level	Credits	Total Credits
I	Major	Animal diversity of non chordates (Protista to Pseudocoelomate)	1	2	3	20
		Lab Course			1	
	Minor	Animal diversity of non chordates (Protista to Pseudocoelomate)	1	2	3	
		To be offer for students of other departments			1	
	Multid.	Elementary Biology -I	1	1	3	
		To be offer for student of other disciplines (except Natural and Physical Sciences)			1	
	SEC	Aquaculture	1	1	2	
		To be offer for student of Zoology/other departments at university level			1	
II	Major	History of Indian science (Understanding India)	2	1	2+2	20
		To be offer for student of Zoology/other departments at university level			2	
	AEC	Language	1	1	2	
		To be offered by Hindi/English Department for student of Zoology			1	
	Minor	Animal diversity of non chordates (Coelomates)	1	2	3	
		To be offer for student of other departments			1	
	Multid.	Elementary Biology -II	1	1	3	
		To be offer for student of other disciplines (except Natural and Physical Sciences)			1	
	SEC	Apiculture	1	1	2	
		To be offer for student of Zoology/other departments at university level			1	
	VAC	Food nutrition and health (Health & wellness)	2	1	2+2	
		To be offer for student of Zoology/other departments at university level			2	
	AEC	Language	1	1	2	
		To be offered by Hindi/English Department for student of Zoology			1	

The student must complete the 4 credit vocational course/internship during summer term to get UG Certificate if he wishes to exit the program after first 2 semesters.

Vocational Seminar	Lab Course			1	
	Applied zoology			4	
	Lab Course			1	
		-	-	2	

As per NEP-2020, Department of Zoology will offer minor course, multidisciplinary course, ability enhancement course (AEC), skill enhancement course (SEC), value added course (VAC) and vocational course to students of other departments.

Similarly, student of Department of Zoology will study these courses from the courses offered by other departments/ as per university decision.

Pool for minor course, multidisciplinary course, AEC, SEC, VAC and vocational course will be given by University.

Two AEC courses are compulsory in first 2 semesters (One in each semester).

Three SEC courses are compulsory in first 3 semesters (One in each semester).

Three Multidisciplinary courses are compulsory in first 3 semesters (One in each semester).

Four VAC courses are compulsory in first 2 semesters (Two in each semester).

One vocational course for certificate course and diploma courses, three vocational courses for 3/ 4 year degree are compulsory.

List of minor course, multidisciplinary course, AEC, SEC, VAC and vocational course offered by the department of zoology in university pool is as follows:

S No	Multidisciplinary course	VAC	Vocational courses
1	Brain and neurological disorders	History of Indian science (Understanding India)	Medical diagnostics
2	Vectors, diseases and management	Food nutrition and health (Health & wellness)	Ornamental fish culture
3	Fundamentals of public health	-----	Histological techniques and light microscopy
S No	SEC	Minor courses	
1	Aquaculture	Animal diversity of non chordates (Protista to Pseudocoelomate)	
2	Sericulture	Animal diversity of non chordates (Coelomates)	
3	Apiculture	Diversity of chordates	
4	-----	Physiology of regulatory life process	
5	-----	Physiology of basic life process	

Department may offer at least one paper in whole UG program on MOOC's platform and it will be compulsory to all students.


Summer and/or winter Internship: duration will be 2-4 weeks (minimum 90 working hours).


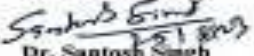
#### Abbreviations:

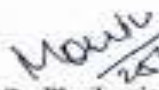
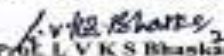
AEC= Ability enhancement course; SEC= Skill enhancement course; VAC= Value added course

(Subject to approval by the competent authority)

  
25/08/2023  
Prof. Poonam Sharda

  
25/08/2023  
Dr. Hansab Nadaf

  
25/08/2023  
Prof. Seema Rai  
  
25/08/2023  
Dr. Santosh Singh

  
25/08/2023  
Prof. Monika Bhattacharya  
  
25/08/2023  
Prof. L V K S Bhaskar

## Major Course:

Semester	Major Course	Course Title	Credits
I	1	Animal diversity of non chordates (Protista to Pseudocoelomate)	Theory: 03 Practical: 01

### About the course

The course is a walk for the Bachelor's entrant through the amazing diversity of living forms from simple to complex one. It enlightens how each group of organisms arose and how did they establish themselves in the environment with their special characteristics. It also deals with the differences and similarities between organisms on the basis of their morphology and anatomy which led to their grouping into taxa and clades.

### Course outcomes

After successfully completing this course, the students will be able to:

1. Develop understanding on the diversity of life with regard to protists to pseudocoelomata.
2. Group animals on the basis of their morphological characteristics/ structures.
3. Develop critical understanding how animals changed from a primitive cell to a collection of simple cells to form a complex body plan.
4. Examine the diversity and evolutionary history of a taxon through the construction of a basic phylogenetic/ cladistics tree.
5. Understand how morphological change due to change in environment helps drive evolution over a long period of time.

### Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	3	3	1	1
CO2	3	3	3	1	3	3	3	1	1
CO3	3	3	3	1	3	3	3	1	1
CO4	3	3	3	1	3	3	3		1
CO5	3	3	3	1	3	3	3		1

Weightage: 1- Slightly; 2- Moderately; 3- Strongly

## Theory

### Unit 1: Protista, Parazoa and Metazoa

**14 Lecture**

General characteristics and classification up to classes; Study of Euglena, Amoeba and Paramecium; Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica; Locomotion and Reproduction in Protista; Types of symmetry.

### Unit 2: Porifera

**08 Lecture**

General characteristics and classification up to classes; Type study of Sycon; Canal system and spicules in sponges.

### Unit 3: Cnidaria

10 Lecture

General characteristics and classification up to classes; Type study of Obelia; Polymorphism in Cnidaria; Corals and coral reefs.

### Unit 4: Platyhelminthes

10 Lecture

General characteristics and classification up to classes; Type study, larval forms and pathogenicity of Fasciola hepatica.

### Unit 5: Nematelminthes

8 Lecture

General characteristics and classification up to classes; Type study of Ascaris lumbricoides; Life cycle and pathogenicity of Wuchereria bancrofti; Parasitic adaptations in helminthes.

## Practical

1. Study of whole mount of *Euglena*, *Amoeba* and *Paramecium*
2. Binary fission and Conjugation in *Paramecium*
3. Examination of pond water collected from different places for diversity in Protista
4. Study of Sycon (T.S. and L.S.), *Hyalonema*, *Euplectella*, *Spongilla*
5. Study of *Obelia*, *Physalia*, *Millepora*, *Aurelia*, *Tubipora*, *Corallium*, *Alcyonium*, *Gorgonia*, *Metridium*, *Pennatula*, *Fungia*, *Meandrina*, *Madrepora*
6. Study of adult *Fasciola hepatica*, *Taenia solium* and their life cycles (Slides/microphotographs)
7. Study of adult *Ascaris lumbricoides* and its life stages (slides/micro-photographs)
8. To submit a Project Report on any related topic on life cycles/coral/ coral reefs.

### Suggested readings

1. Ruppert and Barnes (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
2. Barnes RSK, Calow P, Olive PJW, Golding DW and Spicer JI (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science.
3. Barrington EJW (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson

Handwritten signatures and dates of students, likely indicating completion of practical work or project reports. The signatures are written in blue ink on a white background. The dates are 25/08/2023. The signatures are: 1. A student with a signature that appears to be 'Aman' and the date '25/08/2023'. 2. A student with a signature that appears to be 'Mou' and the date '25/08/23'. 3. A student with a signature that appears to be 'Sanku' and the date '25/08/23'. 4. A student with a signature that appears to be 'Sanku' and the date '25/08/23'.

## Major Courses:

Semester	Major Course	Course Title	Credits
II	2	Animal diversity of non chordates (Coelomates)	Theory: 03 Practical: 01

### About the course

To discuss representative lineages of the protostome coelomates, including molluscs, annelids and arthropods. Students will know how are these groups of animals similar? What morphological and developmental patterns do they have in common? How do they differ?

They will know the importance of segmentation in the annelids. Students will come to know why the animals in Phylum Arthropods are thought to be so successful.

### Course Outcomes

1. Compare the two groups (Acoelomate and Coelomates) of animals with true coeloms.
2. Compare the differences in development seen in these two groups.
3. Compare the protostomes and deuterostomes
4. Explain the characteristics of arthropods that have made them successful.
5. Review the diversity of arthropod groups, including trends in arthropod evolution.

### Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	3	3	1	1
CO2	3	3	3	1	3	3	3	1	1
CO3	3	3	3	1	3	3	3	1	1
CO4	3	3	3	1	3	3	3		1
CO5	3	3	3	1	3	3	3		1

Weightage: 1- Slightly; 2- Moderately; 3- Strongly

## Theory

### Unit 1: Introduction to Coelomates and Annelida

**12 Lecture**

Evolution of coelom and metamerism. General characteristics and Classification up to classes; Type study of *Pheretima*; Metamerism in Annelids.

### Unit 2: Arthropoda

**15 Lecture**

General characteristics and Classification up to classes; Type study of *Periplaneta*; Vision and Respiration in Arthropoda; Larval forms in Arthropoda; Metamorphosis in Insects; Social life in bees.

### **Unit 3: Onychophora**

**03 Lecture**

General characteristics and Evolutionary significance with special reference to *Peripatus*.

### **Unit 4: Mollusca**

**12 Lecture**

General characteristics and Classification up to classes; Type study of *Pila*; Respiration in Mollusca; Torsion and detorsion in Gastropoda; Pearl formation in bivalves; Evolutionary significance of trochophore larva.

### **Unit 5: Echinodermata**

**10 Lecture**

General characteristics and Classification up to classes; Type study of *Asterias*; Water-vascular system in Asteroidea; Larval forms in Echinodermata; Affinities with Chordates.

## **Practical**

1. Study of following specimens:

**Annelids:** *Aphrodite*, *Nereis*, *Heteronereis*, *Sabella*, *Serpula*, *Chaetopterus*, *Pheretima*, *Hirudinaria* etc.

**Arthropods :** *Limulus*, *Palaemon*, *Daphnia*, *Balanus*, *Sacculina*, *Cancer*, *Eupagurus*, *Scolopendra*, *Julus*, *Bombyx*, *Periplaneta*, termites and honey bees etc.

**Onychophora:** *Peripatus*

**Molluscs:** *Chiton*, *Dentalium*, *Pila*, *Doris*, *Helix*, *Unio*, *Ostrea*, *Pinctada*, *Sepia*, *Octopus*, *Nautilus* etc.

**Echinoderms:** *Pentaceros/Asterias*, *Ophiura*, *Clypeaster*, *Echinus*, *Cucumaria* and *Antedon* etc.

2. Study of digestive system of earthworm
3. Study of septal nephridia and pharyngeal nephridia of earthworm
4. T. S. through pharynx, gizzard, and typhlosolar intestine of earthworm
5. Mount of mouth parts and dissection of digestive system of *Periplaneta*
6. Dissection of nervous system of *Periplaneta*
7. To submit a project report on any related topic to larval forms (crustacean, mollusc and echinoderm)

### **Suggested readings**

1. Ruppert and Barnes (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
2. Barnes RSK, Calow P, Olive PJW, Golding DW and Spicer JI (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science.
3. Barrington EJW (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson.
4. Nigam (1997). Biology of Chordates, S. Chand.
5. Kotpal, Modern text book of Zoology: Vertebrates, Rastogi Publication.

Handwritten signatures and dates of students, likely indicating completion of practical work or project submission. The signatures are written in blue ink on a white background. The dates are 25/08/2023. The signatures are: 1. A student with a signature that looks like 'Aman' and date '25/08/2023'. 2. A student with a signature that looks like 'Mouli' and date '25/08/23'. 3. A student with a signature that looks like 'Sanku' and date '25/08/23'. 4. A student with a signature that looks like 'Sanku' and date '25/08/23'.



### Multidisciplinary Course:

Semester	Multidisciplinary Course	Course Title	Credits
II	MDC-1	Elementary Biology -I	Theory: 03

#### About the course

The course provides a detailed insight into basic concepts of biomolecules and their importance; cellular structure and function. It also gives an account of genetics and evolutionary mechanism.

#### Course Outcomes

1. Understand the functioning of nucleus and extra nuclear organelles and understand the intricate cellular mechanisms involved.
2. Understand about the importance and scope of biomolecules. Understand the structure and biological significance of carbohydrates, proteins, lipids and nucleic acids.
3. Understand how DNA encodes genetic information and the function of mRNA and tRNA. Apply the principles of Mendelian inheritance.
4. Understand how developmental processes and gene functions within a particular tissue or organism can provide insight into functions during evolution.

#### Course Outcomes and their mapping with Programme Outcomes:

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	1	2	2	3	1	1
CO2	3	3	3	1	2	2	3	1	1
CO3	3	3	3	1	2	2	3	1	1
CO4	3	3	3	1	2	2	3	1	1

Weightage: 1- Slightly; 2- Moderately; 3- Strongly



## Theory

### Unit 1: Biomolecules

10 Lectures

Chemical foundation of life. Principle of bimolecular organization, configuration and conformation. Water as biological solvent. Structure and biological importance of carbohydrates, lipids, proteins and nucleic acids.

### Unit 2: Cell

10 Lectures

General structure of prokaryotes, bacteria, archaea and eukaryotes. Cell theory. Structure and functions of endoplasmic reticulum, ribosome, golgi apparatus, lysosome, peroxisomes, mitochondria, cytoskeleton, and nucleus. Cell cycle, cell division- mitosis and meiosis.

### Unit 3: Genetics

10 Lectures

Mendel's laws of inheritance; Exceptions to Mendelian Inheritance: Incomplete dominance, Codominance, Multiple allelism ; Concept of Gene; Elementary idea of gene expression and regulation; Mutation; Genetic disorders: chromosomal aneuploidy (Down, Turner and Klinefelter syndromes), chromosome translocation (Chronic Myeloid Leukemia) and deletion (cry of cat syndrome), gene mutation (sickle cell anemia).

### Unit 4: Evolutionary biology

10 Lectures

Origin of life on earth, Miller-Urey Experiment; Oparin-Haldane theory; Sources and types of variations; Theories of evolution: Lamarckism; Darwinism; Mutation theory, Modern synthetic theory; Natural selection (Example: Industrial melanism); Types of natural selection (Directional, Stabilizing, Disruptive); Isolating mechanisms and modes of speciation.

### Recommended readings

1. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006) Cell and Molecular Biology (8th edition) Lippincott Williams and Wilkins, Philadelphia.
3. Nelson, D.L. & Cox, M.M. (2017) Lehninger Principles of Biochemistry (7th edition) Worth.
4. Berg, J.M.; Tymoczko, J.L. and Stryer, L. (2012) Biochemistry (7th edition) Freeman.
5. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. (VIII edition) Wiley India.
6. Snustad, D.P. and Simmons, M.J. (2009). Principles of Genetics. (V edition) John Wiley and Sons Inc.
7. Klug, W.S., Cummings, M.R. and Spencer, C.A. (2012). Concepts of Genetics. (X edition) Benjamin Cummings.
8. Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007) Evolution. Cold Spring, Harbour Laboratory Press.
9. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett

Handwritten signatures and dates: 25/08/2023, 25/08/2023, 25/08/2023, 25/08/2023.



### Skill Enhancement Course (SEC):

Semester	SEC	Course Title	Credits
I	SEC-1	Aquaculture	Theory: 02 Practical: 01

#### About the course

This course will give the students an understanding of the principles of aquaculture, including production systems, water quality, nutrition, spawning, larval culture and culture methodologies with special reference to fish, and prawn. The course will include an opportunity to conduct hands-on activities related to culture and husbandry of animals

#### Course outcomes

After completing this course the learners will be able to

1. Understand the aquaculture systems
2. Understand pond management to increase fish production
3. Understand fish breeding and health management
4. Understand the environmental impacts on aquaculture

#### Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	2	1	2	-	-	1
CO2	3	1	3	1	1	2	1	1	2
CO3	3	3	2	2	2	3	1	1	2
CO4	3	1	3	1	2	3	-	1	2

Weightage: 1- Slightly; 2- Moderately; 3- Strongly



## Theory

### Unit 1: Freshwater aquaculture systems

08

#### Lecture

Aquaculture concept, Culture systems: Freshwater prawn culture, fish culture in paddy fields, Culture of Catfishes. Composite fish culture: Techniques of composite culture. Composite fish farming in India. Mariculture: Brackish water prawn culture. Mussel culture. Culture of aquatic weeds.

### Unit 2: Preparation and management of fish culture ponds

08

#### Lecture

Fish culture ponds. Pond management: Fish toxicants. Predatory and Weed fishes and their control. Aquatic insects and their control. Fish manures. Water quality. Culture: Pond culture. Monoculture. Monosex culture. Supplementary feeding. Harvesting: Fishing techniques, preservation & processing of fish.

### Unit 3: Fish breeding, Transportation and Pathology

09

#### Lecture

Fish breeding: Natural and artificial. Fish transportation: Methods for packaging and transport of fish. Transport of fish seed and Brood fish. Causes of mortality in transport. Use of chemicals in live fish transport: Anesthetic drugs. Antiseptics and Antibiotics. Fish diseases: Bacterial, fungal, protozoan and helminthes diseases. Non parasitic diseases.

### Unit 4: Technologies in Fisheries development

10

#### Lecture

Pearl culture: Introduction, Pearl producing mollusks, pearl formation, collection of oysters, Rearing of oysters, insertion of nucleus, harvesting of pearls, composition & quality of pearl. Recirculation technology. Geographic Information System (GIS) technology. Passive Acoustics in fisheries, Use of Information Communication Technology (ICT) in fishes: production aspects, marketing aspects.

## Practical

1. Estimation of dissolved oxygen
2. Determination of pH of water samples
3. Measuring turbidity using a secchi disk
4. Measuring salinity of water
5. Total alkalinity measurement in natural waters
6. Phytoplankton analysis
7. Measurement of productivity
8. Study of major carps
9. Study of prawn species
10. Study of pearl oysters

*Handwritten signatures and dates:*  
Aman 25/08/2023  
Mouli 25/08/23  
Sanku 25/08/23  
Sanku 25/08/23



### Value Added Courses:

Semester	VAC	Course Title	Credits
I	VAC-1	History of Indian science	Theory: 02

### About the course

The course provides an insight into the status of science in ancient India, its gradual development, innovations and the pioneers in the field of science, reputed research institutions in India and cutting edge research in science.

### Course outcomes

1. The students will feel pride to know the pioneer role of Indians in the development of astronomy, mathematics, engineering and medicine in the World history.
2. Develop understanding of various branches of science during different eras and analyze the role played by different Indian organizations in science.
3. Appraise the contribution of different Indian Scientists.
4. Students will be aware about the modern development of animals, agriculture and biological sciences in republic India.

### Course Outcomes and their mapping with Programme Outcomes

CO	PO						PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	2	1	3	2
CO2	3	3	2	3	2	2	2	3	3
CO3	3	2	2	2	2	1	2	3	2
CO4	3	2	1	2	1	2	2	2	1
CO5	-	-	-	-	-	-	-	-	-

Weightage: 1- Slightly; 2- Moderately; 3- Strongly



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## Theory

### Unit I: Science in ancient and medieval India

10

#### Lecture

History of development in astronomy, mathematics, engineering and medicine subjects in Ancient India, Influence of the Islamic world and Europe on developments in the fields of mathematics, chemistry, astronomy and medicine.

### Unit 2: Prominent Indian scientists

12

**Lecture** Eminent scholars in mathematics and astronomy: Baudhayana, Aryabhatta, Brahmgupta, Bhaskaracharya, Varahamihira, and Nagarjuna, Medical science of Ancient India (Ayurveda and Yoga): Susruta, Charak. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha, Vikram Sarabhai etc.

### Unit III: Indian science in before and after Independence

13

**Lecture** Introduction of different surveyors, zoologists and doctors as early scientist in Colonial India, Indian perception and adoption for new scientific knowledge in Modern India, Establishment of premier research organizations like CSIR, DRDO and ICAR and ICMR, IIT's, Establishment of Atomic Energy Commission, Launching of the space satellites, ISRO's accomplishments. Zoological survey of India.

### Recommended readings

1. Kuppuram, G. (1990) History of Science and Technology in India, South Asia Books.
2. Handa, O.C. (2014) Reflections on the history of Indian Science and Technology, Pentagon Press.
3. Basu, A. (2006) Chemical Science in Colonial India: The Science in Social History, K.P. Bagchi & Co.
4. Habib, I. (2016) A people's history of India 20: Technology in Medieval India, 5th Edition, Tulika Books.
5. Rahman, A. et al (1982) Science and Technology in Medieval India – A Bibliography of Source Materials in Sanskrit, Arabic and Persian, New Delhi: Indian National Science Academy.
6. Subbarayappa, B.V. & Sarma, K.V. (1985), Indian Astronomy — A Source Book, Bombay.
7. Srinivasan, S., Ranganathan, S. (2013) Minerals and Metals heritage of India, National Institute of Advanced Studies.
8. Srinivasiengar, C.N. (1967) The History of Ancient Indian Mathematics, World Press Private Ltd. Calcutta.
9. Bhardwaj, H.C. (2000) Metallurgy in Indian Archaeology. Tara Book Agency



### Value Added Courses:

Semester	VAC	Course Title	Credits
I	VAC-II	<b>Food, Nutrition and Health</b>	Theory: 02

#### About the course

The course covers the basic concepts of balanced diet for people of different ages besides focusing on the consequences of malnutrition and the deficiency diseases and the diseases caused due to poor hygiene.

#### Course outcomes

1. Imparting the basic concept of food and nutrition including the concept of a balanced diet, nutrient needs, and dietary patterns for various groups.
2. Understanding the biochemistry of major food components and the effects of their deficiency on health and evaluating the effectiveness of nutrition interventions when dealing with certain health problems.
3. Understanding the importance of lifestyle-related diseases, their causes, and prevention through dietary and lifestyle modifications.
4. Understand the importance of food and water safety and methods associated with the preservation of food and purification of contaminated water and make students aware of food, nutrition, and health needs.

#### Course Outcomes and their mapping with Programme Outcomes

COs	POs						PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	1	-	3	-	3	-	1
CO2	2	3	-	1	2	-	2	2	1
CO3	1	2	1	1	2	2	2	1	-
CO4	2	1	1	2	2	1	1	2	1

Weightage: 1- Slightly; 2- Moderately; 3- Strongly



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## Theory

### Unit 1: Nutrition and dietary nutrients 08

#### Lectures

Basic concept of Food: Components and nutrients. Concept of balanced diet, nutrient requirements and dietary pattern for different groups viz., adults, pregnant and nursing mothers, infants, school children, adolescents and elderly people.

### Unit 2: Macro nutrients and micronutrients 09

#### Lectures

Nutritional Biochemistry: Macronutrients. Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role. Micronutrients. Vitamins- Water-soluble and Fat-soluble vitamins- their sources and importance. Important minerals viz., Iron, Calcium, Phosphorus, Iodine, Selenium and Zinc: their biological functions.

### Unit 3: Malnutrition and nutrient deficiency diseases 10

#### Lectures

Definition and concept of health: Common nutritional deficiency diseases- Protein Malnutrition (e.g., Kwashiorkor and Marasmus), Vitamin A deficiency, Iron deficiency and Iodine deficiency disorders- their symptoms, treatment, prevention and government initiatives, if any. Life style dependent diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention. Social health problems- smoking, alcoholism, narcotics. Acquired Immuno Deficiency Syndrome (AIDS): causes, treatment and prevention. Other ailments viz., cold, cough, and fever, their causes and treatment.

### Unit 4: Diseases caused by microorganisms 10

#### Lectures

Food hygiene: Potable water- sources and methods of purification at domestic level. Food and Water-borne infections: Bacterial diseases: cholera, dysentery; typhoid fever, viral diseases: Hepatitis, Poliomyelitis etc., Protozoan diseases: amoebiasis, giardiasis; Parasitic diseases: taeniasis and ascariasis their transmission, causative agent, sources of infection, symptoms and prevention. Causes of food spoilage and its prevention.

#### Suggested readings

1. Mudambi, S.R. and Rajagopal, M.V. (2007). Fundamentals of Foods, Nutrition and Diet Therapy; Fifth Ed;; New Age International Publishers
2. Srilakshmi, B. (2002). Nutrition Science; New Age International (P) Ltd.
3. Srilakshmi, B. (2007). Food Science; Fourth Ed; New Age International (P) Ltd.
4. Swaminathan, M. (1986). Handbook of Foods and Nutrition; Fifth Ed; BAPPCO.
5. Bamji, M.S.; Rao, N.P. and Reddy, V. (2009). Text Book of Human Nutrition; Oxford & IBH Publishing Co. Pvt Ltd.



6. Wardlaw, G.M. and Hampl, J.S. (2007). Perspectives in Nutrition; Seventh Ed; McGraw Hill.
7. Lakra, P. and Singh M.D. (2008). Textbook of Nutrition and Health; First Ed; Academic Excellence.
8. Manay, M.S. and Shadaksharaswamy, M. (1998). Food-Facts and Principles; New Age International (P) Ltd.
9. Gibney, M.J. et al. (2004). Public Health Nutrition; Blackwell Publishing.

*Handwritten signatures and dates:*  
Ahamy 25/08/2023  
Gurukulam 25/08/2023  
Hampl 25/08/2023  
Mouli 25/08/23  
[Signature] 25/8/23  
Sankar Singh 25/8/23