

**FACULTY OF LIFE SCIENCES**

**SYLLABUS**

**of**

**Zoology**

**for**

**B. Sc. Medical (Semester II, IV, VI)**

**M. Sc. Zoology (Semester II, IV)**

**B.Sc. Biotechnology (Semester II)**

**M. Sc. Chemistry (Semester II)**

**Environmental Studies (Semester IV)**

**Drug Abuse (Semester II, IV)**

**Session: 2020-21**



**The Heritage Institution**  
**KANYA MAHA VIDYALAYA**  
**JALANDHAR**

**(Autonomous)**



**KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)**  
**SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE**  
**YEAR DEGREE PROGRAM**

**B. Sc. (Medical) Sem II**

**Session-2020-21**

Semester II										
Course Name	Program Name	Course Code		Course Type	Marks					Examination time (in Hours)
					Total	Paper	Ext.		CA	
							L	P		
Zoology	B.Sc. (Medical)	BSMM-2483	I	E	100	Ecology	30	-	20	3
			II			Biodiversity-II	30	-		3
			P			PRACTICAL –II (Related To Ecology & Biodiversity-II)	-	20		3

**B.Sc. Medical (Semester–II) (Session 2020-21)**

**ZOOLOGY**

**CELL BIOLOGY**

**Course Code: BSMM-2483 (I)**

**(THEORY)**

## **Course Outcomes**

After passing this course the student will be able to:

- CO1. Construct the food web.
- CO2. Familiarise with ecological adaptations.
- CO3. Know about the characteristics of population & biotic community.
- CO4. Know about the conservation of resources.

**B.Sc. Medical (Semester–II) (Session 2020-21)**

**ZOOLOGY**

**CELL BIOLOGY**

**Course Code: BSMM-2483 (I)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**Instructions for the Paper Setter**

Eight questions of equal marks (6 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

Ecology: Definition, Subdivisions and scope of ecology.

Ecosystem: Components, ecological energetics, food web, major ecosystems of the world.

Ecological factors: Temperature, light and soil as ecological factors.

**UNIT-II**

Nutrients: Biogeochemical cycles and concept of limiting factors.

Ecological Adaptations: Morphological, physiological and behavioural adaptations in animals in different habitats.

**UNIT-III**

Population: Characteristics and regulations of population. Inter and Intra Specific relationship: Competition, Predation, Parasitism, Commensalism and Mutualism.

Biotic community: Characteristics, ecological succession, ecological niche.

**UNIT-IV**

Natural resources: Renewable and nonrenewable natural resources and their conservations.

Environmental Issues: Causes, impact and control of environmental pollution.

**Suggested Readings:**

Anderwartha, H.G. and Birch, L. C. (1970), The distribution and abundance of animals, University of Chicago Press, Chicago London.

Beeby, A. (1992), Applying Ecology, Chapman and Hall Madras.

Begon, M., Harper J. L. and Townsend, C. R. (1995), Ecology – Individuals, populations and communities, Blackwell Science, Cambridge UK.

Brewer, R. (1994), The science of Ecology, Saunders College of Publishing, New York.

Chapman, J. L. and Resis, M. J. (1995), Ecology- Principles and applications, Cambridge University Press, Cambridge UK.

Kaeighs, S. C. (1974), Ecology with special references to animal and Man, Prentice Hall Inc.

Kormondy, E.J. (1975), Concept of Ecology, Englewood Cliffs, N.J. Prentice Hall Inc.

Kreb C.J. (1982), Ecology, Harper & Row, New York.

Putmann, R. J. and Wratten, S. D. ( 1984 ), Principles of Ecology, Crown Helm, London.

**B.Sc. Medical (Semester–II) (Session 2020-21)**

**ZOOLOGY**

**Biodiversity-II (Arthropoda to Hemichordata)**

**Course Code: BSMM-2483 (II)**

**(THEORY)**

**Course Outcomes:**

After passing this course the student will be able to:

CO1. Familiarize with the non-chordate world that surrounds us.

CO2. Appreciate the process of evolution (unicellular cells to complex, multicellular organisms).

CO3. Identify the invertebrates and classify them up to the class level with the basis of systematic.

CO4. Understand the basis of life processes in the non-chordates and recognize the economically important invertebrate fauna.

**B.Sc. Medical (Semester–II) (Session 2020-21)**

**ZOOLOGY**

**Biodiversity-II (Arthropoda to Hemichordata)**

**Course Code: BSMM-2483 (II)**

**(THEORY)**

Max. Time: 3 Hrs.

Max Marks: 30

**Instructions for the Paper Setter**

Eight questions of equal marks (6 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

Arthropoda: Type study-Periplaneta americana (Cockroach),

Social organizations in insects (Honey bee and Termite)

**UNIT-II**

Mollusca: Type study-Pila globosa, Tortion, Pearl formation

**UNIT-III**

Echinodermata: Type study - Asterias (Star fish), Study of Echinoderm larvae

**UNIT-IV**

Hemichordata: Type study - Balanoglossus (External characters only). Affinities of Hemichordates with Non-Chordates and Chordates

**Suggested Readings:**

Barnes, R.D.(1999), Invertebrate Zoology. W.B. Saunder, Philadelphia.



Dhami, P.S. & Dhami, J. K., Invertebrates, R. Chand & Co., New Delhi, 2001.

Barth, R. H. and Broshears, R. E (1982), The Invertebrate world. Holt Saunder, Japan.

Brusca, R. C. and Brusca, G. J. (2003), Invertebrates (2nd ed), Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.

Engemann, J. G. and Hegner, R. W. (1981), Invertebrate Zoology (3rd ed), Macmillan, New York.

Gardiner, M. S. (1972), The Biology of Invertebrates, McGraw Hill, New York.

Meglitsch, P. A. and Schran, F. R. (1991), Invertebrate Zoology (3rd ed), Oxford University Press, New York.

Pechenik, A. Jan. (2000), Biology of the invertebrates, (4th ed), McGraw Hill Book Co. Singapore.

**B.Sc. Medical (Semester–II) (Session 2020-21)**

**ZOOLOGY**

**Practical-II (Related to Ecology and Biodiversity-II)**

**Course Code: BSMM-2483 (P)**

**(PRACTICAL)**

**Course Outcomes:**

After passing this course the student will be able to:

- CO1. Know about the morphological, physiological & behavioural adaptations of different animals in different habitats.
- CO2. Familiarise with the classification & ecology of invertebrates.
- CO3. Identify different zoogeographical realms with fauna.
- CO4. Know about the different nest of birds.

**B.Sc. Medical (Semester–II) (Session 2020-21)**

**ZOOLOGY**

**Practical-II (Related to Ecology and Biodiversity-II)**

**Course Code: BSMM-2483 (P)**

**(PRACTICAL)**

**Time: 3hrs.**

**Marks: 20**

**Instructions for the Practical Examiners:**

Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar

**1. Classification up to orders with ecological notes and economic importance (if any) of the following animals :**

**Arthropoda :** Peripatus, Palaemon (prawn), Lobster, Cancer (crab), Sacculina, Eupagurus (hermit Crab), Lepas, Balanus, Cyclops, Daphnia, Lepisma, Periplaneta (cockroach), Schistocerca (locust), Poecilocus (ak grasshopper), Gryllus (cricket), Mantis (praying mantis), Cicada, Forficula (earwig), Dragonfly, Termite queen, Bug, Moth, Beetles, Polistes, (wasp), Apis (honey bee), Bombyx, Pediculus (body louse) Millipede and Centipede, Palamnaeus (scorpion), Aranea (spider) and Limulus (king Crab).

**Mollusca:** Anodonta, Mytilus, Ostrea, Cardium, Pholas, Solen (razor fish), Pecten, Haliotis, Patella, Aplysia, Doris, Limax, Loligo, Sepia, Octopus, Nautilus shell (Complete and T.S.), Chiton, Dentalium.

**Echinodermata :** Asterias, Echinus Ophiothrix, Antedon.

**Hemichordata :** Balanoglossus.

**2. Study of the following permanent stained preparations:**

Trachea and mouth parts of Insects

Radula and osphradium of Pila

T.S. Star fish (Arm).

**3. Demonstration of digestive and nervous systems of Periplaneta (cockroach) with the help of charts/models/videos.**

#### **4. Ecology:**

Study of animal adaptations with the help of specimens, charts and models.

Study of abiotic and biotic components of an ecosystem.

Study of different types of nests of birds.

Study and preparation of Zoogeographical charts.

#### **5. Assignment**

Note:- Some changes can be made in the practicals depending on the availability of material.

#### **Guidelines for conduct of practical Examination:-**

- |           |   |          |
|-----------|---|----------|
| <b>1.</b> | Identify and classify the specimens upto order. Write a note on their habit, habitat, special features and economic importance. | <b>4</b> |
| <b>2.</b> | Draw a well labelled sketch of the given system of the animal & explain it to the examiner.                                     | <b>3</b> |
| <b>3.</b> | Identify the slides/models and give two reasons for identification.   | <b>3</b> |
| <b>4.</b> | Identify the adaptive feature/nest.   | <b>2</b> |
| <b>5.</b> | Mark the distribution of animals of a realm on the map.   | <b>2</b> |
| <b>6.</b> | Assignment  | <b>2</b> |
| <b>7.</b> | Viva-voce & Practical file.   | <b>4</b> |

**KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)**  
**SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE**  
**YEAR DEGREE PROGRAM**

**B. Sc. (Medical) Sem IV**

**Session-2020-21**

Semester IV										
Course Name	Program Name	Course Code		Course Type	Marks					Examination time (in Hours)
					Total	Paper	Ext.		CA	
							L	P		
Zoology	B.Sc. (Medical)	BSMM-4483	I	E	100	Biochemistry	30	-	20	3
			II			Animal Physiology	30	-		3
			P			PRACTICAL –IV (Related To Biochemistry & Animal Physiology)	-	20		3

**B.Sc. Medical (Semester–IV) (Session 2020-21)**

**ZOOLOGY**

**BIOCHEMISTRY**

**Course Code: BSMM-4483 (I)**

**(THEORY)**

## **Course Outcome**

- CO-1. Familiar with various biochemical pathways.
- CO-2. Understand the chemical nature of life and life process.
- CO-3. Get an idea on structure and functioning of biologically important molecules.
- CO-4. Help to explore new developments in biochemistry.

**B.Sc. Medical (Semester–IV) (Session 2020-21)**

**ZOOLOGY**

**BIOCHEMISTRY**

**Course Code: BSMM-4483 (I)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**Instructions for the Paper Setter**

Eight questions of equal marks (6 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**Unit I**

**Biochemistry and its scope**

**Classification and functions of:**

Carbohydrates

Proteins

Lipids

Nucleic acids

**Unit II**

**Enzymes:**

Nature and their classification

Coenzymes.

**Lipid Metabolism:**

B-Oxidation of fatty acid

Ketosis

**Unit III**

**Carbohydrate Metabolism:**

Glycolysis

Tricarboxylic acid cycle

Hexose monophosphate shunt

Glycogenesis

Glycogenolysis

Gluconeogenesis

Oxidative Phosphorylation

## Unit IV

### **Protein Metabolism:**

Metabolism of amino acids  
Oxidative deamination  
Transamination  
Decarboxylation  
Hydrolysis of proteins  
Ornithine cycle

### **Suggested Reading Material:-**

1. Conn, E.E., Stump. P.K. Bruening, S. and Doi R.H. (2006), Outlines of Biochemistry (5th ed), John Wiley and Sons Inc., New York.
2. Fischer, J. and Arriold, J.R.P. (2001). Instant notes in Chemistry for Biologists, Viva Books Pvt. Ltd.
3. Harper, H.A. (2018): Harper's Biochemistry (31<sup>st</sup> ed).
4. Holde, K.E.V., Johnson, W.C. and Shing, P. (2005). Principles of Physical Biochemistry Prentice Hall, Inc., USA.
5. Lehninger, A (2017). Principles of Biochemistry, (7<sup>th</sup> ed).
6. Morris, H. Best, L.R., Pattison, S., Arerna, S. (2013). Introduction to General Organic Biochemistry, (11<sup>th</sup> ed), Wadsworth Group.
7. Robert, K., Murray, Mayes Daryl, K. Granner, Victor, W., Woodwell (1990), Harper's Biochemistry, 22nd Edition, Prentice Hall International Inc.
8. Sheehan, D (2013). Physical Biochemistry: Principles and Applications – John Wiley & Sons Ltd., England.
9. Stryer, L. (2019). Biochemistry (9<sup>th</sup> ed), San Francisco W.H. Freeman.



**B.Sc. Medical (Semester–IV) (Session 2020-21)**

**ZOOLOGY**

**Animal Physiology**

**Course Code: BSMM-4483 (II)**

**(THEORY)**

## **Course Outcomes**

- CO1. Understand the functioning of various systems.
- CO2. Apply the knowledge to lead a healthy life.
- CO3. Familiarize with various biochemical pathways.
- CO4. Compare the functioning of organ systems across the animal world.
- CO5. Learn more about human physiology and anatomy.

**B.Sc. Medical (Semester–IV) (Session 2020-21)**

**ZOOLOGY**

**Animal Physiology**

**Course Code: BSMM-4483 (II)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**Instructions for the Paper Setter**

Eight questions of equal marks (6 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**Units I**

**Digestion** : Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intra cellular digestion, enzymatic digestion and symbiotic digestion.

**Respiration** : Transport of O<sub>2</sub> and CO<sub>2</sub>, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride (-) shift, Haldane effect and control of breathing.

**Units II**

**Heart** : Origin and regulation of heart beat, cardiac cycle, electrocardiogram, cardiac output, Blood pressure and micro-circulation.

**Blood** : Composition and functions of blood and lymph. Blood clotting. Blood groups including Rh factor, haemopoiesis

**Excretion** : Urine formation and osmoregulation.

**Units III**

**Muscles** : Ultrastructure, chemical and physical basis of skeletal muscle contraction.

**Neural Integration:** Structure of neuron, resting membrane potential, Origin and propagation of impulse along the axon, synapse and myoneural function.

**Units IV**

**Physiology of Behavior:** Taxes and reflexes, instinctive and motivate learning and reasoning

**Endocrine** : Structure and physiology of thyroid, parathyroid, adrenal, hypothalamus, pituitary, pancreas and gonads.

**Suggested Reading Material:**

1. Guyton, and Hall, (2015), Text Book of Medical Physiology, 15th Edition, Elsevier.
2. Hill, R. W., Wyse, G. K. and Anderson, N. 3<sup>rd</sup> ed (2012), Animal physiology, Sinauer Associate, INC. Pub. Saunderland, Massachusettes, USA.
3. Hoar, W. S. (1984), General and Comparative Physiology, Prentice Hall of India Pvt. Limited, New Delhi, India.
4. Prosser, C.L. 4<sup>th</sup> Ed (1991), Comparative Animal Physiology, Satish Book Enterprise Books seller & Publishers, Agra.
5. Purves, W. K., Oriane, G. H., Space, H. C. and Salava, D. (2001), Life – The Science of Biology (6<sup>th</sup> ed), Sinauer Assoc. Inc., USA.
6. Randall, D., Burggren, K.L. and French, K. (2002), Eckert Animal Physiology: Mechanisms and Adaptations, W.H. Freeman and Company, New York.
7. Taneja, S.K. (1997), Biochemistry & Animal Physiology, Trueman Book Co.
8. Willmer, P. Stone, G. and Johnston, I (2000). Environmental Physiology of Animals, Blackwell Science.
9. Withers, P.C. (1992), Comparative Animal Physiology, Saunder College Publishing, New York.

**B.Sc. Medical (Semester–IV) (Session 2020-21)**

**ZOOLOGY**

**Practical -IV (Related to Biochemistry and Animal Physiology)**

**Course Code: BSMM-4483 (P)**

**(PRACTICAL)**

**Course Outcomes**

- CO-1. Learn clinical procedures for blood & urine analysis.
- CO-2. Develop skill in simple biochemical laboratory procedures.
- CO-3. Skill in observing and to some extent in analysing various Biological Data.

**B.Sc. Medical (Semester–IV) (Session 2020-21)**

**ZOOLOGY**

**Practical -IV (Related to Biochemistry and Animal Physiology)**

**Course Code: BSMM-4483 (P)**

**(PRACTICAL)**

**Time: 3 hrs.**

**Marks: 20**

**Instructions for the Practical Examiners:** Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar

1. Study of the skeleton of *Scoliodon*, *Rana*, *Varanus*, *Gallus* and *Oryctolagus*.
2. Identification of food stuffs: starch, glucose, proteins and fats in solution.
3. Demonstration of osmosis and diffusion.
4. Demonstrate the presence of amylase in saliva, denaturation by pH and temperature.
5. Determination of coagulation and bleeding time of blood in man/rat/rabbit.
6. Determination of blood groups of human blood sample.
7. Recording of blood pressure of man.
8. Analysis of urine for urea, chloride, glucose and uric acid.
9. Estimation of haemoglobin content.
10. Field study: Visit to a fossil Park/Lab/ Science City and submit a report /  
Familiarity with the local vertebrate fauna.

**Guidelines for conduct of Practical Examination:**

- |   |   |
|---|---|
| 1. Identify the given bones, make labeled sketches of their respective–views          | 8 |
| 2. Write down the steps and determine the constituents in the given sample.           | 3 |
| 3. Write the procedure and perform the given physiology experiment.                   | 3 |
| 4. Report on visit to a fossil park/lab/Science City/study of local vertebrate fauna. | 2 |
| 5. Viva-voce & Practical file.  | 4 |

**Note:- Some changes can be made in the practicals depending on the availability of material.**

**KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)**  
**SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE**  
**YEAR DEGREE PROGRAM**

**B. Sc. (Medical) Sem VI**

**Session-2020-21**

Semester VI										
Course Name	Program Name	Course Code		Course Type	Marks					Examination time (in Hours)
					Total	Paper	Ext.		CA	
							L	P		
Zoology	B.Sc. (Medical)	BSMM-6483	I	E	100	Medical Zoology	30	-	20	3
			II			Medical Laboratory Technology	30	-		3
			P			PRACTICAL-VI (Related To Medical Zoology & Medical Laboratory Technology)	-	20		3

**B.Sc. Medical (Semester–VI) (Session 2020-21)**

**ZOOLOGY**

**MEDICAL ZOOLOGY**

**Course Code: BSMM-6483 (I)**

**(THEORY)**

**Course Outcome**

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

- CO-1. To study and understand the scope and branches of Medical Zoology.
- CO-2. To aware the students for various parasites and diseases which spreads in human with the help of study of host-parasite relationship.
- CO-3. To increase awareness for the health in students.
- CO-4. Understand the various disease-causing vectors like Mosquitoes
- CO-5. To aware about the typhoid, cholera likes disease.
- CO-6. Provides basics knowledge about immune system and allows the student to create insight as how to improve their immune system and good health.
- CO-7. Types of immunity, antigens-antibodies and their properties
- CO-8. Complement system, MHC's and immune response.

**B.Sc. Medical (Semester–VI) (Session 2020-21)**

**ZOOLOGY**

**MEDICAL ZOOLOGY**

**Course Code: BSMM-6483 (I)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**Instructions for the Paper Setter**

Eight questions of equal marks (6 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

1. Introduction of Parasitology (various terminologies in use).
2. Brief introduction to pathogenic microbes, viruses, Rickettsiae, spirochaetes and bacteria.
3. Brief accounts of life history, mode of infection and pathogenicity of the following with reference to man; prophylaxis and treatment:
  - a) Pathogenic protozoa: *Entamoeba*, *Trypanosoma*, *Leishmania*, *Giardia*, *Trichomonas* and *Plasmodium*.
  - b) Pathogenic helminthes: *Fasciola*, *Schistosoma*, *Echinococcus*, *Ancylostoma*, *Trichinella*, *Wuchereria*, *Dracunculus* and *Oxyuris*.

**UNIT-II**

4. Life cycle and control measures of arthropod vectors of human disease: Malaria (*Anopheles stephensi*, *A. culicifacies*, Yellow fever, Dengue, Dengue haemorrhagic fever and Chikungunya. (*Aedes aegypti*, *A. albopictus*); Filariasis (*Culex pipiens fatigans*) *Mansonia* sp. Japanese Encephalitis (*C. tritaeniorhynchus*); Plague (*Yersinia pestis*) and Epidemic Typhus (*Pediculus spp.*).
5. Epidemic diseases, such as Typhoid, Cholera, Small pox; their occurrence and eradication programs.

**UNIT-III**

6. Brief introduction to human defence mechanisms.



7. Humoral and cell mediated immune response. Physical & chemical properties of antigens.  
Antibody structure and function of M, G, A, E and D immunoglobulins.

#### **UNIT-IV**

8. Antigen and antibody interactions-Serodiagnostic assays (Precipitation, agglutination immunodiffusion, ELISA,RIA)
9. Vaccines

#### **Suggested Readings:**

1. Baker,F.J.andSilverton,R.E.(1985)IntroductiontoMedicalLaboratoryTechnology,(6<sup>th</sup> ed), Butlerworth and Co.Ltd.
2. Chatterjee, K.D. (2019), Parasitology, Protozoology and Helminthology (13<sup>th</sup>ed).
3. Cheesborough, M. (1991), Medical Laboratory Technology for Tropical countries, Butlerworth and Co.,Ltd.
4. Garcia, L.S. (2001), Diagnostic Medical Parasitology, (4<sup>th</sup> ed), ASM Press Washington.
5. Kimball,J.W.(1987),Introduction of Immunology, (2<sup>nd</sup> ed),MacMillian Publishing Co.,NewYork.
6. Kuby, J. (2013), Immunology, 7<sup>th</sup> Edition W.H. Freeman & Co.,USA.
7. Roitt, I. (2017), Essential Immunology, 13<sup>th</sup> Edition, Blackwell Scientific Publications, Oxford.
8. Talib, V.H. (2019), Essential Laboratory Manual,2<sup>nd</sup> edition, Mehta Publishers, New Delhi.

**B.Sc. Medical (Semester–VI) (Session 2020-21)**  
**ZOOLOGY**  
**MEDICAL LABORATORY TECHNOLOGY**  
**Course Code: BSMM-6483 (II)**  
**(THEORY)**

## **Course Outcome**

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

- CO-1. Apply knowledge and **technical** skills associated with **medical lab technology**.
- CO-2. Perform routine **clinical laboratory** procedures within acceptable quality control parameters in haematology, chemistry, immunohematology, and microbiology.
- CO-3. Perform basic laboratory techniques on biological specimens.
- CO-4 Comply with safety regulations and universal precaution.
- CO-5. Apply basic scientific principles in learning new techniques and procedures.

**B.Sc. Medical (Semester–VI) (Session 2020-21)**

**ZOOLOGY**

**MEDICAL LABORATORY TECHNOLOGY**

**Course Code: BSMM-6483 (II)**

**(THEORY)**

**Max. Time: 3 Hrs.**

**Max Marks: 30**

**Instructions for the Paper Setter**

Eight questions of equal marks (6 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

Laboratory safety rules, hazards and precautions during sample collection and laboratory investigations.

Laboratory Techniques: Colorimetry, Microscopy, Autoclaving, Centrifugation and Spectrophotometry

**UNIT-II**

Collection, transportation and preservation of different clinical samples.

Haematology: collection of blood ( venous and capillary), anticoagulants (merits and demerits), Romanowsky's stains, total RBC count, erythrocyte sedimentation rate, TLC, DLC, platelet count.

**UNIT-III**

Bacteriology: sterilization (dry heat, moist heat, autoclave, filtration), disinfection, staining techniques,( gram stain, AFB stain,etc),culture media (defined and synthetic media & routine laboratory media), bacterial culture (aerobic and anaerobic) and antibiotic sensitivity.

**UNIT-IV**

Histopathology: Common fixatives and staining techniques.

Biochemistry: Principal/theory and significance of estimation of urea, sugar, cholesterol, creatinine, enzymes (transaminase, phosphatase, amylase and lipase), uric acid in blood, estimation of proteins, sugar, bile salts, ketone bodies in urine and liver function test.

### **Suggested Readings:**

1. Baker, F.J. and Silvertown, R.E. (1985) Introduction to Medical Laboratory Technology, (6<sup>th</sup> ed), Butlerworth and Co.Ltd.
2. Chatterjee, K.D.(2019), Parasitology, Protozoology and Helminthology (13<sup>th</sup>ed).
3. Cheesborough, M.(1991), Medical Laboratory Technology for Tropical countries,Butlerworth and Co.,Ltd.
4. Garcia, L.S.(2001), Diagnostic Medical Parasitology, (4<sup>th</sup> ed), ASM PressWashington.
5. Kimball,J.W.(1987),IntroductionofImmunology, (2<sup>nd</sup> ed),MacMillianPublishingCo.,NewYork.
6. Kuby, J.(2013), Immunology, 7<sup>th</sup> Edition W.H. Freeman & Co.,USA.
7. Roitt, I. (2017), Essential Immunology, 13<sup>th</sup> Edition, Blackwell Scientific Publications,Oxford.
8. Talib, V.H.(2019), Essential Laboratory Manual,2<sup>nd</sup> edition, Mehta Publishers, NewDelhi.

**B.Sc. Medical (Semester–VI) (Session 2020-21)**

**ZOOLOGY**

**PRACTICAL–V (Related to Medical Zoology & Medical Laboratory Technology)**

**Course Code: BSMM-6483 (P)**

**(PRACTICAL)**

**Course Outcomes**

- CO1: Apply knowledge and **technical** skills associated with **medical laboratory technology** for delivering quality **clinical** investigations support.
- CO2: Perform basic clinical laboratory procedures using appropriate laboratory techniques and instrumentation in accordance with current laboratory safety protocol
- CO3: Recognize the role of medical laboratory technology in the context of providing quality patient health care.
- CO4: Understanding of sterilization techniques
- CO5: Students will learn about various histotechniques, handling and processing of tissue specimens as well as staining procedures.
- CO6: Understanding of estimation of protein & sugar

**PRACTICAL–VI (Related to Medical Zoology & Medical Laboratory Technology)**

**Course Code: BSMM-6483 (P)**  
**(PRACTICAL)**

**Time: 3 hrs.**

**Max. Marks:20**

**Instructions for the Practical Examiners:** Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar

1. Demonstration of safety rules in laboratory like proper handling of patients, specimens and disposal of syringes, needles etc.
2. Demonstration of the use of autoclave, centrifuge and spectrophotometer.
3. Cleaning and sterilization of glass ware, using hot air oven, autoclave etc.
4. Physico-chemical examination of urine.
5. Preparation of thick and thin blood smear.
6. Counting of WBC, RBC and DLC.
7. Study of permanent slides and specimens of parasitic protozoans, helminthes and arthropods mentioned in the theory syllabus.
8. ESR and haematocrit.
9. Estimation of blood sugar, protein.
10. Demonstration of fixation, embedding, cutting of tissue sections, and their staining (routine haematoxylin and eosin).
11. Visit to a pathology Lab and preparation of report.

**Guidelines for conduct of Practical Examination:**

- |    |  |   |
|----|--|---|
| 1. | Write down the principle and working of the given equipment.   | 4 |
| 2. | Write down the procedure, precautions and perform the experiment for physico-chemical examination of urine/ haematology. | 4 |
| 3. | Identification, pathogenicity and host of parasitic organism.  | 4 |
| 4. | Estimation of blood sugar / protein in the given sample.   | 4 |
| 5. | Viva-voce and practical file   | 4 |

**(Note:-Some changes can be made in the practicals depending on the availability of material.)**

## Scheme of Studies and Examination

### Master of Science (Zoology) Session: 2020-21

Master of Science (Zoology) Semester II							
Course Code	Course Name	Course Type	Marks				Examination time (in Hours)
			Total	Ext.		CA	
				L	P		
MZOL-2481	Functional Organization of Animals – II	C	100	80	-	20	3
MZOL-2482	Applied Zoology-I (Invertebrates)	C	75	60	-	15	3
MZOL-2483	Evolution	C	50	40	-	10	3
MZOL-2334	Biostatistics	C	50	40	-	10	3
MZOS-2485	Seminar	C	50	-	40	10	3
MZOP-2486	Practical- III (Functional Organization of Animals –II)	C	50	-	40	10	3
MZOP-2487	Practical- IV (Evolution & Applied Zoology-I)	C	50	-	40	10	3
Total			425				

M. Sc. Zoology (Semester-II)  
**MZOL-2481: FUNCTIONAL ORGANIZATION OF ANIMALS – II**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Describe the specializations and evolution of skin.
- CO2 Describe the physiology of nervous system of human beings.
- CO3 Understand the physiology of sense organs, muscles and endocrine system.



# **Master of Science (Zoology) Semester–II**

**Session-** 2020-21

**Course code:** MZOL-2481

**Course Title:** Functional Organization of Animals –II

**Max. Marks-** 100

**Examination Time:** 3 hrs

**Theory –** 80

**CA-**20

## **Instructions for the Paper Setter:**

Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## **Unit - I**

### **Integumentary System**

Embryonic origin

General features of the Integument

Specializations of integument

Evolution of Skin

### **Muscular System**

Classification of Muscles, Structure of Skeletal Muscles and cardiac muscle, Tendons

Muscle mechanics Muscle Function Basis of Muscles contraction,

Muscle Fiber, Muscle organs and fibers

Bone-muscle lever systems

## **Unit-II**

### **Skeletal System**

Exo and Endo Skeleton in Invertebrates

Appendicular skeleton in vertebrates, Basic Components

Phylogeny of fishes and tetrapods

Evolution of the Appendicular system

Form and Function

Swimming

Terrestrial locomotion

## **Unit – III**

### **Integratory Systems**

Chemical coordination of body functions through neuro-secretion in non-chordates. Physiology of nerve net and giant fibre system.

Evolution of functional anatomy of brain.

### **Endocrine System**

Endocrine organs

Chemical coordination of body functions through hormones and neuro secretions

## **Unit-IV**

### **Sensory System**

General sensory organs

Free sensory receptors

Encapsulated sensory receptors

Associated sensory receptors

Mechanisms of perceiving stimuli

Special sensory organs (Mechano, Radiation, Chemo. and Electoreceptors)

Additional special sensory organ

**Suggested Reading Material.**

1. Barrington, E. U. W. (1967), Invertebrates Structure and Functions. Houghton Mifflin Co. Boston.
2. Barth, R. H. and Broshears, R. E (1982), The Invertebrate World. Holt Saunder, Japan.
3. Brusca, R. C. and Brusca, G. J. (2003), Invertebrates Second Edition. Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
4. Cooper, G. M. (2004), The Cell: A Molecular Approach, IIIrd edition, ASM Press, Washington, D.C.
5. Engemann, J. G. and Hegner, R. W. (1981), Invertebrate Zoology (3rd ed.) Macmillan, New York.
6. Gardiner, M. S. (1972), The Biology of Invertebrates, McGraw Hill, New York.
7. Hill, R. W., Wyse, G. K. and Anderson, N. (2004), Animal Physiology. Sinauer Associate, INC. Pub. Saunderland, Massachusettes, USA.
8. Hoar, W. S. (1984), General and Comparative Physiology. Prentice Hall of India Pvt. Limited, New Delhi, India.
9. Karp, G.(2005), Cell and Molecular Biology; Concepts and Experiments (4th ed.), Hoboken, John Willy and Sons, New York.
10. Meglitsch, P. A. and Schran, F. R. (1991), Invertebrate Zoology 3rd Ed. Oxford University Press, New York.
11. Pechenik, A. Jan. (2000), Biology of the Invertebrates, Fourth Edition, McGraw HillBook Co. Singapore.
12. Prosser, C.L. (1984), Comparative Animal Physiology. Satish Book Enterprise Books Seller & Publishers, Agra.
13. Purves, W. K., Oriane, G. H., Space, H. C. and Salava, D. (2001), Life – The Science of Biology 6th ed., Sinauer Assoc. Inc., USA.

14. Randall, D., Burggren, K.L. and French, K. (2002), *Eckert Animal Physiology: Mechanisms and Adaptations*. W.H. Freeman and Company, New York.
15. Ruppert, E. E. and Barnes, R. D. (2004), *Invertebrate Zoology* 7th ed. Saunders Publ., Philadelphia.
16. Willmer, P., Stone, G. and Johnston, I ( 2000 ). *Environmental Physiology of Animals*, Blackwell Science.
17. Withers, P.C. (1992), *Comparative Animal Physiology*. Saunder College Publishing New York

M. Sc. Zoology (Semester–II)  
MZOL-2482: APPLIED ZOOLOGY – I (INVERTEBRATES)

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Describe the Taxonomy, Morphological sex differences in larva and adult of beneficial and harmful insects.
- CO2 Understand the culture of mulberry plants, mulberry silk and silk gland.
- CO3 Know the culture methods of *B.mori* and *Apis*.
- CO4 Understand the diseases and pests of *B.mori* and plants.
- CO5 Study the quality of silk and marketing strategies of silk.
- CO6 Know the culture and harvesting methods of Lac.
- CO7 Describe the insect species and host plants of Lac.
- CO8 Know the culture methods of honeybee and prawn.

## **Master of Science (Zoology) Semester–II**

**Session- 2020-21**

**Course Code: MZOL-2482**

**Course Title: Applied Zoology- I (Invertebrates)**

**Max. Marks- 75**

**Examination Time: 3 hrs**

**Theory – 60**

**CA-15**

### **Instructions for the Paper Setter:**

Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

### **Unit – I**

#### **Arthropods (Important Species and their Economic Importance)**

Diplopods and chilopods

Arachnids (other than plant pests)

Insects (other than insect pests of crops, parasites of man and domestic animals)

As pollinators

In Biological pest management

As source of food

Venomous insects

#### **Apiculture**

History and Introduction

Honey bee and kinds

Social organization of colony and nests

Life Cycle

Relation between honeybees and plants

Flora for Apiculture

Honey composition, quality and importance

Bee keeping, selection, methods, precautions

Products of bee keeping

Bee enemies and diseases

## **Unit – II**

### **Lac culture**

Introduction

Lac insect:- species, Life cycle and Host plants

Lac composition, properties & importance

Cultivation and harvesting of Lac

Enemies of Lac insect and host plants

Lac industry in India

### **Sericulture**

Indian sericulture industry (distribution and prospects)

Silk moth species and their Life Cycle

Silk composition, kinds and uses

Mulberry cultivation

Rearing of silkworm

Treatment and disposal of cocoons

Silk reeling, twisting and weaving

Diseases & pests of silkworm

### **Unit – III**

#### **Crustaceans (Important species and their Economic Importance)**

Crab, lobsters, copepods.

#### **Prawn Culture**

Introduction to prawns

Prawn: species

Fresh water prawn farming and Marine Prawn farming

Methods of Prawn farming

Spoilage and its prevention

Processing and preservation of prawns

Future of prawn culture

#### **Molluscs (Economically important species)**

Eulamellibranchs

Gastropods

Cephalopods

#### **Pearl Culture**

Pearl culture, Historical background

Pearl oyster –species

Pearl formation, composition, quality and commercial value



Artificial Culturing of Pearls, synthetic pearls types and their manufacturing.

Methods of harvesting

Problems of pearl industry

## **Unit – IV**

### **Economic Importance of Protozoans**

Important Parasitic species, diseases caused, prevention and cure.

### **Annelids**

Leeches

Vermiculture; species of worms, conditions for efficient vermiculture (domestic and commercial level), Economics of Vermiculture

### **Helminthes**

Liver flukes

Cestodes/ tapeworms

Roundworms (Animal and plant parasitic Nematodes)

### **Echnioderms**

Sea cucumbers

Star Fish

### **Suggested Reading Material**

1. Bhamrah, H. S. & Juneja, K. (2001), An Introduction to Mollusca. Anmol Publications Pvt., Ltd. New Delhi.
2. Bhatnagar, R. K. and Palta, R. K. (2003), Earthworm ; Vermiculture and Vermicomposting , Kalyani Publishers India.
3. Carter, G. A. (2004) Beekeeping , Biotech Books, New Delhi.

4. Fenermore, P. G. and Prakash, A. (1992), Applied Entomology, Wiley Eastern Ltd. New Delhi.
5. Ghorai, N. (1995), Lac Culture in India. International Books and Periodicals, New Delhi.
6. Jhingran , V. G. (1991) Fish and Fisheries of India, Hindustan Publishing Company India.
7. Kumar, A. and Nigam, P. M. (1989), Economic and Applied Entomology EMKAY Publishing Co. New Delhi.
8. Mishra, R. C. (1995), Honey Bees & their Management in India. ICAR, New Delhi.
9. Mustafa, S. (1990) Applied and Industrial Zoology. Associated Publishing Company, New Delhi.
10. Shukla, G. S. & Upadhaya, V. B. (1991-92), Economic Zoology, Rastogi Publications, Meerut.
11. Sathe, T. V. and Jadhav, A. D. (2001) Sericulture and Pest Management, Daya Publishing House, New Delhi.
12. Shimizu, M. (1972) Handbook of Silkworm Rearing (Agricultural Techniques Manual- Fuji Publishing Co. Ltd , Tokyo, Japan.
13. Singh, S. (1962), Bee Keeping in India, I. C. A. R. Publications, New Delhi.
14. Sobti, R. C. (1992), Medical Zoology, Nagin Chand & Co. Jalandhar.
15. Srivastava, P. A. (1977), Economic Zoology, Commercial Publication Bureau, Kanpur.
16. Ullal, S.R. and Narsimhanna, M. N. (1981), A Handbook of Practical Sericulture, Central Silk Board, Bombay.
17. Venkatanarasaiah, P. (1992), Sericulture in India, Ashish Publishing House, New Delhi.

M. Sc. Zoology (Semester–II)  
**MZOL-2483: EVOLUTION**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Understand that many of the organisms that inhabit the Earth today are different from those that inhabited it in the past.
- CO2 Understand that the four propositions underlying Darwin's theory of evolution through natural selection are:
  - (1) More individuals are produced than can survive;
  - (2) There is therefore, a struggle for existence
  - (3) Individuals within a species show variation
  - (4) Offspring tend to inherit their parental characters
- CO3 Explain adaptation, providing examples from several different fields of biology.
- CO4 Explain how the molecular record provides evidence for evolution.
- CO5 Understand the Human origin and evolution.

# **Master of Science (Zoology) Semester–II**

**Session- 2020-21**

**Course Code: MZOL-2483**

**Course Title: Evolution**

**Max. Marks- 50**

**Examination Time: 3 hrs**

**Theory – 40**

**CA-10**

## **Instructions for the Paper Setter:**

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## **Unit – I**

### **Origin of Life**

Origin of Micro molecules

Origin of Macro molecules

Origin of Viruses

Origin of Prokaryotes

Origin of Unicellular eukaryotes and multicellularity

### **Organic Evolution**

Theories

Evidences

Separation of kingdoms

## **Unit –II**

## **Variations**

Types of variations

Causes of variations

Mutation rates and directions

## **Natural Selection:**

Types of selection

Selection forces

Experimental demonstration of Natural selection

Industrial melanism and polymorphism

Sexual selection

Selection and non adaptive characters

## **Unit-III**

### **Speciation**

Isolation and its types

Gradual and abrupt

Origin of higher categories

### **Distribution of Species**

Island, Ocean and Continental distribution

Theories of continental drift

### **Extinction**

Kinds of extinction

Causes of extinction

Major extinctions

## **Unit-IV**

### **Quantative and Molecular Aspects of Evolution**

Hardy- Weinberg law

Selection pressure

Mutation pressure

Genetic drift

Migration

Meiotic drive

Brief account of:

Evolution of genome in viruses, prokaryotes and eukaryotes

Evolution of sexual reproduction,

Molecular clocks

Future Course of Evolution

### **Suggested Reading Material**

1. Avers, C. J.(1989). Evolution Process and Pattern in Evolution Oxford University, Press, New York, Oxfor.
2. Ayala, F. J. and Valentine J. W. (1979). Evolving the theory and Process of Organic Evolution, Benjamin Cumming.
3. Brookfield, A. P. (1986). Modern aspects of Evolution. Hutchinson London, Melbourne.
4. Gallow, P. (1983). Evolutionary principles. Chapman and Hall.
5. Freeman, S. and Herron, Jon C. (2007). Evolutionary analysis Pearson Prentice Hall, New Jersey.
6. Futuyma, D. J. (1998), Evolutionary Biology, Sinauer Assoc. Inc. Pub. USA.
7. Meglitsch, P. A. (1991), Invertebrate Zoology (3rd edition), Oxford University Press.

8. Minkoff, E. C. (1983), *Evolutionary Biology*, Addison Wesley Pub. Co., London.
9. Wen-Hsiung Li (1997), *Molecular Evolution*, Sinauer associates Inc. Pub. USA.

M. Sc. Zoology (Semester–II)  
**MZOP-2486: FUNCTIONAL ORGANIZATIONS OF ANIMALS-II (PRACTICAL)**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Understand the comparative anatomy through demonstration.
- CO2 Understand the comparative physiology of sense organs, muscles, endocrine system through ICT based videos, presentations and charts



# **Master of Science (Zoology) Semester–II**

**Session- 2020-21**

**Course Code- MZOP-2486**

**Course Title- PRACTICAL –III (Functional Organizations of Animals-II)**

**Max. Marks- 50**

**Examination Time: 3hrs**

**Practical - 40**

**CA – 10**

## **1. Study of permanent slides:**

- Skin of fish, frog, lizard, bird and mammal.
- Setae of earthworm
- Spicules of Sponges and Herdmania.
- Internal ear of fish
- Tentorium of grasshopper
- Muscle fibers, cartilage and bone.
- Endocrine glands of vertebrates.

## **2. Appendicular skeleton:**

## **3. Study the following with the help of charts/models/videos/permanent slides:**

- Appendages of Prawn
- Wing venation, coupling and types of wings of insects.
- Comparative anatomy of nervous system in Earthworm, Cockroach, Pila, Sepia, Fishes, Bird and Mammal.
- Eye muscles of fish/mammal
- Modification of antennae of arthropods

**Note: The above mentioned practicals are in accordance with the guidelines of UGC. Practical involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to availability of resources.**

M. Sc. Zoology (Semester–II)  
**MZOP-2487: EVOLUTION AND APPLIED ZOOLOGY-I (PRACTICAL)**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Know the Animals of evolutionary importance, fossils, analogous and homologous organs, Mimicry and Colouration.
- CO2 Acquaint with the applied aspects of Zoology i.e. sericulture, lac culture, apiculture, dairy farming, poultry etc.
- CO3 Understand the propositions underlying theories of evolution through demonstrations.
  - (1) More individuals are produced than can survive;
  - (2) There is therefore, a struggle for existence
  - (3) Individuals within a species show variation
  - (4) Offspring tend to inherit their parental characters

## **Master of Science (Zoology) Semester–II**

**Session-2020-21**

**Course Code: MZOP-2487**

**Course Code: PRACTICAL IV (Evolution and Applied Zoology-I)**

**Max. Marks- 50**

**Examination Time: 3hrs**

**Practical - 40**

**CA – 10**

- Calculations for regression, correlation and variance of gene frequency and genetic equilibrium (taking pea pods).
- Examination of the principle of natural selection as a process related to evolution in a population (using coloured marbles /beads).
- Comparison of skeletons for listing evolutionary trends.
- Comparison of molluscan shells to depict polyphyletic origin.
- Comparison of homologous and analogous structures (e.g. insect antenna, legs, limbs of vertebrate etc.).
- Demonstration of kinds of mimicry in various groups of animals.
- Mapping of geographic distribution of some birds, insects, fish etc.
- Study of various evolutionary phenomenon using slides / photographs.
- Study of fossils.
- Preparation of Phylogenetic tree using some Priory weight characters with the help of 8 – 10 animals from various categories.
- Visit to apiary/vermicomposting unit/ sericulture unit/ Prawn Farm and preparation of report.

**Note: The above mentioned practicals are in accordance with the guidelines of UGC. Practical involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to availability of resources.**

M. Sc. Zoology (Semester–II)  
**MZOS-2485: SEMINAR**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Express their innovative ideas & creativity on any scientific phenomenon & develop interest in research aptitude.
- CO2 Build up confidence for public speaking.
- CO3 Improve their presentation skills.

**Master of Science Zoology (Semester–II)**

**Session-** 2020-21

**Course Code:** MZOS-2485

**Course Title:** Seminar

**Max. Marks- 50**

**Examination Time: 3 hrs**

**Seminar – 40**

**CA-10**

**Instructions for the Paper Setters:**

The students are required to present a seminar on a topic of relevance and importance from the subject Zoology. The seminar carries 50 marks (10 for material, 15 for presentation, 5 for discussion and 10 for the seminar based paper at the end of the semester).

**Kanya Maha Vidyalaya, Jalandhar (Autonomous)**

**SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE  
PROGRAMMER**

**Master of Science (Zoology) Semester-IV**

Session-2020-21

Master of Science (Zoology) Semester IV							
Paper No.	Course Title	Course Type	Marks				Examination time  (in Hours)
			Total	Ext.		CA	
				L	P		
MZOL-4481	Animal Behavior and Wildlife Conservation	C	100	80	-	20	3
MZOL-4482	Animal Genetics & Biotechnology	C	100	80	-	20	3
MZOL-4483	Concepts of Immunology	C	100	80	-	20	3
MZOL-4484	Biosystematics	C	50	40	-	10	3
MZOP-4485	Practical –VII (Animal Behaviour and Wildlife Conversation)	C	50	-	40	10	3
MZOP-4486	Practical - VIII (Genetics & Biosystematics)	C	50	-	40	10	3
MZOD-4487	Project Report	C	-	-	-	-	-
	Total	C	450				





**MZOL-4481: ANIMAL BEHAVIOUR AND WILDLIFE CONSERVATION**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Demonstrate knowledge of key concepts in animal behaviour
- CO2 Understanding and identify behaviors in a variety of taxa
- CO3 Designing and implementing experiments to test hypothesis relating to animal behaviour
- CO4 Completely discuss the evolutionary origins of various behaviors
- CO5 Understand the proximate controls of behavior including the role of hormones, the animal's genotype and the animal's environment in the development of behavior
- CO6 Adaptive significance of behaviour, emphasizing animal communication, social behavior, territoriality, sexual selection and mating systems
- CO7 Demonstrate skills in the collection of behavioural data in the field.
- CO8 Understanding and awareness for wildlife conservation
- CO9 Knowledge of conservation of threatened animal species

# **Master of Science (Zoology) Semester–IV**

**Session-2020-21**

**Course Code: MZOL-4481**

**Course Title: Animal Behaviour and Wildlife Conservation**

**Time: 3hrs**

**Max. Marks: 100**

**Theory: 80**

**CA: 20**

## **Instructions for the Paper Setter:**

Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## **Unit–I**

### **Introduction**

Ethology as a branch of biology

Animal Psychology – classification of behavioural patterns, analysis of behaviour (ethogram)

### **Neural and Hormonal Control of Behaviour**

Genetic and environmental components in the development of behaviour

### **Communication:**

Chemical, Visual tactile and Audio communication

Functions of communication

Song specificity in birds

Evolution of language (primates)

Host-parasite relations

## **Unit–II**

## **Social Behaviour**

Aggregations-schooling in fishes, flocking in birds, herding in mammals, Advantages and disadvantages of living in groups

Group selection, kin selection, altruism, reciprocal altruism, inclusive fitness Social organization in insects and primates

## **Reproductive Behaviour**

Evolution of sex.

Mating and Courtship behaviour

Sperm competition

Sexual selection and Parental care

## **Learning and Memory**

Conditioning, Habituation, Associative learning, Reasoning and Cognitive skills

## **Unit–III**

### **Wild life in India**

Wild life as a resource and its value

Causes of depletion of wildlife

Wild life ecology, ecological sub regions, distribution of wildlife in India  
Methods of studying wildlife and census of wildlife National and state animals of India

Names, Organization and management of Wildlife sanctuaries, National parks and Biosphere reserves

### **Wildlife conservation measures**

Role of Zoos, parks and sanctuaries for conservation of some wild animals

Laws, legislation and statutory bodies for protecting wildlife

Red data book, endangered, vulnerable, rare, threatened and intermediate species

Measures for Wildlife conservation

## **Unit–IV**

### **Status of Wildlife in Punjab**

### **Special projects for Endangered and Threatened Species and concerns**

Project Tiger

Project Hangul

Project Rhino

Project Elephant

Gir Lion Sanctuary Project

Project Great Indian Bustard

Crocodile breeding Project

Ecology & Conservation of the Himalayan Musk deer and the Manipur Brow antlered deer

### **Suggested Reading Material:**

1. Aggarwal,. (2000), Biodiversity.
2. Aggarwal,. ( 2000 ), Wildlife of India.
3. Alcock, J. (1998), Animal behaviour, An evolutionary approach Sinauer Assoc., Sunderland, Mass, USA.
4. Ali, S. (1971), The Books of Indian Birds, Bombay Natural History Society, Bombay.
5. Burton, L. D. (2003), Fish and Wildlife: Principles of Zoology and Ecology. Delmar Thompson Learning Pb.
6. Dasmann, R. F., ( 1982 ), Wildlife Biology, Wiley Eastern, New Delhi.
7. Drickamer, L. C. and Vessey, S. H. (1986), Animal Behaviour - Concepts, Processes and Methods. (2<sup>nd</sup> ed.), Wordsworth Publ. Co., California.
8. Fulbright, Timothy, E. and Hewitt, D. G. (2008). Wildlife Science: Linking Ecological Theory and Management Applications. CRC Press, Taylor and Francis : BocaRaton, F L.
9. Giles, R. H. (1984), Wildlife Management Techniques, Natraj Publishers, Dehradun.
10. Gopal, R. ( 1992), Fundamental of Wildlife management Justice Home Allahabad.
11. Goodenough, J., McGurie and Wallace, R. A. (2001), Perspective on animal behaviour. John Wiley & Sons, Inc. New York.
12. Hosetti, B. B. ( 1997 ), Concepts in Wildlife Management, Chawla Press, Delhi.
13. Huntingford F. ( 1984 ), The study of animal Behaviour, Chapman and Hall, London.
14. Manning, A. and Dawkins, M. S. ( 1992 & 1998 ), An Introduction to Animal Behaviour , 4<sup>th</sup> ed. ( Cambridge low price editions ). Cambridge University Press, Cambridge.

15. Manning, A. (1979), An Introduction to Animal Behaviour, 3<sup>rd</sup> Edition . The English Language Book Society and Edward Arnold Publishers Ltd.
16. McFarland, D. (1985 & 1999), Animal Behaviour. Pitman Publishing Ltd. London.
17. Majupuria T. C. (1990), Wildlife Wealth of India (Resources and Management), ISBN, Tecpress Services, Thailand.
18. Moulton, M. P. and Sanderson, J. (1997), Wildlife issues in a changing world. St. Luice Press Florida.
19. Negi, S. S. ( 1995 ), Hand Book of National Park, Sanctuaries and Biosphere Reservoirs in India, Indus publishing Co., New Delhi
20. Prater, S. H. (1980), The Book of Indian Animals, Bombay Natural History Society, Bombay.
21. Saharia, V. P. (1982), Wildlife in India, Natraj Publisher, Dehradun.
22. Samways, M. J. (1994), Insect Conservation Biology, Chapman and Hall, New York.
23. Sharma, B. D. (1994), High Altitude Wildlife of India, Oxford IBH, New Delhi.
24. Sharma, B.D. ( 1999 ), Indian Wild Life Resources Ecology and Development . Daya Publishing House, Delhi.
25. Sharma, B.D. (2002 ), Man environment and wildlife animal. IBH Publishing Co., Pvt . Ltd. New Delhi.
26. Teague, R. D. ( 1987), A manual of Wildlife Conservation, Natraj Publishers, Dehradun.
27. Tikadar, B. K. ( 1988 ), Threatened Animals of India, Publications of Zoological Survey of India, Calcutta.
28. Tirvedi, P.R. and Singh, U. K. ( 1996 ), Environmental Laws of Wildlife.

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 describe the basic principles and techniques in genetic manipulation and genetic engineering.
- CO2 describe gene transfer technologies for animals and animal cell lines.
- CO3 Learn different techniques for animal research
- CO4 To understand genetic material, processes related to hereditary, problems associated with genes
- CO5 have Knowledge of microorganism

# **Master of Science (Zoology) Semester–IV**

**Session-2020-21**

**Course Code: MZOL-4482**

**Course Title: Animal Genetics & Biotechnology**

**Time: 3 hrs.**

**Max. Marks: 100**

**Theory: 80**

**CA: 20**

## **Instructions for the Paper Setter:**

Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## **Unit–I**

### **DNA- The genetic material:**

DNA: Structure, Properties, Replication and packaging into chromosomes  
Prokaryote nucleoid structure

Chemical composition of eukaryote chromosomes

Euchromatin, Heterochromatin and banding pattern

Repetitive DNA and sequence organization

Protein synthesis

Linkage, Crossing over and Chromosome Mapping

Cytological basis of crossing over

Two factor crosses, Three factor crosses and interference

Somatic Cell hybridization.

## **Unit–II**

### **Mutations**

Introduction and classification of mutation



Molecular basis of mutation

Radiation and chemical induced mutation

Correlation between mutagenicity and carcinogenicity

Mutation Frequency

Practical applications of Mutations

### **Gene Concepts**

Classical versus molecular concepts of Gene

Complementation test for functional allelism

Regulation of gene expression in prokaryotes and Eukaryotes

## **Unit–III**

### **Bacterial Genetics**

Transformation, transduction and conjugation.

F mediated sex-duction.

Mechanism of recombination in bacteria.

Plasmid, Episome, IS elements and Transposons.

### **Genetics of Viruses**

Organisation and expression of bacteriophage genomes

Structure and infection cycles of Viruses of eukaryotes

Animal viruses and cancer

## **Unit–IV**

### **Recombinant DNA technology**

Gene cloning and Sequencing.

Restriction endonuclease.

Vectors.

cDNA cloning.

Identification of Specific clone with a specific probe.

Techniques: Southern, Northern, Western Blotting, PAGE, PCR, DNA finger printing, DNA foot printing.

In situ hybridization, RFLP.

Practical applications of gene cloning.

### **Extranuclear inheritanc**

Criteria for extranuclear inheritance

DNA and drug resistance.

Mitochondrial DNA and genetic diseases.

Mechanism of Sex determination, Sex differentiation, Sex linked inheritance.

### **Books Recommended:**

1. Ayala, F.J. & Kiger, Jr. J.A. (1980) Modern Genetics. The Benjamin Cummings Publishing Co. Inc.
2. Brown T.A. (1992). Genetics- A Molecular Approach, 2<sup>nd</sup> ed. Van Nostrand Rainhold (international).
3. De-Robertis, F.D.P. and De-Robertis Jr., E.M.E. (1987). Essentials of Cell and Molecular Biology, Saunders, Philadelphia.
4. De-Robertis, F.D.P. and De-Robertis Jr., E.M.E. (1987). Cell and Molecular Biology, Saunders, Philadelphia.
5. Freifelder, D. & Malacinski. G.M. (1993) : Essentials of Molecular Biology, Jones & Bartlett Publishers, Boston.
6. Gardener, E.J., Simmons, M.T.J. & Sunstad, D.P. (1999) : Principles of Genetics, 8th ed. John Wiley & Sons, New York.
7. Miglani, G.S. (2000). Basic Genetics Narosa Publishing House, New Delhi.
8. Sambrook, J., Fritisch, E.F. and Maniatis, J. (1989). Molecular Cloning. A lab manual.
9. Winter, P.C., Hickey, G.I. and Fletcher, H.L. (1999) Instant notes in Genetics. New Delhi
10. Satson, J.D. et. al. (1987) : Molecular Biology of Gene, 4th ed. Vol. I & II. The Benjamin / Cummings Publishing Co., Inc.
11. Weaver, R.F. and Hedrick, P.W. (1992). Genetics Wm. C. Brown Publishers Dubuque.
12. Zubay. U.G. (1987), Genetics. The Cummings Publishing Co., Inc.

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Describe the basic mechanisms, distinctions and functional interplay of innate and adaptive immunity
- CO2 Define the cellular/molecular pathways of humoral/cell-mediated adaptive responses
- CO3 Define the basic mechanisms that regulate immune responses and maintain tolerance
- CO4 Explain the cellular and molecular aspects of lymphocyte activation, homeostasis, differentiation, and memory.
- CO5 Understand the molecular basis of complex, cellular processes involved in inflammation and immunity, in states of health and disease
- CO6 Describe basic and state-of-the-art experimental methods and technologies
- CO7 Integrate knowledge of each subsystem to see their contribution to the functioning of higher-level systems in health and disease

# **Master of Science (Zoology) Semester–IV**

**Session-2020-21**

**Course Code: MZOL-4483**

**Course Title: Concepts of Immunology**

**Time: 3 hrs.**

**Max. Marks: 100**

**Theory: 80**

**CA: 20**

## **Instructions for the Paper Setter:**

Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## **Unit–I**

### **Introduction**

Types of immunity-innate and adaptive. Features of immune response-memory, specificity and recognition of self and non-self. Terminology and approaches to the study of immune system. Immunity to viruses bacteria, fungi and tumours.

### **Cells and Organs of the immune system**

Lymphoid cells, heterogeneity of lymphoid cells, T-cells, B-cells, Null cells, Monocytes, polymorphs; primary and secondary lymphoid organs-thymus, Bursa of fabricius spleen, lymph nodes, lymphatic system, Mucosa Associated Lymphoid Tissue (MALT), Lymphocytes traffic.

## **Unit–II**

### **Humoral Immunity:**

Antigen-antibody interactions, affinity and avidity, high and low affinity anti-bodies. Immunoglobulins, classes and structure. Molecular mechanism of generation of antibody diversity. Complement fixing antibodies and complement cascade.

## **Cell Mediated Immunity**

T-cell subset and surface markers. T-dependent and T-independent antigens, recognition of antigens by T-cells and role of MHC, structure of

T – cell antigen receptors.

## **Unit–III**

### **Immunological Disorders**

Types of Hypersensitivity reactions, autoimmune disorders, their underlying molecular mechanism, aetiology, diagnostic, prognostic and prophylactic aspects, Immunodeficiency disorders, Aids

### **Immuno biotechnology:**

### **Hybridoma Technology**

Immunization of animals, isolation of stimulated spleen cells, Myeloma cell lines used as fusion partners. Fusion methods, Detection and applications of monoclonal antibodies, Vaccines: conventional vaccines, Viral vaccines, Bacterial vaccines, peptide vaccines, genetically engineered vaccines, Production and application of lymphokines.

## **Unit–IV**

### **Immunodiagnostic Procedures**

Various types of Immunodiffusion and immunoelectrophoretic procedures, Immunoblot, ELISA, RIA, Agglutination of pathogenic bacteria, haemagglutination and inhibition.

### **Books Recommended:**

1. Kuby, J., Immunology W. H. Freeman and Company, New York, (1992).
2. Roitt, I. M. Brostoff, J and Male, D., Immunology, 2nd edition, Gower Medical Publishing, New York. (1989).
3. Roitt, I. M., Essential Immunology, 6th edition, Blackwell Scientific Publications, Oxford. (1988).
4. Paul, W.E., Fundamental Immunology, 2nd edition, Raven Press, New York. (1989).
5. Playfair, J.H.L.: Immunology at a glance, 5th edition, Blackwell Scientific Publications, Oxford. (1992).
6. Paul, W.E.: Immunology; recognition and response. W.H. Freeman, New York. (1991).

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Understand the patterns and processes of evolution above the species level
- CO2 Appreciate the differences between the three methods of phylogenetic analysis: evolutionary systematics, phenetics, cladistics.
- CO3 Classify using scientific names and the hierarchy.
- CO4 have knowledge of preparing scientific reports
- CO5 Understanding of taxonomic classification

# **Master of Science (Zoology) Semester–IV**

**Session- 2020-21**

**Course Code: MZOL-4484**

**Course Title: Biosystematics**

**Time: 3 hrs.**

**Max. Marks: 50**

**Theory: 40**

**CA: 10**

## **Instructions for the Paper Setter:**

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

## **Unit–I**

### **Introduction**

Terms / Definitions

History/ Development of theories / kinds of classification

Importance of Biosystematics

### **Material basis of Biosystematics**

Different attributes or evidences

Character kinds

Character weighing

New aspects of Biosystematics:

Cytotaxonomy

Chemotaxonomy

Molecular taxonomy

## **Unit–II**

### **Taxonomic Procedures**

Taxonomic collections

Preservation

Identification

Taxonomic keys ( Different kind, salient features, merits and demerits)

International Code of Zoology/ Cal Nomenclature

Nomenclature Principles, important rules, their interpretation and application in scientific nomenclature.

## **Unit–III**

### **Taxonomic Publications**

The Scientific publications

Systematic publications

Contents of publications

### **Taxonomic Hierarchy**

Species category and various concepts of species

Hierarchy of categories

Lower and higher categories

Subspecies and other sub specific categories

Decision at species and sub species level

## **Unit–IV**

**History of kingdom systems (resume of whittakar's system and other recent systems of classification)**

An outline of classification of kingdom Animalia  
Salient features of minor phyla.

**Suggested Reading Material:**



1. Gote, H.E. (1982), Animal Taxonomy, Edward Arnold.
2. Jaffery, C. (1973), Biological Nomenclature, Edward Arnold.
3. Kapoor, V.C. (1987), Theory and Practice of Animal Taxonomy, IPH Pb. New Delhi.
4. Mayer, E. (1969), Principle of Systematic Zoology, McGraw Hill Book Co. London.
5. Mayer, E. & Aschhok (1991), Principles of Systematics, McGraw Hill Book Co. London.
6. Minell, A. (1993), Biological Systematics, The State of Art. Chapman & Hall, London.
7. Quicke, D.L.J, (1996), Principles & Techniques of Contemporary Taxonomy, Blacky Academic & Professional, London, New York, Madras.
8. Kitching, I.J., Forey, P.L. Humpheries, C.J. & William, D. 1998. Cladistics: Theory and Practice of Parsimony Analysis, Oxford University Press.
9. Sebu, Randall T. 2000, Biological Systematics: Principles & Applications Cornell University Press 256 pp.
10. Winston, J. 1999. Describing Species Practical Taxonomic Procedure of Biologists. Columbia University Press, Lincoln, R.J. Dictionary of Ecology, Evolution and Systematics.

M. Sc. Zoology (Semester–IV)

**MZOP-4485: PRACTICAL VII (BEHAVIOUR AND WILD LIFE CONSERVATION)**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Understanding of behavior of animals
- CO2 Understanding of wild life

**Master of Science (Zoology) Semester–IV**

**Session- 2020-21**

**Course Code: MZOP-4485**

**Course Title:**PRACTICAL-VII (Animal Behaviour and Wild Life Conservation)

**Time: 3 hrs**

**Max. Marks: 50**

**(Practical: 40, CA: 10)**

1. To study the influence of temperature on development and population built up of *Tribolium/Rhizopertha/Callosobruchus*.
2. To study the food preference in different animals.
  - a) *Tribolium /Rhizopertha*
  - b) *Pieris brassicae*.
3. To investigate the locomotive, explorative, withdrawal and habituation behaviours in Earthworm and Slug
4. To study the latent and operant learning in rat.
5. To study the thigmotaxis response in *Callosobruchus/ Tribolium/ Rhizopertha*
- 6. To study the Geotaxis Responses in**
  - a) *Tribolium*
  - b) Ant
  - c) *Pieris brassicae* Larvae
  - d) Slug

**7. To study the Humidity Preference in**

- a) *Drosophila / Zaprionus*
- b) *Tribolium*
- c) *Callosobruchus*
- d) *Pieris brassicae* Larvae

**8. To study the Phototaxis to Point Source and Different Colours of Light.**

- a) Earthworm
- b) *Zaprionus*.
- c) *Tribolium*
- d) *Callosobruchus*
- e) *Pieris brassicae* Larvae

**9. Use of videos to Study the**

- a) Grooming and righting behaviour in cockroach.
- b) Tarsal response in butterfly/housefly.
- c) Equilibrium study on housefly.
- d) Effect of temperature on opercular movement in fish

**10. To Investigate the Chemosensory Responses in *Zaprionus* / *Bactrocera***

11. Study of body rhythms in human beings

12. Animal behaviour patterns using photostat sheets.

13. Assignment on Wildlife project.

M. Sc. Zoology (Semester–IV)

**MZOP-4486: PRACTICAL VII (GENETICS AND BIOSYSTEMATICS)**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Understanding of pedigree analysis and preparation of family charts
- CO2 Knowledge of isolation of DNA from human blood and buccal cells.
- CO3 Understanding of cell division
- CO4 Understanding of inheritance of morphogenetic human characters.
- CO5 Knowledge of collection ,preservation and nomenclature of animals

**Master of Science (Zoology) Semester–IV**

**Session- 2020-21**

**Course Code: MZOP-4486**

**Course Title: PRACTICAL-VIII (Genetics and Biosystematics)**

**Time: 4 hrs    Max. Marks: 50**

**(Practical: 40, CA: 10)**

- To prepare and study the karyotype of human cell from meta phase pictures.
- To study the pedigree analysis of a family.
- To study blood groups in human beings.
- Demonstration of Barr body in the oral epithelium of human beings.
- To study different stages of mitosis in root tips of *Allium cepa*.
- To study permanent slides of:-
  - Mitosis in bone marrow cells of rat.
  - Stages of meiosis in testis of rat/grasshopper/*Allium cepa*.
  - Polytene chromosomes in third instar larvae of *Zaprionus paravittiger*.
- To study dermatoglyphics with palms of hands and fingertips.
- To study inheritance of morphogenetic human characters.
- Isolation of DNA from plant tissues.
- Numericals on Mendelian laws of inheritance and linkage.
- Serum extraction from blood.
- ELISA & RIA, Rocket Immuno- electrophoresis.
- Demonstration of various kinds of equipment required for collection and preservation of animals.
- Videos of Methods of collection and preservation.
- Kinds of keys and their use at higher and lower category levels.

**Master of Science (Zoology) Semester–IV**

**Session-** 2020-21

**Course Code:** MZOD-4487

**Course Title:** Project Report

This non credit compulsory course has been introduced to make the students learn how to design an experiment and what are the various research strategies. The students can opt for any one from the following and will submit a detail report after successful completion:

- Review on any Research Topic
- Small Research Project
- Hands on Training in any Industry/Research Lab

**KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)**  
**SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR**  
**DEGREE PROGRAM**

**Scheme for M. Sc. (Chemistry)**

SemesterII							
PaperNo.	C/S/I/ V/E	PaperTitle	Marks				Examination time (in Hours)
			Total	Ext.		CA	
				L	P		
MCHL-2057	C	Biology for Chemists	25	20	-	5	2



**M. Sc. Chemistry(Semester-II)(Session-2020-21)**

**BIOLOGY FOR CHEMISTS**

**COURSE CODE: MCHL-2057**

**(For Non-Medical Students)**

**(Theory)**

**Time: 2 Hrs.**

**Max. Marks: 25**

**(Theory: 20, CA: 5)**

**Note: The students are allowed to use Non-Programmable Calculator.**

**Instructions for the Paper Setter**

Eight questions of equal marks (4 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from unit I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

**The Organization of Life**

1. Biologically important molecules: Carbohydrates, lipids, proteins and nucleic acids.
2. The life of cells – The cell theory, general characteristics of cells, difference between prokaryotic and eukaryotic cells, difference between plant and animal cells, cell organelles.

**UNIT-II**

3. Tissues, organs and organ systems: Animal tissues; epithelial tissues, connective tissues, muscle tissue, nervous tissue and neoplasias; plant tissue: meristematic tissue, permanent tissues.

**UNIT-III**

**Genetics**

4. The basic principle of heredity: Mendals law, monohybrid cross, dihybrid cross.
5. DNA – Double helix structure and replication.
6. Genes expression: Transcription and translation, genetic code.

**UNIT-IV**

**The Diversity of Life**

7. The classification of Living things – Criteria of classification, Whittaker's systems of classification, their characteristics with are example of each.
8. Viruses, structure of Viruses.

**Book Recommended:**

1. Cord Biology - South Western Educational Publications, Texas, 200

**KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)**  
**SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR**  
**DEGREE PROGRAM**

**B. Sc. (Biotechnology) Sem II**

**Session-2020-21**

Bachelor of Science (Bio-Technology) Semester II							
Course Code	Course Name	Course Type	Marks				Examination time (in Hours)
			Total	Ext.		CA	
				L	P		
BBTM-2484	Zoology-I	C	60	30	18	12	3+3

**B.Sc. Biotechnology (Semester-II) (Session: 2020-21)**

**Zoology-I**

**Course Code: BBTM-2484**

**(Theory)**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Understand the general classification of Animal Kingdom.
- CO2 Familiarize with the various classes of animal Kingdom.
- CO3 Understand the digestive system, respiratory system, excretory and circulatory system of man..
- CO4 Come to know the various effects viz. bohr effect, haldane effect etc.
- CO5 Understand the skeletal system, neural integration and endocrine system of man.

**B.Sc. Biotechnology (Semester-II) (Session: 2020-21)**

**Zoology-I**

**Course Code: BBTM-2484**

**(Theory)**

**Time: 3 Hrs.**

**Max. Marks: 60**

**Theory: 30**

**Practical: 18**

**CA: 12**

**Periods: 4**

**Instructions for the Paper Setters:** Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**Section–A**

**Introduction to Animal Kingdom and its diversification:**

Overview and General classification of Kingdom Animalia, General Characteristics of each group upto class level with an example.

**Section–B**

**Digestive System:** The alimentary canal and associated glands of Man. Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intracellular digestion, enzymatic digestion and symbiotic digestion.

**Respiratory System:** Respiratory system of man, Transport of O<sub>2</sub> and CO<sub>2</sub>, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride shift, Haldane effect and control of breathing.

**Section–C**

**Circulatory System:** General plan of circulation in Man, structure of human heart. Origin and regulation of heart beat, Electrocardiogram, Cardiac output and Blood pressure, Composition and functions of blood and lymph, Blood clotting, blood groups including Rh-factor.

**Excretory system:** Structure of Kidney and nephron. Urine formation and osmoregulation.

**Section–D**

**Skeletal system:** Ultrastructure, chemical and physical basis of skeletal muscle contraction.

**Neural Integration:** Structure and functions of brain, Structure of neuron, resting membrane potential, Origin and propagation of impulse along the axon, synapse and myoneural junction.

**Endocrine System:** Structure and physiology of thyroid, parathyroid, adrenal, hypothalamus, pituitary, pancreas and gonads of man.

**Suggested Readings:**

1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, VishalPublishers, Jalandhar.
2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of LifeSciences. Vishal Publishers, Jalandhar.
3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools andApplication, Vishal Publishers.

**B.Sc. Biotechnology (Semester-II) (Session: 2020-21)**

**Zoology-I**

**Course Code: BBTM-2484**

**(Practical)**

## **COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Understand the estimation of blood haemoglobin
- CO2 Familiarize with the various systems of human such as digestive, arterial, venous and urinogenital systems.
- CO3 The students will be able to record blood pressure and blood groups.

**B.Sc. Biotechnology (Semester-II) (Session: 2020-21)**

**Zoology-I**

**Course Code: BBTM-2484**

**(Practical)**

**Time: 3 Hrs.**

**Max. Marks: 18**

**Note:** The question paper will be set by the examiner based on the syllabus.

1. Study the following system of Human with the help of charts / models /videos:

Digestive, Arterial, Venous and Urinogenital systems.

2. Analysis of food stuff for the presence of starch, protein and fats.

3. Determination of blood groups of human blood samples.

4. Recording of blood pressure of man.

5. Estimation of hemoglobin content.

6. Make a temporary preparation of the following:

Blood smear of mammals.

7. Visit to clinical laboratory / hospital for demonstration of ECG, ECHO, X-ray, ultrasound, CT-scan and MRI.



**Scheme of Studies and Examination**  
**Semester-IV (session 2020-21)**  
**Environmental Studies (COMPULSORY PAPER)**

Semester IV								
Course Name	Program Name	Course Code	Course Type	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					Theory	Field work		
Environmental Studies	B.A	AECE-4221	AECC	100	60	20	20	3
	B.A (JMC)							
	B.A(Hons.)English							
	B.Sc (fashion designing)							

**\*AECC- Ability enhancement compulsory course**

**KANYA MAHA VIDYALAYA, JALANDHAR**  
**(AUTONOMOUS)**  
**SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR**  
**DEGREE PROGRAM**  
**B.Voc(Retail Management,Management Sectorial**  
**Practices,Animation,Textile Designing and Apparel Technology, Nutrition,**  
**Exercise and Health, Beauty & Wellness)**

Semester-IV								
Course Code	Course Title	Course Type	Credits L-T-P	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					Theory	Field work		
AECE-4221	Environmental Studies - Compulsory paper	AECC	4-0-0	100	60	20	20	3

**\*AECC- Ability enhancement compulsory course**

**B.A/B.A(JMC)/B.SC (FD)/B.A(Hons.)English, (Semester-IV)**  
**(session 2020-21)**

**Environmental Studies**

**(COMPULSORY PAPER)**

**Course Code: AECE-4221**

**(Theory)**

**COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Demonstrate and Understand the ecological relationships between organisms and their environment.
- CO2 Present an overview of diversity of life forms in an ecosystem.
- CO3 Explain and identify the role of the organism in energy transfers.
- CO5 Understand the Environmental Pollution and their management.
- CO6 Understanding and awareness for wildlife conservation.
- CO7 Knowledge of conservation of threatened animal species

**B.A/B.A(JMC)/B.SC (FD)/B.A(Hons.)English, (Semester-IV)**

**(session 2020-21)**

**Environmental Studies  
(COMPULSORY PAPER)**

**Course Code: AECE-4221**

**(Theory)**

**Time: 3Hrs.**

**Max. Marks: 100**

**Theory: 60 Project**

**Report:20**

**CA: 20**

**Instructions for the Paper Setter:**

The question paper should carry 60 marks.

The structure of the question paper being:

**Part-A**, Short answer pattern – 20 marks

Attempt any five questions out of seven. Each question carries 4 marks. Answer to each question should not exceed 2 pages

**Part-B**, Essay type with inbuilt choice – 40 marks

Attempt any five questions out of eight. Each question carries 8 marks. Answer to each question should not exceed 5 pages.

**Unit 1**

**The multidisciplinary nature of environmental studies**

Definition, scope and importance, Need for public awareness

**Unit 2**

**Natural Resources: Renewable and non-renewable resources:**

Natural resources and associated problems.

- (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

- (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
  - Role of an individual in conservation of natural resources.
  - Equitable use of resources for sustainable lifestyles.

### **Unit 3**

#### **Ecosystems**

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

### **Unit 4**

#### **Biodiversity and its conservation**

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

### **Unit 5**

#### **Environmental Pollution**

##### **Definition**

- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

## **Unit 6**

### **Social Issues and the Environment**

- From unsustainable to sustainable development
  - Urban problems and related to energy
  - Water conservation, rain water harvesting, watershed management
  - Resettlement and rehabilitation of people; its problems and concerns. Case studies.
  - Environmental ethics: Issues and possible solutions
  - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
  - Wasteland reclamation
  - Consumerism and waste products
  - Environmental Protection Act, 1986
  - Air (Prevention and Control of Pollution) Act, 1981
  - Water (Prevention and control of Pollution) Act, 1974
  - Wildlife Protection Act
  - Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

## **Unit 7**

### **Human Population and the Environment**

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

## **Unit 8**

### **Field Work**

- Visit to a local area to document environmental assets  
river/forest/grassland/hill/mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc

### **References:**

1. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. &Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
4. Joseph, K. &Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
5. Kaushik, A. & Kaushik, C.P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
6. Rajagopalan, R. 2011. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.
7. Sharma, J. P., Sharma. N.K. & Yadav, N.S. 2005. Comprehensive Environmental Studies, Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut.
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi

## **COURSE OUTCOMES**

After passing this course the student will be able to:

- CO1 Demonstrate and Understand the ecological relationships between organisms and their environment.
- CO2 Present an overview of diversity of life forms in an ecosystem.
- CO3 Explain and identify the role of the organism in energy transfers.
- CO5 Understand the Environmental Pollution and their management.
- CO6 Understanding and awareness for wildlife conservation.
- CO7 Knowledge of conservation of threatened animal species



**B.Voc(RM,MSP,Animation,TD &AT,NEH,B&W) (Semester-IV)**  
**(Session 2020-21)**

**B.Voc(RM,MSP,Animation,TD &AT,NEH,B&W)**

**Environmental studies (COMPULSORY PAPER)**

**Course Code: AECE-4221**

**(Theory)**

**Time: 3Hrs.**  
**Credit: 4-0-0**

**Max. Marks: 100**  
**Theory: 60**  
**Project Report:20**  
**CA: 20**

**Instructions for the Paper Setter:**

The question paper should carry 60 marks.

The structure of the question paper being:

**Part-A**, Short answer pattern – 20 marks

Attempt any five questions out of seven. Each question carries 4 marks. Answer to each question should not exceed 2 pages

**Part-B**, Essay type with inbuilt choice – 40 marks

Attempt any five questions out of eight. Each question carries 8 marks. Answer to each question should not exceed 5 pages.

**Unit 1**

**The multidisciplinary nature of environmental studies**

Definition, scope and importance, Need for public awareness

**Unit 2**

**Natural Resources: Renewable and non-renewable resources:**

Natural resources and associated problems.

- (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

- (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
  - Role of an individual in conservation of natural resources.
  - Equitable use of resources for sustainable lifestyles.

### **Unit 3**

#### **Ecosystems**

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

### **Unit 4**

#### **Biodiversity and its conservation**

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

## **Unit 5**

### **Environmental Pollution**

#### **Definition**

- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

## **Unit 6**

### **Social Issues and the Environment**

- From unsustainable to sustainable development
  - Urban problems and related to energy
  - Water conservation, rain water harvesting, watershed management
  - Resettlement and rehabilitation of people; its problems and concerns. Case studies.
  - Environmental ethics: Issues and possible solutions
  - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
  - Wasteland reclamation
  - Consumerism and waste products
  - Environmental Protection Act, 1986
  - Air (Prevention and Control of Pollution) Act, 1981
  - Water (Prevention and control of Pollution) Act, 1974
  - Wildlife Protection Act
  - Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

## **Unit 7**

### **Human Population and the Environment**

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights
- Value Education
- HIV / AIDS

- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

## **Unit 8**

### **Field Work**

- Visit to a local area to document environmental assets  
river/forest/grassland/hill/mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
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# Kanya maha vidyalaya,jalandhar(autonomous)

## SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

**B.A. / B.Sc. (Medical) / B.Sc. (Non Medical) / B.Sc. (Computer Science) /  
B.Sc. (Economics) / B. Com. (R)/ BBA/ B.A. (JMC) / B. Sc. (FD) / B. Sc.  
(Home Science) / BCA/ B.Sc (IT)/ B.Sc. (BT)/ B.A (Hons.) in English /  
B.Com (Hons.)/ B. Sc (Hons.) Maths/ B.Sc(Hons.)Agriculture/ B. Sc  
(Hons.) Physics**

**(Session 2020-21)**

SEMESTER- II							
Course Code	Course Title	Course Type	Marks				Examination time (in Hours)
			Total	Ext.		CA	
				L	P		
AECD-2161	Drug Abuse; : Problem, Management and Prevention (COMPULSORY)	AC	50	40	-	10	3

**AC-Audit Course**

**B.A. / B. Sc. (Medical) / B. Sc. (Non Medical) / B. Sc. (Computer Science) /  
B. Sc. (Economics) / B. Com. (R)/ BBA/ B. A. (JMC) / B. Sc. (FD) / B. Sc.  
(Home Sciences/ BCA/ B. Sc (IT)/ B. Sc. (BT)/ B. A. (Hons.) in English /  
B.Com (Hons.)/ B. Sc (Hons.) Maths/ B.Sc (Hons.) Agriculture/ B.Sc  
(Hons.) Physics**

**Semester-II**

**(Session 2020-21)**

**Course Code: AECD-2161**

**Drug Abuse: Problem, Management and Prevention (COMPULSORY)  
(Theory)**

**Time: 3 Hrs**

**Max. Marks: 50**

**Theory: 40**

**CA: 10**

**Instructions for the Paper Setter**

Eight questions of equal marks(8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

**UNIT-I**

**Prevention of Drug abuse:** Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.

**UNIT-II**

**School:** Counselling, Teacher as role-model. Parent-teacher-Health Professional Coordination, Random testing on students.

**UNIT-III**

**Controlling Drug Abuse:** Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program

**UNIT-IV**

**Legislation:** NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

## References:

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. *The Drug Crime Connection*. Beverly Hills: Sage Publications.
4. Kapoor. T. (1985) *Drug epidemic among Indian Youth*, New Delhi: Mittal Pub.
5. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
6. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
7. Sain, Bhim 1991, *Drug Addiction Alcoholism, Smoking obscenity* New Delhi: Mittal Publications.
8. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab: A Sociological Study*. Amritsar: Guru Nanak Dev University.
9. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
10. Sussman, S and Ames, S.L. (2008). *Drug Abuse: Concepts, Prevention and Cessation*, Cambridge University Press.

**KANYA MAHA VIDYALAYA, JALANDHAR  
(AUTONOMOUS)**

**SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR  
DEGREE PROGRAM**

**B. Voc (Retail Mgt)/B.Voc (MSP)/ B.Voc (Animation)/B.Voc  
(TDAT)/B.Voc. (NEH)/B.Voc (Beauty & wellness),B.Voc( Photography and  
Journalism)  
(Session 2020-21)**

Semester-II								
Course Code	Course Title	Course Type	Credits L-T-P	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
AECD-2161	Drug Abuse; : Problem, Management and Prevention (COMPULSORY)	AC	2-0-0	50	40	-	10	3

**AC-Audit Course**



**B. Voc (Retail Mgt)/ B.Voc (MSP)/ B.Voc (Animation)/ B.Voc (TDAT)/ B.Voc. (NEH)/  
B.Voc (Beauty & wellness)/ B.Voc (Photography and Journalism)**

**Semester-II (Session 2020-21)**

**Course Code: AECD-2161**

**Drug Abuse: Problem, Management and Prevention (COMPULSORY)  
(Theory)**

**Time: 3 Hrs**

**Credit: 2-0-0**

**Max. Marks: 50**

**Theory: 40**

**CA: 10**

### **Instructions for the Paper Setter**

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**Controlling Drug Abuse:** Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program

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**Legislation:** NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

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