Dr.V.S KRISHNA GOVT. DEGREE & PG COLLEGE (A)

VISAKHAPATNAM – 530 013

ZOOLOGY SYLLABUS

FOR THE UNDER GRADUATE COURSE
(W.E.F. 2018 - '19)

By

DEPARTMENT OF ZOOLOGY

Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam
Resolutions/Minutes of the 5th Board of Studies-March 2018

Subject: ZOOLOGY **Department:** ZOOLOGY

In pursuance of conferment of Autonomous status to Dr.V.S.Krishna Govt. Degree College(A), Visakhapatnam by the UGC vide letter No.F.22-1.2011(AC) dated 20.07.2011 from Dr. Manju Singh, Joint Secretary, UGC, New Delhi and Proceedings No. C-II (CDC) /Dr.VSK.Govt.College/BOS/2018 dt.10.10.2018 of The Vice-Chancellor, Andhra University, Visakhapatnam, the **5th Board of Studies in** ZOOLOGY Subject is conducted on 10.10.2018 at 10:00 AM with the following members. The Changes will be implemented from 2019-20 academic year onwards.

MEMBER	NAME & DESIGNATION	SIGNATURE
Head of the Department (Chairman)	Dr B Krishna	
Faculty Members	1 Dr V Ratna Bharathi 2 Dr G Vijaya Pratap 3 Dr P R Vani 4 Dr T L V Sarala Devi 5 T Sasikala	
Subject Expert (University Nominee)	Prof C MANJULATHA Department of Zoology Andhra University VISAKHAPATNAM.	
Subject Experts (from outside the parent university)	Dr Y POLI NAIDU LECTURER IN ZOOLOGY. Govt Degree College(MEN) SRIKAKULAM	
	Dr R Ramachandra Rao Lecturer in Zoology. Govt. Degree College(MEN) SRIKAKULAM.	
Representative Member From Industry / Corporate / Allied Area relating to placement	JAYANTH	
Member from Alumni	Dr. G. VIJAYA PRATAP	
Coordinator, Academic Council	Dr. D. SRAVAN KUMAR	
Chairperson, Academic Council	Dr V Chandra Sekhar Principal	

Dr.V.S.Krishna Govt. Degree College (A)

2017-18

ALLOCATION OF CREDITS FOR B.SC PROGRAMME

Subject	Sem -1	Sem -2	Sem -3	Sem -4	Sem -5	Sem - 6	Total	Remarks
ENGLISH	3	3	3	3			12	
TELUGU/HINDI/SANSKRIT	3	3	3	3			12	
HVPE	1						1	
ENVIRONMENTAL STUDIES	1						1	
ICT - I		1					1	
CSS - I		1					1	
ICT - II			1				1	
CSS - II			1				1	
ANALYTICAL SKILLS				1			1	
ENTERPRENUERSHIP				1			1	
MAJOR - I : THEORY	3	3	3	3	3+3	3+9	30	
MAJOR - I : PRACTICALS	2	2	2	2	2+2	2+6	20	
MAJOR -II : THEORY	3	3	3	3	3+3	3+0	21	
MAJOR - II : PRACTICALS	2	2	2	2	2+2	2+0	14	
MAJOR - III : THEORY	3	3	3	3	3+3	3+0	21	
MAJOR - III : PRACTICALS	2	2	2	2	2+2	2+0	14	
COMMUNITY SERVICES AND EXTRA - CURRICULAR ACTIVITIES		1		1		1	3	
PROJECT WORK						1	1	
Total	23	24	23	24	30	32	156	

PRINCIPAL
Dr. V.S. Krishna Govt. Degree College
(Autonomous)
Visakhapatnam

ZOOLOGY PAPER STRUCTURE UNDER CBCS (w.e.f 2017-18)

YEAR	SEMESTER	PAPER	TITLE	MARKS	CREDITS
I	I	I N1208	Biology of Non-chordates	100	03
			Practical - I N1208P	50	02
	II	N2208 N2208P	Biology of Chordates N2208	100	03
			Practical - II N2208P	50	02
II	III	III N3208	Cell biology, Genetics and Evolution N3208	100	03
			Practical - III N3208P	50	02
	IV	IV N4208 N4208P	Embryology, Physiology and Ecology N4208	100	03
			Practical - IV N4208P	50	02
III	V	V	Animal Biotechnology N5216	100	03
			Practical - V N5216P	50	02
		VI	Animal Husbandry N5217	100	03
			Practical - VI N5217P	50	02
	*Any one Paper from A, B and C ** Any one cluster from I, II and III	* VII (A)*	Immunology Z00607A	100	03
			Practical - VII (A) Z00607AP	50	02
		VII (B)*	Cellular Metabolism and Molecular Biology Z00607B	100	03
			Practical - VII (B) Z00607BP	50	02
		VII (C)*	Bioinformatics Z00607C	100	03
			Practical - VII (C) Z00607CP	50	02
	VI	Cluster VIII-A** Z00608A1 Z00608A2 Z00608A3 Z00608A1P Z00608A2P	**Cluster Electives –VIII-A : Medical Diagnostics**		
			1. Clinical Biochemistry	100	03
			2. Haematology	100	03
			3. Clinical Microbiology	100	03
			Practical – VIII: 1	50	02
			Practical – VIII: 2	50	02
			Project Work	50	02
		Cluster VIII-B** Z00608B1 Z00608B2 Z00608B3 Z00608B1P Z00608B2P	**Cluster Electives –VIII-B : Aquaculture**		
			1. Principles of Aquaculture	100	03
			2. Aquaculture Management	100	03
			3. Postharvest Technology	100	03
			Practical – VIII: 1	50	02
			Practical – VIII: 2	50	02
			Project Work	50	02
		Cluster VIII-C** Z00608C1 Z00608C2 Z00608C3 Z00608C1P Z00608C2P	**Cluster Electives – VIII-C : Sericulture**		
			1. Gen. Sericulture, Mulberry cultivation and Management	100	03
			2. Biology of Mulberry Silkworm and Silkworm rearing Technology	100	03
			3. Silk Technology, Silk Marketing and Extension	100	03
			Practical – VIII: 1	50	02
			Practical – VIII: 2	50	02
			Project Work	50	02

PAPER – I

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER-I PAPER- I Hrs/Week: 4

ANIMAL DIVERSITY – NON CHORDATES

MAX. MARKS: 100 Hours: 60 Hrs

Unit – I

1.1 Brief history, Significance of Diversity of Non Chordates

1.2 Protozoa (5 Hrs)
- 1.2.1 General characters
- 1.2.2 Classification of Protozoa up to classes with examples
- 1.2.3 *Elphidium* – Structure & Life Cycle

1.3 Porifera (7 Hrs)
- 1.3.1 General characters
- 1.3.2 Classification of Porifera up to classes with examples
- 1.3.3 Histology of Sponges
- 1.3.4 Skelton in Sponges
- 1.3.5 Canal system in sponges

Unit - II

2.1 Coelenterata (8 Hrs)
- 2.1.1 General characters
- 2.1.2 Classification of Coelenterata up to classes with examples
- 2.1.3 *Obelia* - External Characters, Structure of Polyp and Medusa
- 2.1.4 Polymorphism in coelenterates
- 2.1.5 Corals and coral reef formation

2.2 Platyhelminthes (6 Hrs)
- 2.1.1 General characters
- 2.1.2 Classification of Platyhelminthes upto classes with examples
- 2.1.3 *Fasciola hepatica* - External Characters, Reproductive System, Life History and pathogenicity

Unit - III

3.1 Nemathelminthes (3 Hrs)
- 3.1.1 General characters
- 3.1.2 Classification of Nemathelminthes up to classes with examples

3.2 Annelida (7 Hrs)
- 3.2.1 General characters
- 3.2.2 Classification of Annelida up to classes with examples
- 3.2.3 *Hirudinaria granulosa* - External Characters, Digestive System
- 3.2.4 Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost

Unit - IV

4.1 Arthropoda (9 Hrs)

- 4.1.1 General characters
- 4.1.2 Classification of Arthropoda up to classes with examples
- 4.1.3 Prawn - External Characters, Appendages, Respiratory system
- 4.1.4 *Peripatus* - Structure and affinities

4.2 Mollusca (3 Hrs)

- 4.2.1 General characters
- 4.2.2 Classification of Mollusca up to classes with examples
- 4.2.3 Pearl formation in Pelecypoda

Unit - V

5.1 Echinodermata (4 Hrs)

- 5.1.1 General characters
- 5.1.2 Classification of Echinodermata up to classes with examples
- 5.1.3 Water vascular system in star fish

5.2 Hemichordata (4 Hrs)

- 5.2.1 General characters
- 5.2.2 Classification of Hemichordata up to classes with examples
- 5.2.3 *Balanoglossus* - Structure and affinities

5.3 Non-Chordata larval forms (3 Hrs)

- 5.3.1 Amphiblastula
- 5.3.2 Ephyra
- 5.3.3 Trochophore
- 5.3.4 Nauplius
- 5.3.5 Glochidium
- 5.3.6 Bipinnaria
- 5.3.7 Tornaria

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ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER-I PAPER- I Hrs/Week: 4

ANIMAL DIVERSITY – NON CHORDATES

MODEL PAPER

Time : 3 hrs **Max. Marks : 60**

SECTION - A

Answer any FIVE of the following: 5X8=40

Draw labeled diagrams wherever necessary

1. a. Define Alternation of generations and explain with reference to the life cycle of *Elphidium*.

OR

b. Write an essay on canal system in sponges.

2. a. Give an account of the polymorphism in Coelenterates.

OR

b. Discuss briefly the life cycle and pathogenecity of *Fasciola hepatica*.

3. a. Write an essay on digestive system in leech.

OR

b. Describe the scope, significance, processing and economic importance of vermiculture.

4. a. Give in account of the Structure and affinities of *Peripatus*.

OR

b. Describe in detail the process of pearl formation in Pelecypoda and add a note on its economic importance.

5. a. Write the structure and functions of water vascular system in star fish.

OR

b. Give an account of the structure and affinities of *Balanoglossus*.

SECTION - B

Answer any FIVE of the following: 5X4=20

Draw labeled diagrams wherever necessary

6. Sarcomastigophora
7. Corals
8. Trematoda
9. Polychaeta
10. Cephalic appendages
11. Mollusca General Characters (Any 10)
12. Structure of *Balanoglossus*
13. Any 2 Invertebrate larvae

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ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER-I CORE-I

COURSE- I ANIMAL DIVERSITY – NON CHORDATES

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs Max Marks: 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (Protozoa & Porifera)	1	2	20
UNIT – II (Coelenterata & Platyhelminthes)	2	2	24
UNIT – III (Nematehelminthes & Annelida	1	2	20
UNIT – IV (Arthropoda, Mollusca)	2	2	24
UNIT – V (Echinodermata, Hemichordata, Non-chordate larval forms)	2	2	24
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE: 1. The question paper setters are requested to kindly adhere to the format given in the above table.

2. The question paper setters are also requested to set the questions in the following way:

a. **80% of questions – memory and Understanding based**

b. **20% of questions – Creativity, Application and Skill based**

3. 8 Marks questions are to be given 1 each from each sub unit (Eg: 1from each of the sub units 1.1/1.2 and 1.3 in Unit 1; 2.1 & 2.2 from Unit 2; 3.1 & 3.2 from Unit 3, 4.1 and 4.3 from Unit 4 and 5.1 and 5.2/5.3 from Unit 5)

4. 4 Marks questions are to be given in the following way (1 question each from unit 1& 3 and 2 questions each from Units 2, 4 and 5)

5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER-I PAPER- I Hrs/Week: 3

ANIMAL DIVERSITY – NON CHORDATES (PRACTICAL SYLLABUS)

Periods: 24 Max. Marks: 50

Observation of the following slides / spotters / models

Protozoa	:	*Elphidium, Paramecium* - Binary fission and conjugation
Porifera	:	*Euspongia, Sycon*
Coelenterata	:	*Obelia* - colony and medusa, *Physalia, Corallium, Gorgonia, Pennatula*
Platyhelminthes	:	*Planaria, Fasciola hepatica, Fasciola* larval forms - Miracidium, Redia, Cercaria, *Echinococcus granulosus*
Nemathelminthes	:	*Ascaris* - Male and female, *Ancylostoma duodenale*
Annelida	:	*Nereis, Aphrodite, Hirudo,* Trochophore larva
Arthropoda	:	Mouth parts of male and female *Anopheles,* Mouth parts of housefly, Nauplius, Mysis, Zoea larvae, crab, prawn, *Scolopendra, Sacculina, Limulus, Peripatus*
Mollusca	:	*Chiton, Pila, Sepia, Octopus, Nautilus,* Glochidium larva
Echinodermata	:	*Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Asterias,* Bipinnaria larva
Hemichordata	:	*Balanoglossus,* Tornaria larva

Demonstration of dissection / dissected / virtual dissection :

1. Earthworm: Digital Dissection
2. Leech / Prawn / Scorpion / Crab - Digestive system
3. Prawn - Appendages
4. Prawn / Scorpion / Crab - Nervous system
5. *Pila / Unio* - Digestive system
6. Mounting of Statocyst
7. Mounting of Radula

Live Zoology Project & Report: Visit to a Museum or Zoo or Biodiversity park or Natural water body and submission of a report on

i. Faunal diversity or

ii. Ecosystem diversity or

iii. Plankton Collection and identification or

iv. Collection of dead specimens (like molluscan shells) and their identification

Note: 1. **Laboratory record work shall be submitted at the time of practical examination**

2. **Compulsory one species to be adopted for demonstration only by the faculty**

3. **Computer aided techniques should be adopted as per UGC guide lines**

PAPER – II

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER-II PAPER - II Hrs/Week : 4

ANIMAL DIVERSITY - CHORDATES

MAX. MARKS: 100 Hours: 60 Hrs

Unit - I

1.1 General characters of Chordata (2 Hrs)

1.2 Prochordata (8 Hrs)

1.2.1 Salient features of Cephalochordata

1.2.2 Structure of *Branchiostoma*

1.2.3 Salient features of Urochordata

1.2.4 Structure and life history of *Herdmania*, Retrogressive Metamorphosis and its Significance

Unit - II

2.1 Cyclostomata (2 Hrs)

2.1.1 General characters of Cyclostomata

2.1.2 Comparision of the *Petromyzon* and *Myxine*

2.2 Pisces (12 Hrs)

2.2.1 General characters of Fishes

2.2.2 Classification of fishes up to sub - class level with examples

2.2.3 *Scoliodon* :- External features, Digestive system, Respiratory system, Heart, Brain

2.2.4 Migration in Fishes

2.2.5 Types of Scales

Unit - III

3.1 Amphibia (10 Hrs)

3.1.1 General characters of Amphibia

3.1.2 Classification of Amphibia upto orders with examples.

3.1.3 *Rana hexadactyla* - External features, Digestive system, Respiratory system, Heart, Brain

3.2 Reptilia (12 Hrs)

3.2.1 General characters of Reptilia

3.2.2 Classification of Reptilia upto orders with examples

3.2.3 Calotes - External features, Digestive system, Respiratory system, Heart, Brain

3.2.4 Identification of Poisonous snakes

Unit - IV

4.1 Aves (10 Hrs)

4.1.1 General characters of Aves

4.1.2 Classification of Aves upto subclasses with examples.

4.1.3 *Columba livia* - External features, Digestive system, Respiratory system, Heart, Brain

4.1.4 Migration in Birds

4.1.5 Flight adaptation in birds

Unit - V

5.1 Mammalia (4 Hrs)

5.1.3 General characters of Mammalia

5.1.2 Classification of Mammalia upto sub - classes with examples

5.2 Dentition in mammals

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ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER-II **PAPER - II** **Hrs/Week : 4**

ANIMAL DIVERSITY – CHORDATES
MODEL PAPER

Time: 3 hrs **Max. Marks: 60**

SECTION - A

Answer any FIVE of the following: **5X8=40**

Draw labeled diagrams wherever necessary

1. a. Explain the origin and general characters of chordates

OR

b. Explain the life history of *Herdmania*

2. a. Compare the characters of *Petromyzon* and *Myxine*

OR

b. Describe the structure of heart of *Scoliodon*

3. a. Describe the brain of *Rana hexadactyla*

OR

b. Explain the external features of *Calotes*

4. a. Write an essay on flight adaptations in birds

OR

b. Explain the respiratory system of *Columba livia*

5. a. Compare the characters of Metatheria and Eutheria

OR

b. Write an essay on dentition in mammals

SCTION - B

Answer any FIVE of the following: **5X4=20**

Draw labeled diagrams wherever necessary

6. Structure of *Amphioxus*
7. Urochordata – General characters (Any 8)
8. General characters of Cyclostomata (Any 8)
9. Placoid scale
10. Apoda
11. Identification of poisonous snakes
12. Ratitae
13. Prototheria

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ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER-II CORE - II

COURSE - II ANIMAL DIVERSITY - CHORDATES

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs Max Marks: 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (General characters of Chordata & Protochordata)	2	2	24
UNIT – II (Cyclostomata & Pisces)	2	2	24
UNIT – III (Amphibia & Reptilia)	2	2	24
UNIT – IV (Aves)	1	2	20
UNIT – V (Mammalia)	1	2	20
Total No. of Questions	8	10	
Total Marks including choice			112

NOTE:

1. The question paper setters are requested to kindly adhere to the format given in the above table.
2. The question paper setters are also requested to set the questions in the following way:
   a. 80% of questions – memory and Understanding based
   b. 20% of questions – Creativity, Application and Skill based
3. 8 Marks questions are to be given 1 each from each sub unit (Eg: 1from each of the sub units 1.1/1.2 and 1.3 in Unit 1; 2.1 & 2.2 from Unit 2; 3.1 & 3.2 from Unit 3, 4.1 and 4.3 from Unit 4 and 5.1 and 5.2/5.3 from Unit 5)
4. 4 Marks questions are to be given in the following way (1 question each from units 4 & 5 and 2 questions each from Units 1, 2 and 3)
5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM
ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER-II **PAPER - II** **Hrs/Week : 3**

ANIMAL DIVERSITY – CHORDATES (PRACTICAL SYLLABUS)

Periods: 24 **Max. Marks: 50**

Observation of the following slides / spotters / models

Protochordata	:	*Herdmania, Amphioxus, Amphioxus* T.S. through pharynx
Cyclostomata	:	*Petromyzon, Myxine*
Pisces	:	*Pristis, Torpedo, Channapleuronectes, Hippocampus, Exocoetus, Eheneis, Labeo, Catla, Clarius, Auguilla,Protopterus* Placoid scale, Cycloid scale, Ctenoid scale
Amphibia	:	*Ichthyophis, Amblystoma, Siren, Hyla, Rhachophous* Axolotl larva
Reptilia	:	*Draco, Chemaeleon, Uromastix, Vipera russeli, Naja, Bungarus, Enhydrina, Testudo, Trionyx, Crocodilus*
Aves	:	*Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo,* Study of different types of feathers : Quill, Contour, Filoplume, Down
Mammalia	:	*Ornithorthynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris,* Hedgehog
Osteology	:	Appendicular skeletons of Varanus, Pigeon Rabbit - Skull, fore limbs, hind limbs and girdles

Demonstration of dissection / dissected / virtual dissection:

1. V, VII cranial nerves of shark / locally available fishes
2. Arterial system, venous system of Shark / Calotes / Fowl / Rat
3. Digestive system of fish
4. Prodissector frog / Biolab Frog / Digi frog – Digital Alternative to dissections

Note: 1. **Laboratory record work shall be submitted at the time of practical examination**

2. Compulsory one species to be adopted for demonstration only by the faculty

PAPER – III

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER - III | PAPER III | Hrs. /week: 4

CYTOLOGY, GENETICS AND EVOLUTION

MAX. MARKS: 100 | HOURS : 60

Unit - I

1. Cytology – I (12 Hrs)

1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma
1.2 Electron microscopic structure of eukaryotic cell.
1.3 Plasma membrane –Different models and functions of plasma membrane.
1.4 Cell Cycle – G1, S, G2 phases
1.5 Nucleus
1.6 Chromatin - Structure and significance, Chromosomes - Structure, types, functions

Unit – II

2. Cell Organelles (12 Hrs)

2.1 Structure and functions of Endoplasmic Reticulum
2.2 Structure and functions of Golgi apparatus
2.3 Structure and functions of Lysosomes
2.4 Structure and functions of Ribosomes
2.5 Structure and functions of Mitochondria

Unit - III

3.1 Genetics – I (12 Hrs)

3.1.1 Mendel's work on transmission on traits
3.1.2 Principles of inheritance
3.1.3 Incomplete dominance and codominance
3.1.4 Lethal alleles, Epistasis, Pleiotropy
3.1.5 Multiple alleles and Blood Group Inheritance

Unit - IV

4.1 Genetics – II (12 Hrs)

4.1.1 Sex determination
4.1.2 Sex linked inheritance
4.1.3 Linkage and crossing over
4.1.4 Extra chromosomal inheritance
4.1.5 Human karyotyping

Unit - V

5.1 Evolution (12 Hrs)

5.1.1 Origin of life
5.1.2 Types of Evolution
5.1.2 Lamarckism, Darwinism, Neo – Darwinism, Hardy-Weinberg Equilibrium.
5.1.3 Types of natural selection (directional, stabilizing, disruptive)
5.1.4 Forces of evolution – Variations, Isolation, Genetic Drift, Mutations, Migration
5.1.5 Speciation (Allopatric and Sympatric)

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER - III | PAPER III | Hrs. /week: 4

CYTOLOGY, GENETICS AND EVOLUTION

MODEL PAPER

Time: 3 hrs | **Max. Marks: 60**

SECTION - A

Answer any FIVE of the following: **5x8=40**

Draw labeled diagrams wherever necessary

1. a. Explain the different models of plasma membrane with suitable diagrams.

OR

b. Describe in detail the Structure, types and functions of chromosomes.

2. a. Write an essay on the structure and functions of Golgi complex.

OR

b. Explain the following:

i. Polymorphism in lysosomes

ii. Structure of Mitochondrion

3. a. Discuss the Mendel's laws of segregation and independent assortment.

OR

b. Give an account of the ABO blood group system and its mode of inheritance.

4. a. Explain in brief different types of sex linked inheritance with suitable examples.

OR

b. Write an essay on cytoplasmic inheritance.

5. a. Write an essay on Natural selection.

OR

b. Define species and give an account of the different types of speciation.

SECTION - B

I. Answer any FIVE of the following: **5x4=20**

Draw labeled diagrams wherever necessary

6. Differences between Prokaryotic and Eukaryotic cells (Any 10)
7. 80 S Ribosome
8. Nucleus
9. Epistasis
10. Linkage
11. Human Karyotyping
12. Lamarckism
13. Genetic Drift

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ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER-III

CORE - III

COURSE - III CYTOLOGY, GENETICS & EVOLUTION

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs

Max Marks: 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (Cytology - I)	1	1	12
UNIT – II (Cell Organelle)	2	3	32
UNIT – III (Genetics - I)	1	2	20
UNIT – IV (Genetics - II)	2	2	24
UNIT – V (Evolution)	2	2	24
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE:

1. **The question paper setters are requested to kindly adhere to the format given in the above table.**
2. **The question paper setters are also requested to set the questions in the following way:**
   a. **80% of questions – memory and Understanding based**
   b. **20% of questions – Creativity, Application and Skill based**
3. **8 Marks questions are to be given in the following way (1from unit 1 (1a); 3 from unit 2 (1b, 2a, 2b) and 2 each from units 3,4 & 5)**
4. **4 Marks questions are to be given in the following way (1 question each from units 1 & 3 and 2 questions each from Units 2, 4 and 3)**
5. **Please avoid repetition of questions.**

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER - III | PAPER III | Hrs. /week: 3

CYTOLOGY, GENETICS AND EVOLUTION

(PRACTICAL SYLLABUS)

Periods: 24 | Max. Marks: 50

I. CYTOLOGY

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides
3. Mounting of salivary gland chromosomes of *Chiranomous*

II. GENETICS

1. Study of Mendelian inheritance using suitable examples
2. Study of linkage recombination, gene mapping using the data
3. Study of human karyotypes

III. EVOLUTION

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin's finches (pictures)
5. Visit to natural history museum and submission of report

PAPER – IV

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER - IV | PAPER - IV | Hrs. /week: 4

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

MAX. MARKS: 100 | HOURS : 60

Unit - I

1.1 Developmental Biology and Embryology (12 Hrs)

1.1.1 Gametogenesis
1.1.2 Fertilization
1.1.3 Types of eggs
1.1.4 Types of cleavages

1.2 Development of Frog upto formation of primary germ layers

1.3 Formation and functions of Foetal membrane in chick embryo

1.4 Development, types and functions of Placenta in mammals

Unit - II

2.1 Physiology – I (12 Hrs)

2.1.1 Elementary study of process of digestion
2.1.2 Absorption of digested food
2.1.3 Respiration - Pulmonary ventilation, transport of oxygen and carbondioxide
2.1.4 Circulation - Structure and functioning of heart, Cardiac cycle
2.1.5 Excretion - Structure of nephron, urine formation, counter current mechanism

Unit - III

3.1 Physiology – II (14 Hrs)

3.1.1 Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibers

3.1.2 Muscle contraction - Ultra structure of muscle fibre, molecular and chemical basis of muscle contraction

3.1.3 Endocrine glands - Structure, secretions and the functions (of hormones) of pituitary, thyroid, parathyroid, adrenal glands and pancreas

3.1.4 Hormonal control of reproduction in a mammal

Unit - IV

4.1 Ecology – I (10 Hrs)

4.1.1 Meaning and scope of Ecology
4.1.2 Important abiotic factors of Ecosystem - Temperature, light, water, oxygen and CO_2
4.1.3 Nutrient cycles - Nitrogen, carbon and phosphorus
4.1.4 Components of Ecosystem (Example:lake), food chains and food web, energy flow in ecosystem

Unit - V

5.1 Ecology – II (7 Hrs)

5.1.1 Habitat and ecological niche
5.1.2 Community interactions - Mutualism, commensalism, parasitism, competition, predation
5.1.3 Ecological succession
5.1.4 Population studies

5.2 Zoogeography (5 Hrs)

5.2.1 Zoogeographical regions
5.2.2 Study of physical and faunal peculiarities of Oriental, Australian and Ethiopian regions

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER – IV PAPER IV Hrs/week : 4

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

MODEL PAPER

Time: 3 hrs Max. Marks: 60

SECTION - A

Answer any FIVE of the following: 5X8=40

Draw labeled diagrams wherever necessary.

1. a. Define Gametogenesis. Describe the process of spermatogenesis with the help of neat labeled diagrams.

OR

b. Write an essay on the development of frog upto gastrulation.

2. a. Describe the physiology of digestion focusing on carbohydrates and lipids.

OR

b. Give an account of O_2 transport in animals.

3. a. Explain sliding filament mechanism of muscle contraction.

OR

b. Give an account of the hormonal control of female reproduction in Mammals

4. a. Describe the gaseous cycle of Nitrogen with the help of neat labeled diagrams.

OR

b. Write an essay on Energy flow in ecosystem.

5. a. Define ecological succession. Describe in detail the process of ecological succession.

OR

b. Describe the Geographical and faunal characters of Oriental region.

SECTION - B

Answer any FIVE of the following: 5X4=20

Draw labeled diagrams wherever necessary

6. Brief account of Oogenesis
7. Types of eggs
8. Hamburger's phenomenon
9. Action Potential
10. Parathyroid
11. Carbon cycle
12. Explain Mutualism with two examples
13. Australian region

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER-IV CORE - IV

COURSE - IV EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs Max Marks: 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (Developmental Biology & Embryology)	2	2	24
UNIT – II (Physiology - I)	1	2	20
UNIT – III (Physiology - II)	2	2	24
UNIT – IV (Ecology - I)	1	2	20
UNIT – V (Ecology – II & Zoogeography)	2	2	24
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE:

1. **The question paper setters are requested to kindly adhere to the format given in the above table.**
2. **The question paper setters are also requested to set the questions in the following way:**
   a. **80% of questions – memory and Understanding based**
   b. **20% of questions – Creativity, Application and Skill based**
3. **8 Marks questions are to be given 2 each from units 1 to 5**
4. **4 Marks questions are to be given in the following way (1 question each from units 2 & 4 and 2 questions each from Units 1, 3 and 5)**
5. **Please avoid repetition of questions.**

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER – IV PAPER IV Hrs/week : 3

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

(PRACTICAL SYLLABUS)

Periods: 24 **Max. Marks: 50**

I. Embryology

1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)

II. Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Qualitative tests for identification of ammonia, urea and uric acid
3. Study of activity of salivary amylase under optimum conditions
4. Study of prepared slides of T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage
5. Digital alternative study of Breathing rate, Alimentary Canal, Heart Rate and Muscle Contraction using BioLab Frog and PhysioX 9.0 software

III. Ecology

1. Determination of pH of given sample
2. Estimation of dissolved oxygen of given sample
3. Estimation of total alkalinity of given sample
4. Estimation of salinity of given sample

PAPER – V

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 - 2018)

SEMESTER – V PAPER – V Hrs/week : 4

ANIMAL BIOTECHNOLOGY

MAX. MARKS: 100 Hours: 60

Unit 1

Tools of Recombinant DNA technology - Enzymes and Vectors (12 Hrs)

Restriction modification systems: Types I, II and III. Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

DNA modifying enzymes and their applications: DNA polymerases. Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases

Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs,

Unit 2

Techniques of Recombinant DNA technology (12 Hrs)

Cloning: Use of linkers and adaptors

Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated delivery

PCR: Basics of PCR.

DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing

Hybridization techniques: Southern, Northern and Western blotting,

Genomic and cDNA libraries: Preparation and uses

UNIT 3

Animal Cell Technology (12 Hrs)

Cell culture media: Natural and Synthetic

Cell cultures: primary culture, secondary culture, continuous cell lines; Protocols for Primary Cell Culture; Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero); Organ culture; Cryopreservation of cultures.

Hybridoma Technology: Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb

Stem cells: Types of stem cells, applications

Unit 4 (12 Hrs)

Reproductive Technologies & Transgenic Animals

Manipulation of reproduction in animals: Artificial Insemination, *In vitro* fertilization , super ovulation, Embryo transfer, Embryo cloning

Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, - fish; applications

Unit 5

Applied Biotechnology (12 Hrs)

Industry: Fermentation: Different types of Fermentation: Short notes on - Submerged & Solid state; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized; Downstream processing - Filtration, centrifugation, extraction, chromatography, spray drying and lyophilization

Agriculture: fisheries – monoculture in fishes, polyploidy in fishes; DNA fingerprinting

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 - 2018)

SEMESTER - V PAPER -V Hrs/week : 4

ANIMAL BIOTECHNOLOGY

MODEL PAPER

Time: 3 hrs Max. Marks: 60

SECTION - A

Answer any FIVE of the following: 5X8=40

Draw labeled diagrams wherever necessary

1 a. Give a brief account of the different types of Restriction Endonucleases and add a note on the mode of action and applications of Type II restriction enzymes in genetic engineering.

OR

b. Explain the following Cloning vectors:

i. pBR series

ii. pUC series

2 a. Write an essay on different types of gene delivery mechanisms.

OR

b. Describe the southern blotting technique in detail.

3. a. Write an essay on natural and synthetic culture media.

OR

b. Give an account of the different types of stem cells and add note on their applications.

4. a. Explain the following techniques in brief:

i. *in vitro* fertilization

ii. Embryo transfer

OR

b. Write an essay on transgenic animals

5. a. Write an account of different types of Fermentation processes.

OR

b. Write an essay on application of biotechnology in aquaculture

SECTION – B

Answer any FIVE of the following: 5X4=20

Draw labeled diagrams wherever necessary

6. DNA Polymerase
7. DNA ligase
8. Basics of PCR
9. cDNA library
10. Cryopreservation
11. Hybridoma technology
12. Superovulation
13. Lyophilization

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER- VI CORE - VI

COURSE – V: ANIMAL BIOTECHNOLOGY

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs **Max Marks: 60**

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (Tools of Recombinant DNA technology - Enzymes and Vectors)	2	2	24
UNIT – II (Techniques of Recombinant DNA technology)	2	2	24
UNIT – III (Animal Cell Technology)	2	2	24
UNIT – IV (Reproductive Technologies & Transgenic Animals)	1	2	20
UNIT – V (Applied Biotechnology)	1	2	20
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE:

1. **The question paper setters are requested to kindly adhere to the format given in the above table.**
2. **The question paper setters are also requested to set the questions in the following way:**
   a. **80% of questions – memory and Understanding based**
   b. **20% of questions – Creativity, Application and Skill based**
3. **8 Marks questions are to be given 2 each from units 1 to 5**
4. **4 Marks questions are to be given in the following way (1 question each from units 4 & 5 and 2 questions from Units 1, 2 and 3)**
5. **Please avoid repetition of questions.**

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 - 2018)

SEMESTER – V PAPER -V Hrs/week : 3

ANIMAL BIOTECHNOLOGY (PRACTICAL SYLLABUS)

Periods: 24 Max. Marks: 50

Any SIX of the following:

1. Maintenance and storage of*E.coli* DH5 alpha cells.
2. Isolation of Plasmid DNA from *E.coli*
3. Preparation of genomic DNA from *E. coli*/animals/ human.
4. DNA quantification using agarose gel electrophoresis (by using lambda DNA as standard).
5. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.
6. Preparation for insertion and vector for ligation.
7. Performance of ligation reaction using T4 DNA ligase.
8. Preparation of competent cells
9. Transformation of *E. coli* with plasmid DNA using CaCl2,
10. Selection of transformants on X-gal and IPTG
11. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting
12. Interpretation of sequencing gel electropherograms
13. Amplification of DNA by PCR
14. Packing and sterilization of glass and plastic wares for cell culture.
15. Preparation of culture media.

SUGGESTED READING

1. Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.
2. Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier Academic Press, USA
3. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
4. Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press
5. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education
6. Brown TA. (2007). Genomes-3. Garland Science Publishers
7. Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell Publishing, Oxford, U.K.
8. Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994.BIOS Scientific Publishers Limited.
9. Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998. Animal Cell Culture Methods Academic Press.
10. P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).
11. B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

PAPER – VI

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017- 2018)

SEMESTER - V PAPER-VI Hrs/week : 4

ANIMAL HUSBANDRY

MAX. MARKS: 100 HOURS : 60

UNIT – I : **10 Hours**

General introduction to poultry farming. Principles of poultry housing. Poultry houses. Systems of poultry farming. Management of chicks, growers and layers. Management of Broilers.

UNIT – II: **10 Hours**

Poultry feed management – Principles of feeding. Nutrient requirements for different stages of layers and broilers. Methods of feeding. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.

UNIT – III: **10 Hours**

Selection, care and handling of hatching eggs. Egg testing. Methods of hatching. Brooding and rearing. Sexing of chicks.

UNIT- IV: **20 Hours**

Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds. Systems of inbreeding and crossbreeding. Housing of dairy animals – Selection of site for dairy farm; systems of housing – loose, housing system. Conventional dairy barn. Cleaning and sanitation of dairy farm. Weaning of calf. Castration and dehorning. Deworming and Vaccination programme. Records to be maintained in a dairy farm.

UNIT - V: **10 Hours**

Care and management of dairy animals - Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks.

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ZOOLOGY SYLLABUS (W.E.F. 2017- 2018)

SEMESTER - V | PAPER-VI | Hrs/week : 4

ANIMAL HUSBANDRY

MODEL PAPER

Time: 3 hrs | Max. Marks: 60

SECTION - A

Answer any FIVE of the following: **5X8=40**

Draw labeled diagrams wherever necessary

1. a. Write an essay on the principles of poultry farming

OR

b. Discuss the various processes involved in management of chicks, growers and layers.

2. a. Write an essay on various nutritional requirements for layers and broilers at different stages of growth.

OR

b. Give an account of the different types of viral & bacterial diseases (2 each) affecting poultry with an emphasis on the symptoms, control and management of the diseases.

3. a. Write an essay on selection, care and handling of hatching eggs.

OR

b. Explain the process of brooding and rearing.

4. a. Give a detailed account of the criteria involved in selection of site for a dairy farm and add a brief note on different systems of housing.

OR

b. Describe the following:

i. Castration & Dehoming

ii. Deworming and Vaccination

5. a. Write an account of the care and management of calf and heifer.

OR

b. Write an essay on the care and management of bulls and bullocks.

SECTION - B

Answer any FIVE of the following: **5X4=20**

Draw labeled diagrams wherever necessary

6. Poultry house
7. Broilers
8. Aspergillosis
9. Avian influenza
10. Sexing of chicks
11. Indian cattle breed varieties
12. Weaning of calf
13. Management of Dry and pregnant animal

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER- VI

CORE - VI

COURSE – VI: ELECTIVE PAPER: VII-(A) : ANIMAL HUSBANDRY

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs

Max Marks: 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I	2	2	24
UNIT – II	2	2	24
UNIT – III	1	2	20
UNIT – IV	2	2	24
UNIT – V	1	2	20
Total No. of Questions	8	10	
Total Marks including choice			112

NOTE:

1. The question paper setters are requested to kindly adhere to the format given in the above table.
2. The question paper setters are also requested to set the questions in the following way:
   a. 80% of questions – memory and Understanding based
   b. 20% of questions – Creativity, Application and Skill based
3. 8 Marks questions are to be given 2 each from units 1 to 5
4. 4 Marks questions are to be given in the following way (1 question each from units 3 & 5 and 2 questions each from Units 1,2 and 4)
5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017- 2018)

SEMESTER - V PAPER-VI Hrs/week : 3

ANIMAL HUSBANDRY (PRACTICAL SYLLABUS)

Periods:24 Max. Marks: 50

1. Study of various breeds of layers and broilers (photographs)
2. Identification of disease causing organisms in poultry birds (as per theory)
3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration)
4. Study of various activities in a poultry farm (layers and broilers) and submission of a report.
5. Study of various breeds of cattle (photographs/microfilms)
6. Study of various activities carried out in a dairy farm and submission of a report.

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PAPER –VII

(ELECTIVES VIIA, VIIB, VIIC

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | PAPER – VII* | Hrs/week : 4

ELECTIVE PAPER: VII-(A)*

IMMUNOLOGY

MAX. MARKS : 100 | HOURS : 60

Unit - I

1.1 Overview of Immune system (6 Hrs)

1.1.1 Introduction to basic concepts in Immunology

1.1.2 Innate and adaptive immunity

1.2 Cells and organs of Immune system (8 Hrs)

1.2.1 Cells of immune system

1.2.2 Organs of immune system

Unit - II

2.1 Antigens (10 Hrs)

2.1.1 Basic properties of antigens

2.1.2 B and T cell epitopes, haptens and adjuvants

2.1.3 Factors influencing immunogenicity

Unit - III

3.1 Antibodies (10 Hrs)

3.1.1 Structure of antibody

3.1.2 Classes and functions of antibodies

3.1.3 Monoclonal antibodies

Unit - IV

4.1 Working of Immune system (12 Hrs)

4.1.1 Structure and functions of major histocompatibility complexes

4.1.2 Exogenes and Endogenes pathways of antigen presentation and processing

4.1.3 Basic properties and functions of cytokines

Unit - V

5.1 Immune system in health and disease (8 Hrs)

5.1.1 Classification and brief description of various types of hyper sensitivities

5.1.2 Introduction to concepts of autoimmunity and immunodeficiency

5.2 Vaccines (6 Hrs)

5.2.1 General introduction to vaccines

5.2.2 Types of vaccines

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI PAPER - VII * Hrs/week : 4

ELECTIVE PAPER: VII-(A)* : IMMUNOLOGY

MODEL PAPER

Time: 3 hrs Max. Marks: 60

SECTION - A

Answer any FIVE of the following: 5X8=40

Draw labeled diagrams wherever necessary

1. a. Write an essay on acquired immunity.

OR

b. Give an account of the different types of organs of the immune system.

2. a. Define antigen. Explain the structure and properties of antigens.

OR

b. Explain the different factors influencing immunogenicity.

3. a. Give a detailed account of the structure of antibodies with neat, labeled diagrams.

OR

b. Explain any 4 antigen-antibody reactions in detail.

4. a. Write an account on the structure and functions of major histocompatibility complexes.

OR

b. Write an essay on the exogenous and endogenous pathways of antigen presentation & processing.

5. a. Describe various types of hypersensitivity briefly, with diagrams.

OR

b. Write an essay on different types of vaccines.

SECTION – B

Answer any FIVE of the following: 5X4=20

Draw labeled diagrams wherever necessary

6. Innate Immunity
7. T - Lymphocytes
8. B and T cell epitopes, Haptens, Adjuvants – Definition & Examples only
9. Functions of Antibodies
10. Cytokines
11. Autoimmunity
12. Immunodeficiency
13. Immunization programme

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER- VI

CORE - VI

COURSE – VII: ELECTIVE PAPER: VII-(A) : IMMUNOLOGY

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs

Max Marks: 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (Overview of Immune system, Cells & Organs of Immune system)	2	2	24
UNIT – II (Antiggens)	1	2	20
UNIT – III (Antibodies)	1	2	20
UNIT – IV (Working of Immune system)	1	2	20
UNIT – V (Immune system in health & disease, Vaccines)	3	2	28
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE:

1. **The question paper setters are requested to kindly adhere to the format given in the above table.**
2. **The question paper setters are also requested to set the questions in the following way:**
   c. **80% of questions – memory and Understanding based**
   d. **20% of questions – Creativity, Application and Skill based**
3. **8 Marks questions are to be given 2 each from units 1 to 5**
4. **4 Marks questions are to be given in the following way (1 question each from units 2, 3 & 4 and 2 questions from Unit 1 and 3 questions from unit 5)**
5. **Please avoid repetition of questions.**

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM
ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI PAPER – VII* Hrs/week : 3

ELECTIVE PAPER: VII-(A)* : IMMUNOLOGY

(PRACTICAL SYLLABUS)

Periods: 24 Max. Marks: 50

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of
    a. ELISA
    b. Immunoelectrophoresis

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI PAPER – VII* Hrs/week : 4

ELECTIVE PAPER: VII-(B)*

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

MAX. MARKS : 100 HOURS : 60

Unit I: Biomolecules (17 Hrs)

1.1 Carbohydrates - Classification of carbohydrates. Structure of glucose

1.2 Proteins - Classification of proteins. General properties of amino acids

1.3 Lipids - Classification of lipids

1.4 Nucleic acids - DNA – Structure and function; RNA - Structure, types and functions

Unit II: Enzymes and Cellular Metabolism (19 Hrs)

2.1. Introduction to biocatalysis, Enzymes and their classification, Enzymekinetics. Mechanism of action.Inhibition and Regulation

2.2 Carbohydrate Metabolism - Glycolysis, Krebs Cycle, Gluconeogenesis,

2.3 Glycogen metabolism, Review of electron transport chain

Unit - III : Cellular Metabolism (6 Hrs)

3.1 Lipid Metabolism - Biosynthesis and β oxidation of palmitic acid

3.2 Protein metabolism - Transamination, Deamination and Urea Cycle

Unit - IV : Cell Physiology (6 Hrs)

4.1 Transport functions of plasma membrane – Active, passive and facilitated transport

4.2 Cell junctions – Tight junctions, desmosomes, gap junctions

Unit - V:Gene Expression (12 Hrs)

5.1 Gene Expression in prokaryotes (Lac Operon)

5.2 Gene Expression in eukaryotes.

5.3 Transcription and Translation.

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[redacted]

SECTION - A

Answer any FIVE of the following: 5X8=40

Draw labeled diagrams wherever necessary

1. Write an essay on the classification of proteins.

OR

Describe the Watson & Crick model of DNA and functions of DNA.

2. Explain the different reactions involved in Kreb's cycle and add a note on its energy budget.

OR

Write an essay on Oxidative Phosphorylation of glucose.

3. Give an account of the β - oxidation of palmitic acid.

OR

Write an essay on the protein metabolism with an emphasis on transamination & Deamination.

4. Give a detailed account of the transport functions of plasma membrane.

OR

Write an essay of different types of cell junctions with neat, labeled diagrams.

5. Write an essay on the mechanism of gene expression in Prokaryotes.

OR

Define and explain the mechanism of transcription.

SECTION – B

Answer any FIVE of the following: **5X4=20**

Draw labeled diagrams wherever necessary

6. Structure of Glucose
7. Types of RNA
8. Enzyme classification
9. Gluconeogenesis
10. Urea cycle
11. Osmosis
12. Central Dogma
13. Elongation in Translation

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

CORE - VI

SEMESTER- VI

COURSE – VII: ELECTIVE PAPER: VII-(B) : CELLULAR METABLOLISM & MOLECULAR BIOLOGY

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs Max Marks: 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (Biomolecules)	2	2	24
UNIT – II (Enzymes & Cellular Metabolism)	2	2	24
UNIT – III (Cellular Metabolism)	1	2	20
UNIT – IV (Cell Physiology)	1	2	20
UNIT – V (Gene Expression)	2	2	24
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE:

1. **The question paper setters are requested to kindly adhere to the format given in the above table.**
2. **The question paper setters are also requested to set the questions in the following way:**
   e. **80% of questions – memory and Understanding based**
   f. **20% of questions – Creativity, Application and Skill based**
3. **8 Marks questions are to be given 2 each from units 1 to 5**
4. **4 Marks questions are to be given in the following way (1 question each from units 3 & 4 and 2 questions from Unit 1, 2 and 5)**
5. **Please avoid repetition of questions.**

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI PAPER – VII* Hrs/week : 3

ELECTIVE PAPER: VII-(B)*

CELLULAR METABOLISM AND MOLECULAR BIOLOGY (PRACTICAL SYLLABUS)

Periods: 24 Max. Marks: 50

1. Qualitative tests to identify functional groups of carbohydrates in given Solutions (Glucose, Fructose, Sucrose, Lactose)
2. Estimation of total protein in given solutions by Lowry's method.
3. Preparation of permanent slide to show the presence of Barr body in Human female blood cells or cheek cells
4. Estimation of DNA (colorimetric or spectrophotometric method)

SUGGESTED READINGS

J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition .W.H. Freeman and Co.

Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IVEdition. W.H. Freeman and Co.

Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). Harper's Illustrated Karp, G. (2010), Cell and molecular biology : Concepts and experiments. VI edition. John Wiley and sons. Inc.

De Robertis, EDP and De Robertis EMF (2006). Cell and molecular biology. VIII edition. Lippincott Williams and Wilkins, Philadelphia Biochemistry. XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | PAPER – VII* | Hrs/week : 4

ELECTIVE PAPER: VII-(C)*

BIOINFORMATICS

MAX. MARKS : 100 | HOURS : 60

UNIT I - HISTORY, SCOPE AND IMPORTANCE (10 hours)

Important contributions - aims and tasks of Bioinformatics - applications of Bioinformatics - challenges and opportunities - internet basics- HTML introduction to NCBI data model- Various file formats for biological sequences

UNIT II - DATABASES - TOOLS AND THEIR USES (15 hours)

Importance of databases - Biological databases-primary sequence databases; Composite sequence databases- Secondary databases- nucleic acid sequence databases - Protein sequence data bases - structure databases - bibliographic databases - specialized genomic resources- analysis packages

UNIT III - SEQUENCE ALIGNMENT METHODS (15 hours)

Sequence analysis of biological data-Significance of sequence alignment pair wise sequence alignment methods- Use of scoring matrices and gap penalties in sequence alignments- multiple sequence alignment methods - Tools and application of multiple sequence alignment.

UNIT IV - PREDICTIVE METHODS USING DNA AND PROTEIN SEQUENCES (10 hours)

Gene predictions strategies - protein prediction strategies - molecular visualization tools- phylogenetic analysis: Concept of trees- phylogenetic trees and multiple alignments.

UNIT V - DRUG DISCOVERY PROCESS (10 hours)

Discovering a drug - target identification and validation - identifying the lead compound - optimization of lead compound - chemical libraries.

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ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | PAPER – VII* | Hrs/week : 4

ELECTIVE PAPER: VII-(C)*

BIOINFORMATICS

MODEL PAPER

Time: 3 hrs | Max. Marks: 60

SECTION - A

Answer any FIVE of the following: 5X8=40

Draw labeled diagrams wherever necessary

1. a. Write an essay on applications of bioinformatics & add a note on the challenges & opportunities.

OR

b. Describe in detail various file formats for biological sequence.

2. a. Give an account of primary and secondary sequence databases.

OR

b. Explain the following:
   i. Structure databases
   ii. Bibliographic databases

3. a. Write an essay on the sequence analysis of biological data.

OR

b. Describe the different tools and application of multiple sequence alignment.

4. a. Explain the following:
   i. Gene Prediction Strategies
   ii. Protein Prediction Strategies

OR

b. Write an essay on Phylogenetic analysis.

5. a. Write an essay on the discovery, target identification and validation of a drug.

OR

b. Give an account of the identification and optimization of the lead compound.

SECTION - B

Answer any FIVE of the following: 5X4=20

Draw labeled diagrams wherever necessary

6. Aims and tasks of Bioinformatics
7. HTML
8. Protein sequence databases
9. Specialized genomic resources
10. Sequence analysis – Definition and significance
11. Use of Scoring Matrices in sequence alignments
12. Molecular visualization tools
13. Chemical libraries

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017-'18)

SEMESTER- VI | CORE - VI

COURSE – VII: ELECTIVE PAPER: VII-(C) : BIOINFORMATICS

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 3 Hrs | **Max Marks: 60**

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 4 MARKS	ESSAY QUESTIONS 8 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (History, Scope & Importance)	2	2	24
UNIT – II (Databases – Tools & their uses)	2	2	24
UNIT – III (Sequence Alignment Methods)	2	2	24
UNIT – IV (Predictive methods using DNA and Protein sequences)	1	2	20
UNIT – V (Drug discovery process)	1	2	20
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE:

1. **The question paper setters are requested to kindly adhere to the format given in the above table.**
2. **The question paper setters are also requested to set the questions in the following way:**
   - **g. 80% of questions – memory and Understanding based**
   - **h. 20% of questions – Creativity, Application and Skill based**
3. **8 Marks questions are to be given 2 each from units 1 to 5**
4. **4 Marks questions are to be given in the following way (1 question each from units 4 & 5 and 2 questions from Unit 1, 2 and 3)**
5. **Please avoid repetition of questions.**

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI **PAPER – VII*** **Hrs/week : 3**

ELECTIVE PAPER: VII-(C)*

BIOINFORMATICS (PRACTICAL SYLLABUS)

Periods: 24 **Max. Marks: 50**

1. Introduction to Computers.
2. Hands on experience on NCBI databases
3. Sequence alignment with BLASTA and FASTA
4. Construction of Phylogenetic tree.
5. Demonstration of Protein visualization (if software available)

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PAPER – VIII

(CLUSTER ELECTIVES VIIIA, VIIIB, VIIIC)

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CLUSTER PAPER – VIII* Hrs/week : 4

CLUSTER ELECTIVE : VIII-A* : MEDICAL DIAGNOSTICS

VIII-A-1* : CLINICAL BIOCHEMISTRY

MAX. MARKS : 100 HOURS : 60

NIT – I: Basic Medical Laboratory Principles and Procedures: **10 Hours**

Introduction to clinical biochemistry. Glassware. Solutions and Reagents – Normal, Molar, percent, buffer solutions and indicators. Equipments and Instruments – Centrifuges, Hot air oven, Incubator, Water bath, Photometer, Spectrophotometer, Analyzers. Quality Control.

UNIT – II: Clinical Biochemistry of Carbohydrates, Proteins & Lipids: **20 Hours**

Elementary classification and metabolism of carbohydrates. Properties of carbohydrates. Regulation of blood sugar and Diabetes. Glucose Tolerance Test. Glycosylated Haemoglobin. General classification of proteins. Structure of proteins. Summary of protein digestion and aminoacid metabolism. Determination of serum proteins. General lipid metabolism. Primary and Secondary Dyslipoproteinemias.

UNIT – III: Clinical Biochemistry of Enzymes: **10 Hours**

Enzymes as catalysts. Enzyme specificity. Factors which affect enzyme activity. Coenzymes and Isoenzymes. Enzymes classification and nomenclature. Enzymes in clinical diagnosis. Use of enzymes as reagents. Laboratory determinations of enzymes – Clinical significance of SGOT, SGPT, S.ALP, S.ACP, Serum Amylase.

UNIT- IV: Water & Mineral Metabolism and Acid-Base Balance: **10 Hours**

Body fluid distribution. Factors which influence the distribution of body water. Mineral metabolism. Importance of the trace elements. Flame photometry. Action of buffer systems. Disturbances in acid-base balance

UNIT - V: Function Tests: **10 Hours**

Diseases of the kidneys. Creatine metabolism. Bile pigment metabolism. Disordered Bilirubin metabolism. Hepatic Jaundice and Post hepatic jaundice. Ischemic heart disease. Clinical significance of gastric analysis.

SUGGESTED READINGS

- Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
- Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
- Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training PAPERs
- Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
- Robbins and Cortan, Pathologic Basis of Disease, VIIIEdition.
- Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CLUSTER PAPER – VIII* Hrs/week : 4

CLUSTER ELECTIVE : VIII-A* : MEDICAL DIAGNOSTICS

VIII-A-1* : CLINICAL BIOCHEMISTRY

MODEL PAPER

Time : 3 hrs **Max. Marks : 60**

SECTION - A

Answer any FIVE of the following: **5X8=40**

Draw labeled diagrams wherever necessary

1. a. Write an essay on various instruments used in clinical Bio - Chemistry

OR

b. Explain Protein digestion and Amino Acid Metabolism

2. a. Write an essay on Carbohydrate Metabolism

OR

b. Explain in detail Lipid Metabolism

3. a. Explain the importance of enzymes in clinical diagnosis

OR

b. Explain the following:

i. Enzyme Specificity

ii. Factors affecting enzyme activity

4. a. Write an essay on action Buffer systems and disturbance in acid – base balance

OR

b. Write an essay on body fluid distribution and factors which influence it

5. a. Write an essay on the diseases of kidney

OR

b. Write an essay on the hepatic jaundice and post hepatic jaundice complications

SECTION - B

Answer any FIVE of the following : **5X4=20**

Draw labeled diagrams wherever necessary

6. Incubator
7. Properties of Carbohydrates
8. Glucose tolerance Test
9. Co - Enzymes
10. Enzymes Nomenclature
11. Importance of trace elements
12. Ischemic heart disease
13. Clinical significance of gastric analysis

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Dr. V.S KRISHNA GOVT. DEGREE & PG COLLEGE (A),
VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CORE –VI Hrs/week : 4

COURSE - VI : CLUSTER ELECTIVE : VIII-A : MEDICAL DIAGNOSTICS

VIII-A-1 : CLINICAL BIOCHEMISTRY

BLUE PRINT FOR PAPER SETTER

Time : 3 hrs Max. Marks : 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 04 MARKS	ESSAY QUESTIONS 08 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I	01	01	12
UNIT II	02	03	32
UNIT III	02	02	24
UNIT IV	01	02	20
UNIT V	02	02	24
Total no. Questions	08	10	
Total Marks including choice			112

NOTE :

1. The Question paper setters are requested to kindly adhere to the format given in the above table.
2. The Question paper setters are also requested to set the questions in the following way:
   a. 80% of questions – memory and understanding based.
   b. 20% of questions – Creativity, application and skill based.
3. 8 Marks questions are to be given 2 each from units 1 to 5
4. 4 Marks questions are to be given in the following way (1 question each from units 1 & 4 and 2 questions from Unit 2, 3 and 5)
5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-A* : MEDICAL DIAGNOSTICS

VIII-A-2* : HAEMATOLOGY

MAX. MARKS : 100 | HOURS : 60

UNIT – I: Laboratory Preparation in Haematology: **10 Hours**

Introduction to practical. Basic requirements. Collection of blood. Anticoagulants and effects of anticoagulants on blood cell morphology. Effects of storage of blood.

UNIT – II: Routine Haematology: **14 Hours**

Composition of blood. Haemoglobin synthesis. Various haemoglobins. Haemopoietic system of the body. Blood cell counts. Erythropoiesis, Leucopoiesis and development of blood corpuscles. Thrombopoiesis. Laboratory technique of haemocytometry. Clinical significance of Total erythrocyte count, total leucocyte count, differential count, erythrocyte sedimentation rate and platelet count.

UNIT – III: Haemostasis and Haematological Diseases: **20 Hours**

General consideration of blood coagulation. Mechanism of coagulation. The fibrinolytic mechanism. Clinical significance of routine coagulation tests. Anaemia. Various types of anaemias – Iron deficiency anaemia, Aplastic anaemia, Perinicious anaemia, Sideroblastic anaemia and Sickel cell anaemia. Types of Leukemia – Myeloid leukemia and Lymphoid leukemia. Other haematological diseases – HDNB, Thalassaemia, Leukaemia. Parasitic infections of blood – structure and life cycle of Plasmodium vivax, types of malaria, Structure and life cycle of Wuchereria bancrofti.

UNIT- IV: Automation in Haematology: **8 Hours**

General considerations. Blood cell counters. Flow through cytochemical differential counter. Automated coagulated systems.

UNIT - V: Immunohaematology and Blood banking: **8 Hours**

Human Blood Group Systems. Inheritance of blood group systems. Blood transfusion.

SUGGESTED READINGS

- Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
- Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology. II Edition, Bhalani Publishing House
- Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training PAPERs
- Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
- Robbins and Cortan, Pathologic Basis of Disease, VIIIEdition.
- Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CORE –VI Hrs/week : 4

COURSE - VI : CLUSTER ELECTIVE : VIII-A : MEDICAL DIAGNOSTICS

VIII-A-2 : HAEMATOLOGY

BLUE PRINT FOR PAPER SETTER

Time : 3 hrs **Max. Marks : 60**

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 04 MARKS	ESSAY QUESTIONS 08 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I	01	01	12
UNIT II	02	03	32
UNIT III	03	04	44
UNIT IV	01	01	12
UNIT V	01	01	12
Total no. of questions	08	10	
Total Marks including Choice			112

NOTE :

1. The Question paper setters are requested to kindly adhere to the format given in the above table.
2. The Question paper setters are also requested to set the questions in the following way:
   a. 80% of questions – memory and understanding based.
   b. 20% of questions – Creativity, application and skill based.
3. 8 Marks questions are to be given in the following way (1a from unit 1; 1b, 2a and 2 b from unit 2; 3a, 3b, 4a and 4b from Unit 3; 5a from unit 4 and 5b from unit 5)
4. 4 Marks questions are to be given in the following way (1 question each from units 1, 4 & 5; 2 questions from Unit 2 and 3 questions from unit 3)
5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-A* : MEDICAL DIAGNOSTICS

VIII-A-3* : CLINICAL MICROBIOLOGY

MAX. MARKS : 100 | HOURS : 60

UNIT – I: Introduction to Clinical Microbiology: **10 Hours**

Introduction to microbiology. Introduction to bacteriology. Classification of bacteria. Basic features of bacteria. Factors influencing the growth of bacteria. Morphology of bacteria. Normal bacterial flora of the body. Pathogenic microorganisms.

UNIT – II: Clinical Bacteriology Laboratory & Staining methods: **15 Hours**

Requirements of a microbiological lab — safe disposal strategies. Safetypractices to be followed in a microbiological laboratory. Sterilization and disinfection. Requirements in a microbiological lab. Microscopy. Automation in Bacteriology. Introduction to Staining. Gram Staining. Acid-Fast Staining. Capsule Staining. Transfer of bacteria.

UNIT – III: Culturing of Microorganisms and Identification of Bacteria: **15 Hours**

Composition of culture media. Different types of culture media. Preparation of culture media. Inoculation of culture media. Culturing of anaerobes and different types of culture media used. Use, preparation and quality control of various culture media. Identification of bacteria – staining reactions, cultural characteristics and biochemical properties. Study of Gram Negative Bacteria – Bacilli and Cocci. Study of Gram Positive Bacteria – Gram positive Cocci, Anaerobic bacteria, study of genus – Bacillus and Corynebacterium. Study of Mycobacteria, Spirocahetes and Rickettsia. Basic sterilization principles - autoclaving.

UNIT- IV: Clinical Mycology and Virology: **10 Hours**

Basic morphological classification of clinically important fungi. Parasitic fungi – Superficial Mycoses and Dermatophytes, Subcutaneous Mycoses, Intermediate Superficial Deep Mycoses and Deep or Systemic mycoses. Classification based on symptomatology. Some important viruses and related diseases (Measles viruses, Influenza viruses, Rotaviruses, PolioviusesHerpes viruses, Rabies viruses, Hepatitis viruses. . General transmission routes for viruses.

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-A* : MEDICAL DIAGNOSTICS

VIII-A-3* : CLINICAL MICROBIOLOGY

MODEL PAPER

Time: 3 hrs **Max. Marks: 60**

SECTION - A

Answer any FIVE of the following: **5X8=40**

Draw labeled diagrams wherever necessary

1. a. Write an essay on the morphology of bacteria and factors influencing their growth

OR

b. Describe the normal bacterial flora of the body and any two pathogenic micro - organisms

2. a. Write an essay on the requirements in a microbiological lab

OR

b. Write an essay on staining of bacteria

3. a. Write an essay on the composition and types of culture media

OR

b. Explain the clinical importance of Bacillus and Cornybacterium

4. a. Write an essay on parasitic Fungi

OR

b. Explain the chemical importance of Measles, Influenza and Hepatitis virus

5. a. Explain the structure, properties and functions of antibody

OR

b. Write an essay on the various types serodiagnostic tests

SECTION - B

Answer any FIVE of the following: **5X4=20**

Draw labeled diagrams wherever necessary

6. Basic features of Bacteria
7. Sterilisation
8. Safe disposal strategies
9. Gram negative bacteria
10. Autoclaving
11. Rotoviruses
12. Parasitic fungi
13. ELISA

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CORE –VI Hrs/week : 4

COURSE - VI : CLUSTER ELECTIVE : VIII-A : MEDICAL DIAGNOSTICS

VIII-A-3 : CLINICAL MICROBIOLOGY

BLUE PRINT FOR PAPER SETTER

Time : 3 hrs **Max. Marks : 60**

UNIT NO.	SHORT ANSWER QUESTIONS 04 MARKS	ESSAY QUESTIONS 08 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I	01	02	20
UNIT II	02	02	24
UNIT III	02	02	24
UNIT IV	02	02	24
UNIT V	01	02	20
Total no. of questions	08	10	
Total Marks including choice			112

NOTE :

1. The Question paper setters are requested to kindly adhere to the format given in the above table.
2. The Question paper setters are also requested to set the questions in the following way:
   a. 80% of questions – memory and understanding based.
   b. 20% of questions – Creativity, application and skill based.
3. 8 Marks questions are to be given 2 each from units 1 to 5
4. 4 Marks questions are to be given in the following way (1 question each from units 1 & 5 and 2 questions from Unit 2, 3 and 4)
5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY PRACTICAL SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CLUSTER PAPER – VIII* Hrs/week : 4

CLUSTER ELECTIVE : VIII-A* : MEDICAL DIAGNOSTICS

PRACTICAL SYLLABUS

Periods: 72 (24+24+24) **Max. Marks: 50 x 3 = 150**

24 Hrs **PRACTICAL – 1 CLINICAL BIOCHEMISTRY** 50 M

- Collection of blood specimen and serum preparation.
- Blood glucose and urine glucose estimation.
- LFT, Kidney Function and Cardiac Profile tests.
- Determination of serum proteins, SGOT, SGPT, S.ALP, S.ACP
- Determination of sodium, potassium and chlorides

24 Hrs **PRACTICAL – 2 HAEMATOLOGY & CLINICAL MICROBIOLOGY** 50 M

- Routine haematological tests – Blood smear preparation, TC, DC, ESR, Platelet count.
- Determination of Haemoglobin.
- Determination of PCV.
- Determination of bleeding time.
- Determination of blood clotting time.
- Blood Grouping.
- Preparation of nutrient agar, culture plates and isolation of bacteria on nutrient agar plate.
- Study of permanent slides of *Candida albicans, Enterobacter sps, Pseudomonas, Salmonella sps, Shigella sps, Staphylococcusaureus*, *Streptococcus pyogenes* and *Vibrio cholera*.
- Staining methods – Albert's and Gram's staining methods.
- Hepatitis test and Pregnancy test using ELISA
- VDRL qualitative and quantitative test.
- WIDAL slide agglutination and tube agglutination test.

24 Hrs **PRACTICAL - III:PROJECT WORK** **50 M**

Associated with a Clinical Diagnostic Laboratory.

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-B* : AQUACULTURE

VIII-B-1* : PRINCIPLES OF AQUACULTURE

MAX. MARKS : 100 | HOURS : 60

Unit – I

1.1 Introduction / Basics of Aquaculture (10 Hrs)

1.1.1 Definition, Significance and History of Aquaculture

1.1.2 Present status of Aquaculture – Global and National scenario

1.1.3 Major cultivable species for aquaculture: freshwater, brackish water and marine.

1.1.4 Criteria for the selection of species for culture

Unit – II

2.1 Types of Aquaculture (8 Hrs)

2.1.1 Freshwater, Brackishwater and Marine

2.1.2 Concept of Monoculture, Polyculture, Composite culture, Monosex culture and Integrated fish farming

2.2Culture systems (4 Hrs)

2.2.1 Ponds, Raceways, Cages, Pens, Rafts and water recirculating systems

2.3Culture practices (4 Hrs)

2.3.1Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish and shrimp.

Unit – III

3.1 Design and construction of aquafarms (4 Hrs)

3.1.1Criteria for the selection of site for freshwater and brackish water pond farms

3.1.2 Design and construction of fish and shrimp farms

3.2 Seed resources (3 Hrs)

3.2.1 Natural seed resources and Procurement of seed for stocking: Carp and shrimp

3.3 Nutrition and feeds (3 Hrs)

3.3.1 Nutritional requirements of a cultivable fish and shellfish

3.3.2 Natural food and Artificial feeds and their importance in fish and shrimp culture

Unit – IV

4.1Management of carp culture ponds (8 Hrs)

4.1.1 Culture of Indian major carps: Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization; Stocking management – Stocking density and stocking; Post-stocking management – Feeding, water quality, growth and health care; and Harvesting ofponds

4.2Culture of giant freshwater prawn, *Macrobrachium rosenbergii* (3 Hrs)

Unit – V

5.1Culture of shrimp (*Penaeus monodon* or *Litopenaeus vannamei*) **(4 Hrs)**

5.2 Culture of pearl oysters (3 Hrs)

5.3 Culture of seaweeds-species cultured, culture techniques, important by-products, prospects **(3 Hrs)**

5.4 Culture of ornamental fishes – Setting up and maintenance of aquarium; and breeding **(3 Hrs)**

SEMESTER - VI CLUSTER PAPER - VIII Hrs/week : 4

CLUSTER ELECTIVE : VIII-B* : AQUACULTURE

VIII-B-1* : PRINCIPLES OF AQUACULTURE

MODEL PAPER

Time : 3 hrs Max. Marks : 60

SECTION - A

Answer any FIVE of the following : **5x8=40**
Draw labeled diagrams wherever necessary

1. a. Write an essay on Species selection criteria in aquaculture and major freshwater cultivable species.

OR

b. Give an account of aquaculture in Global scenario.

2. a. Write an essay on integrated aquaculture.

OR

b. Describe the various culture practices of shrimp.

3. a. Write an essay on the natural seed resources and procurement of seed for carp.

OR

b. Give an account of various natural and artificial feeds used in fish culture.

4. a. Explain the various pre-stocking pond management practices in carp culture.

OR

b. Write an essay on freshwater prawn culture.

5. a. Write an essay on the shrimp culture.

OR

b. Write an essay on pearl culture.

SECTION - B

Answer any FIVE of the following : **5x4 =20**
Draw labeled diagrams wherever necessary.

6. Cultivable species of brackish water.
7. Present status of aquaculture in India.
8. Polyculture.
9. Cage culture.
10. Criteria for site selection.
11. Artificial feeds.
12. Algal blooms.
13. Ornamental fishes.

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CORE –VI Hrs/week : 4

COURSE - VI : CLUSTER ELECTIVE : VIII-B : AQUACULTURE

VIII-B-1 : PRINCIPLES OF AQUACULTURE

BLUE PRINT FOR PAPER SETTER

Time : 3 hrs Max. Marks : 60

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 04 MARKS	ESSAY QUESTIONS 08 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I	02	02	24
UNIT II	02	02	24
UNIT III	02	02	24
UNIT IV	01	02	20
UNIT V	01	02	20
Total no. Questions	08	10	
Total Marks including choice			112

NOTE :

1. The Question paper setters are requested to kindly adhere to the format given in the above table.
2. The Question paper setters are also requested to set the questions in the following way:
   a. 80% of questions – memory and understanding based.
   b. 20% of questions – Creativity, application and skill based.
3. 8 Marks questions are to be given 2 each from units 1 to 5
4. 4 Marks questions are to be given in the following way (1 question each from units 4 & 5 and 2 questions from Unit 1, 2 and 3)
5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-B* : AQUACULTURE

VIII-B-2* : AQUACULTURE MANAGEMENT

MAX. MARKS : 100 | HOURS : 60

Unit – I

1.1Breeding and Hatchery Management (12 Hrs)

1.1.1 Bundh Breeding and Induced breeding of carp by Hypophysation; and use of synthetic hormones

1.1.2Types of fish hatcheries; Hatchery management of Indian major carps

1.1.3 Breeding and Hatchery management of *Penaeus monodon*/ *Litopenaeus vannamei*

1.1.4 Breeding and Hatchery management of giant freshwater prawn.

Unit – II

2.1 Water quality Management (10 Hrs)

2.1.1Water quality and soil characteristics suitable for fish and shrimp culture

2.1.2 Identification of oxygen depletion problems and control mechanisms in culture ponds

2.1.3 Aeration: Principles of aeration and Emergency aeration

2.1.4 Liming materials, Organic manures and Inorganic fertilizers commonly used and their implications in fish ponds

Unit – III

3.1 Feed Management (12 Hrs)

3.1.1Live Foods and their role in shrimp larval nutrition.

3.1.2 Supplementary feeds: Principal foods in artificial diets; Types of feeds; Feed additives and Preservatives; role of probiotics.

3.1.3 Feed formulation and manufacturing; Feed storage

3.1.4 Feeding strategies: Feeding devices, feeding schedules and ration size; Feed evaluation- feed conversion efficiencies and ratios

Unit – IV

4.1 Disease Management (16 Hrs)

4.1.1 Principles of disease diagnosis and health management;

4.1.2 Prophylaxis, Hygiene and Therapy of fish diseases

4.1.3 Specific and non-specific defense systems in fish; Fish immunization and vaccination

4.1.4Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish ponds

4.1.5Etiology, Symptoms, prophylaxis and therapy of common shrimp diseases in shrimp ponds

Unit – V PRV

5.1 Economics and Marketing (2 Hrs)

5.1.1 Principles of aquaculture economics – Capital costs, variable costs, cost-benefit analysis

5.1.2Fish marketing methods in India, Basic concepts in demand and price analysis

5.2 Fisheries Extension (2 Hrs)

5.1.3 Fisheries Training and Education in India; Role of extension in community development.

5.3 Fish Genetics (6 Hrs)

5.1.4 Genetic improvement of fish stocks – Hybridization of fish.

5.1.5 Gynogenesis, Androgenesis, Polyploidy, Transgenic fish, Cryopreservation of gametes, Production of monosex and sterile fishes and their significance in aquaculture.

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S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-B* : AQUACULTURE

VIII-B-2* : AQUACULTURE MANAGEMENT

MODEL PAPER

Time : 3 hrs **Max. Marks : 60**

SECTION – A

Answer any FIVE of the following : **5x8=40**
Draw labeled diagrams wherever necessary

1. a. Write an essay on induced breeding in major carps.

   OR

   b. Explain the hatchery management practices involved Penaeus monodon culture.

2. a. Give an account of soil and water quality parameters involved in fish culture.

   OR

   b. Write in detail various fertilizers and liming materials used in aquaculture.

3. a. Write an essay on the supplementary feeds.

   OR

   b. Write an essay on feeding strategies in aquaculture.

4. a. Write an essay on fish disease management.

   OR

   b. Explain the specific and non-specific defense mechanisms in fish.

5. a. Give a detailed account of Fisheries training and Education in India.

   OR

   b. Write an essay on the genetic improvement of fish stocks.

SECTION – B

Answer any FIVE of the following : **5x4=20**
Draw labeled diagrams wherever necessary

6. Types of fish hatcheries.
7. Giant freshwater prawn breeding.
8. Oxygen depletion in aquaculture ponds.
9. Aeration.
10. Role of probiotics in aquaculture.
11. Fish health management.
12. Common shrimp diseases.
13. Fish marketing methods in India.

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CORE –VI Hrs/week : 4

COURSE - VI : CLUSTER ELECTIVE : VIII-B : AQUACULTURE

VIII-B-2 : AQUACULTURE MANAGEMENT

BLUE PRINT FOR PAPER SETTER

Time : 3 hrs **Max. Marks : 60**

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 04 MARKS	ESSAY QUESTIONS 08 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I	02	02	24
UNIT II	02	02	24
UNIT III	01	02	20
UNIT IV	02	02	24
UNIT V	01	02	20
Total no. of questions	08	10	
Total Marks including Choice			112

NOTE :

1. The Question paper setters are requested to kindly adhere to the format given in the above table.
2. The Question paper setters are also requested to set the questions in the following way:
   a. 80% of questions – memory and understanding based.
   b. 20% of questions – Creativity, application and skill based.
3. 8 Marks questions are to be given 2 each from units 1 to 5
4. 4 Marks questions are to be given in the following way (1 question each from units 3 & 5 and 2 questions from Unit 1, 2 and 4)
5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 - 18)

SEMESTER - VI | CLUSTER PAPER - VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-B* : AQUACULTURE

VIII-B-3* : POST HARVEST TECHNOLOGY

MAX. MARKS : 100 | HOURS : 60

Unit – I YSP

1.1 Handling and Principles of fish Preservation (12 Hrs)

1.1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), spoilage in marine fish and freshwater fish.

1.1.2 Principles of preservation– cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to lowradiation of gamma rays.

Unit – II TLV

2.1. Methods of fish Preservation (12 Hrs)

2.1.1 Traditional methods - sun drying, salt curing, pickling and smoking.

2.1.2 Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Unit – III BK

3.1 Processing and preservation of fish and fish by-products (10 Hrs)

3.1.1Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.

3.1.2 Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.

3.2Seaweed Products (4 Hrs)

3.2.1Preparation of agar, algin and carrageen. Use of seaweeds as food for humanconsumption, in diseasetreatment and preparation of therapeutic drugs.

Unit – IV PRV

4.1Sanitation and Quality control (10 Hrs)

4.2.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

4.2.2 Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

4.2 Regulatory affairs in industries (2 Hrs)

Unit – V DR VRB

5.1 Quality Assurance, Management and Certification (10 Hrs)

5.1.1Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

5.1.2 National and International standards – ISO 9000: 2000 Series of Quality Assurance System, *Codex Alimentarius*.

REFERENCE BOOKS

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-B* : AQUACULTURE

VIII-B-3* : POST HARVEST TECHNOLOGY

MODEL PAPER

Time : 3 hrs **Max. Marks : 60**

SECTION – A

Answer any FIVE of the following : **5x8=40**
Draw labeled diagrams wherever necessary

1. a. Explain the principles involved in the handling, storage and transport of fresh fish.

   OR

   b. Write an essay on the various principles in the fish preservation.

2. a. Write an essay on the traditional methods of fish preservation.

   OR

   b. Write an essay on the advanced methods of fish preservation.

3. a. Write in detail about the various by-products of fish.

   OR

   b. Give a detailed account of uses of seaweeds.

4. a. Explain about the sanitation aspects in processing plants.

   OR

   b. Write an essay on the Quality control procedures during and after processing of fish and fishery products.

5. a. Explain the Standard Operating Procedures (SOPs) and the Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

   OR

   b. Write an essay on the National and International Standards in seafood Quality Assurance Systems.

SECTION – B

Answer any FIVE of the following : **5x4=20**
Draw labeled diagrams wherever necessary

6. Spoilage in marine fish.
7. Fish preservatives
8. Traditional fish preservation methods.
9. Fish oil.
10. Preparation of Agar.
11. Regulatory affairs in industries.
12. GLPs.
13. *Codex Alimentaris.*

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CORE –VI Hrs/week : 4

COURSE - VI : CLUSTER ELECTIVE : VIII-B : AQUACULTURE

VIII-B-3 : POST HARVEST TECHNOLOGY

BLUE PRINT FOR PAPER SETTER

Time : 3 hrs **Max. Marks : 60**

UNIT NO.	SHORT ANSWER QUESTIONS 04 MARKS	ESSAY QUESTIONS 08 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I	02	02	24
UNIT II	01	02	20
UNIT III	02	02	24
UNIT IV	01	02	20
UNIT V	02	02	24
Total no. of questions	08	10	
Total Marks including choice			112

NOTE :

1. The Question paper setters are requested to kindly adhere to the format given in the above table.
2. The Question paper setters are also requested to set the questions in the following way:
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4. 4 Marks questions are to be given in the following way (1 question each from units 2 & 4 and 2 questions from Unit 1, 3 and 5)
5. Please avoid repetition of questions.

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 9

CLUSTER ELECTIVE : VIII-B* – AQUACULTURE

(PRACTICAL SYLLABUS)

Periods : 72 (24+24+24) **Max. Marks : 50 x 3 = 150**

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24 Hrs **PRACTICAL: I** 50 M

Cultivable fishes

1. Identification and study of important cultivable and edible fishes - Any ten
2. Identification and study of important cultivable and edible crustaceans - Any five
3. Identification and study of common aquarium fishes – Any five
4. General description and recording biometric data of a given fish.

Diseases

1. Identification and study of fish and shrimp diseases - Using specimens / pictures
2. External examination of the diseased fish – diagnostic features and procedure.
3. Autopsy of fish – Examination of the internal organs.
4. Determination of dosages of chemicals and drugs for treating common diseases.

Pond Management

1. Water Quality -Determination of temperature, pH, salinity in the pond water sample; Estimation of dissolved oxygen, free carbondioxide, total alkalinity, total hardness, phosphates and nitrites.
2. Soil analysis – Determination of soil texture, pH, conductivity, available nitrogen, available phosphorus and organic carbon.
3. Identification and study of common zooplankton, aquatic insects and aquatic weeds – Each 5

24 Hrs **PRACTICAL – II** 50 M

Nutrition

1. Identification and study of Live food organisms – Any five
2. Formulation and preparation of a balanced fish feed
3. Estimation of Proximate composition of aquaculture feeds – Proteins, carbohydrates, lipids, moisture, ash content.
4. Gut content analysis to study artificial and natural food intake.

Post harvest Technology

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products, examination of salt, protein, moisture in dried / cured products, examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
3. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
4. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet, plan form and corrective action procedures in processing of fish.

24Hrs **PRACTICAL – III** 50 M

Project Work

Visit to a fish breeding centre / fish farms and submit a project report

or

Visit to a feed manufacturing unit and submit a project report

or

Visit to a shrimp hatchery / shrimp farms and submit a project report

or

Visit to a shrimp processing unit and submit a project report

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-C* : SERICULTURE

VIII-C-1* : GENERAL SERICULTURE, MULBERRY CULTIVATION & MANAGEMENT

MAX. MARKS : 100 | HOURS : 60

Unit - I : Introduction (8 Hrs)

1.1 Definition, history and present status of Sericulture

1.2 Types of silk worms and their food plants

1.3 Prospects of Sericulture in India - Sericulture industry in different states, employment, potential in mulberry and non mulberry Sericulture

Unit - II : Morphology of mulberry plant (12 Hrs)

2.1 Common varieties of mulberry used in India

2.2 Characters of root, stem and leaf

2.3 Anatomy of root, stem and leaf

2.4 Male and female reproductive organs, pollination, fertilization, development of seed.

Unit - III : Requirements for mulberry cultivation (12 Hrs)

3.1 Physical and chemical properties of soil and its nature

3.2 Soil moisture and water requirements

3.3 Climatic conditions - Temperature, photoperiod, humidity and rain fall

Unit - IV : Mulberry management (12 Hrs)

4.1 Land preparation - leveling and ploughing

4.2 Irrigation - drip, sprinkler or flood irrigation, weeding

4.3 Manuring - organic, inorganic and biofertilizers

4.4 Harvesting - leaf picking, shoot-leaf harvesting, branch cutting, leaf storage

Unit - V : Diseases and pests of mulberry (16 Hrs)

5.1 Fungal and bacterial diseases - Powdery mildew, red rust and leaf spot caused by fungi
Mulberry wilt caused by bacteria
Symptoms; mechanical and chemical control

5.2 Nematode and mycoplasm diseases - Mulberry root-knot and mulberry root rot (nematode diseases), Mycoplasm and viral mulberry disease, Symptoms; mechanical and chemical control

5.3 Caterpillars - Bihar hairy caterpillar, semilooper
Bugs - Leaf hoppers and scale insects
Beetles - Girdle beetle, powder pest beetle

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-C* : SERICULTURE

VIII-C-1* : GENERAL SERICULTURE, MULBERRY CULTIVATION & MANAGEMENT

MODEL PAPER

Time : 3 hrs **Max. Marks : 60**

SECTION – A

Answer any FIVE of the following : **5 x 8 = 40**

Draw labeled diagrams wherever necessary

1. a. Write an essay on types of silk worms and their food plants

OR

b. Discuss briefly about the Sericulture industry in different states and its employment ?

2. a. Write an essay on common varieties of mulberry used in india ?

OR

b. Write an essay on male and female reproductive organs of mulberry plant ?

3. a. Discuss the physical and chemical properties of soil in mulberry cultivation ?

OR

b. Write an essay on the climatic conditions of mulberry cultivation ?

4. a. Write an essay on irrigation in mulberry management ?

OR

b. Write an essay on the harvesting techniques of mulberry management ?

5. a. What are the fungal and bacterial diseases in mulberry plants discuss them briefly?

OR

b. Write an essay on caterpillars and bugs of mulberry plants?

SECTION – B

Answer any FIVE of the following : **5 x 4 = 20**

Draw labeled diagrams wherever necessary

6. Definition of sericulture
7. Potential in mulberry culture
8. Anatomy of stem of the mulberry plant
9. Pollination of the mulberry plant
10. Soil moisture
11. Biofertilizers
12. Nematode diseases
13. Beetles

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Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER-IV

CORE-IV

COURSE- VI CLUSTUER ELECTIVE : VIII-C-1

GENERAL SERICULTURE, MULBERRY CULTIVATION AND MANAGEMENT

BLUE PRINT FOR QUESTION PAPER SETTER

Time : 3hours **Max marks: 60**

MODULE NO. & NAME	SHORT ANSWER QUESTIONS (4 MARKS)	ESSAY QUESTIONS (8 MARKS)	MARKS ALLOTED TO THE UNIT
UNIT – I (Introduction)	2	2	24
UNIT – II (Morphology of mulberry plant)	2	2	24
UNIT– III (Requirements for mulberry cultivation)	1	2	20
UNIT – IV (Mulberry management)	1	2	20
UNIT – V (Diseases and pests of Mulberry)	2	2	24
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE:

1. **The question paper setters are requested to kindly adhere to the format given in the above table.**
2. **The question paper setters are also requested to set the questions in the following way:**
   a. **80% of questions – memory and Understanding based**
   b. **20% of questions – Creativity, Application and Skill based**
3. **8 Marks questions are to be given 2 each from units 1 to 5**
4. **4 Marks questions are to be given in the following way (1 question each from units 3 & 4 and 2 questions each from Units 1, 2 and 5)**
5. **Please avoid repetition of questions.**

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-C* : SERICULTURE

VIII-C-2* : BIOLOGY OF MULBERRY SILKWORM AND SILKWORM REARING TECHNOLOGY

MAX. MARKS : 100 | HOURS : 60

Unit - I : Morphology of silk worm (10 Hrs)

1.1 Egg - External and internal morphology and colour changes

1.2 Larva - Mouth parts, legs, prolegs, spiracles, eyes, claspers, integumentary hair and sexual markings

1.3 Pupa – Male and female morphology and sexual dimorphism

1.4 Adult – Mouth parts, antennae, wings and external genitalia

Unit - II : Anatomy and physiology of Mulberry silk worm (12 Hrs)

2.1 Digestive system of larva - Structure and physiology of digestion

2.2 Silk glands of larva – Structure, development and mechanism of silk synthesis

2.3 Circulatory system of larva – Blood vessel, haemolymph and cells

2.4 Reproductive system of adult – Mechanism of egg development

2.5 Endocrine glands in larva and pupa, their secretions and hormonal control on development

2.6 Roll of pheromone in mating

Unit - III : Silk worm rearing house and appliances (12 Hrs)

3.1 Construction of ideal rearing house (CSB model)

3.2 Early age rearing appliances

3.3 Late age rearing appliances – Trays, ant wells, stands and racks, paraffin papers, rubber foam pads, nets, chopsticks and feathers

3.4 Mountages – Bamboo, plastic, nylon, balances (digital)

Unit - IV : Disinfection and feeding appliances and silk worm technology (14 Hrs)

4.1 Disinfection of ants, appliances

4.2 Disinfectant appliances – Sprayers and dusters

4.3 Feeding appliances – Leaf chamber, chopping knife, chopping board

4.4 Humidity and temperature measuring devices

4.5 Commercial races – Multivoltine, bivoltine and hybrid races

4.6 Seed collection, cards, loose eggs, incubation, hatching, brushing, rearing of early instars, rearing of late instars

4.7 Mounting and cocoon production

4.8 Harvesting and storage of cocoons

Unit - V : Diseases of silk worms and their management (12 Hrs)

5.1 Viral diseases – Nuclear polyhydrosis disease, infectious flacherie viral disease (symptoms, prevention, control and management)

5.2 Protozoan disease – Pebrine disease (symptoms, prevention, control and management)

5.3 Bacterial diseases – Septicemia,Toxicosis (symptoms, prevention, control and management)

5.4 Fungal diseases – Muscardine disease, aspergillosis (symptoms, prevention, control and management)

5.5 Pests – Tachinid fly, dermistid beetle (damage, control measures)

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-C* : SERICULTURE

VIII-C-2* : BIOLOGY OF MULBERRY SILKWORM AND SILKWORM REARING TECHNOLOGY

MODEL PAPER

Time : 3 hrs **Max. Marks : 60**

SECTION - A

Answer any FIVE of the following : **5 x 8 = 40**

Draw labeled diagrams wherever necessary

1. a. Write an essay on external and internal morphology of Egg

OR

b. Write an essay on sexual dimorphism of male and female Pupa

2. a. Write an essay on reproductive system of adult silk worm

OR

b. Discuss the role of pheromone in mating

3. a. Write an essay on construction of ideal rearing house (CSB)

OR

b. Write an essay on Late age rearing appliances

4. a. Write an essay on feeding appliances

OR

b. Write an essay on Mounting and Cocoon production

5. a. Write an essay on Bacterial diseases

OR

b. Write an essay on Fungal diseases

SECTION - B

Answer any FIVE of the following : **5 x 4 = 20**

Draw labeled diagrams wherever necessary

6. Mouth parts of the Adult Silk worm
7. Structure of the Silk glands of larva
8. Endocrine glands of larva and pupa
9. Mountages –Bamboo and Plastic
10. Disfenction of ants
11. Harvesting of Cocoons
12. Nuclear polyhydrosis disease
13. Pebrine disease

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Dr. V.S. KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER-IV CORE-IV

COURSE- VI CLUSTUER ELECTIVE : VIII-C-2

BIOLOGY OF MULBERRY SILK WORM AND SILK WORM REARING TECHNOLOGY

BLUE PRINT FOR QUESTION PAPER SETTER

Time : 3hours Max marks: 60

MODULE NO. & NAME	SHORT ANSWER QUESTIONS (4 MARKS)	ESSAY QUESTIONS (10 MARKS)	MARKS ALLOTED TO THE UNIT
UNIT – I (Morphology of silk worm)	1	2	20
UNIT – II (Anatomy and Physiology of mulberry silk worm)	2	2	24
UNIT– III (Silk worm rearing house and appliances)	1	2	20
UNIT – IV (Disenfection and feeding appliances and silk worm technology)	2	2	24
UNIT – V (Diseases of silk worm and their management)	2	2	24
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

NOTE:

1. **The question paper setters are requested to kindly adhere to the format given in the above table.**
2. **The question paper setters are also requested to set the questions in the following way:**
   - **c. 80% of questions – memory and Understanding based**
   - **d. 20% of questions – Creativity, Application and Skill based**
3. **8 Marks questions are to be given 2 each from units 1 to 5**
4. **4 Marks questions are to be given in the following way (1 question each from units 1 & 3 and 2 questions each from Units 2, 4 and 5)**
5. **Please avoid repetition of questions.**

Dr. V.S KRISHNA GOVT. DEGREE COLLEGE (A), VISAKHAPATNAM

ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-C* : SERICULTURE

VIII-C-3* : SILK TECHNOLOGY, SILK MARKETING AND EXTENSION

MAX. MARKS : 100 | HOURS : 60

Unit – I : Cocoons (12 Hrs)

1.1 Quality of cocoon, cocoon shell ratio, silk filament length, cocoon reelability and factors effecting reelability

1.2 Physical and chemical properties of fibre

1.3 Cocoon drying – Conventional and modern techniques

1.4 Cocoon sorting and preservation

1.5 Cocoon cooking

Unit – II : Reeling, silk throwing and weaving (12 Hrs)

2.1 Reeling appliances – Conventional and modern

2.2 Reeling operations

2.3 Rereeling

2.4 Raw silk testing and grading

2.5 Silk throwing and twisting

2.6 Silk weaving

2.7 Chemical processing of silk yarn and fabrics

Unit – III : Sericulture and management (12 Hrs)

3.1 Sericulture □rganization at state and national levels – Development, research, training and policies

3.2 Role of national silk worm seed organization in grainage

3.3 Sericulture services network – Basic seed facility, seed areas, grainages, nurseries, central research centers (CRCs), filature, silk exchanges and cocoon certification centers

3.4 Project formulation and role of credit co-operative and financing agencies in sericulture – NAARD, IDBI, Banks, IRDP etc.

Unit – IV: Marketing organizations, Cocoon and Yarn marketing (12 Hrs)

4.1 Sericulture marketing □ganization for seed cocoon, raw silk and silk fabric

4.2 Traditional and regulated markets, their merits and limitations

4.3 Government intervention – Legislation and implication in marketing

4.4 Marketing institutions – Marketing boards, co-operatives and stabilization of price

Unit – V : Cocoon and Yarn marketing (12 Hrs)

5.1 Cocoon marketing – Gradation of seed and reeling cocoons, marketing of multivoltine, bivoltine and hybrid cocoons

5.2 Yarn marketing – Gradation of yarn, twisted and untwisted yarn

5.3 Feedback system – Surveys and types, merits and limitations

5.4 Silk export – Challenges and growth prospects

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ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI | CLUSTER PAPER – VIII* | Hrs/week : 4

CLUSTER ELECTIVE : VIII-C* : SERICULTURE

VIII-C-3* : SILK TECHNOLOGY, SILK MARKETING AND EXTENSION

MODEL PAPER

Time : 3 hrs **Max. Marks : 60**

SECTION – A

Answer any FIVE of the following: **5 x 8 = 40**

Draw labeled diagrams wherever necessary

1. a. Write an essay on physical and chemical properties of fibre

   OR

   b. Write an essay on Cocoon sorting and preservation
2. a. Write an essay on Raw silk grading and testing

   OR

   b. Write an essay on chemical processing of Silk yarn and fabrics
3. a. Role of national silk worm seed organization in grainage. Discuss it.

   OR

   b. Discuss the role of Credit co-operative and financing agencies in sericulture
4. a. Write an essay on marketing organization for raw silk and silk fabric

   OR

   b. Discuss about the Marketing institutions in sericulture
5. a. Write an essay on cocoon marketing

   OR

   b. What are the Challenges and growth prospects of silk export?

SECTION – B

Answer any FIVE of the following : **5 x 4 = 20**

Draw labeled diagrams wherever necessary

6. Cocoon shell ratio
7. Cocoon cooking
8. Rereeling
9. Silk weaving
10. Central research centres (CRCs)
11. Traditional markets
12. Surverys and types
13. Gradation of yarn

□□□□□

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ZOOLOGY SYLLABUS (W.E.F. 2017 – 2018)

SEMESTER-IV

CORE-IV

COURSE- VI CLUSTUER ELECTIVE : VIII-C-3

SILK TECHNOLOGY, SILK MARKETING AND EXTENSION

BLUE PRINT FOR QUESTION PAPER SETTER

Time : 3hours **Max marks: 60**

MODULE NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTED TO THE UNIT
UNIT – I (Cocoons)	2	2	24
UNIT – II (Reeling, Silk throwing and weaving)	2	2	24
UNIT– III (Sericulture management)	1	2	20
UNIT – IV (Marketing organizations, Cocoon and Yarn marketing)	1	2	20
UNIT – V (Cocoon and Yarn marketing)	2	2	24
Total No. of Questions	**8**	**10**	
Total Marks including choice			112

1. The question paper setters are requested to kindly adhere to the format given in the above table.

2. The question paper setters are also requested to set the questions in the following way:

- **e. 80% of questions – memory and Understanding based**
- **f. 20% of questions – Creativity, Application and Skill based**

3. 8 Marks questions are to be given 2 each from units 1 to 5

4. 4 Marks questions are to be given in the following way (1 question each from units 3 & 4 and 2 questions each from Units 1, 2 and 5)

5. Please avoid repetition of questions.

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ZOOLOGY SYLLABUS (W.E.F. 2017 – 18)

SEMESTER – VI CLUSTER PAPER – VIII* Hrs/week : 9

CLUSTER ELECTIVE : VIII-C* – SERICULTURE

(PRACTICAL SYLLABUS)

Periods : 72 (24+24+24) Hours **Max. Marks : 50 x 3 = 150**

24 Hrs **PRACTICAL – I** 50 M

1. Maps and records
   a. Preparation of a map showing extension of sericulture in the world
   b. Preparation of a map showing extension of sericulture in the India
   c. Graphical representation of cocoon and silk production by various silk worms in India

2. Moriculture
   a. Soil sampling and analysis of soil pH and moisture
   b. Preparation and study of sections of root, stem, and leaf of mulberry plant
   c. study of inflorescence, male and female reproductive parts

3. Mulberry diseases
   a. Collection, study and preservation of mulberry disease samples
   b. Microscopic preparation of mulberry fungi, virus, bacteria causing diseases

24 Hrs **PRACTICAL – II** 50 M

1. Morphology of egg, last instar larva, pupa, adult, sexual dimorphism, mouth parts, antennae, legs, prolegs and wings
2. Dissection of digestive system of larva, silk gland of larva and reproductive system of adult
3. Study of various appliances
4. Microscopic preparation of pebrine causative agents in larva and adult by Giemsa stain
5. Study of one each of viral, bacterial, protozoan diseases and pests

24 Hrs **PRACTICAL – III** 50 M

Project work

SUGGESTED READING

1. Text book of tropical sericulture Publ., Japan Overseas Corporation volunteers – 1960
2. Silkworm rearing techniques in the tropics, Dr. S. Omura, Japan International Cooperation Agency – 1980
3. The natures and property of soils (9th edition) N.C. Brady (Mac Millan Pub. Co. Inc., New York)
4. Studies on soils of India, S.V. Govind Rajan and H.G. Gopala Rao (1970), Vikas Pub. House Pvt. Ltd., New Delhi
5. Manual on sericulture – Food and Agriculture Organisation, Rome – 1976
6. Handbook of practical sericulture : S.R. Ullal and M.N. Narasimhanna CSB, Bangalore – 1987
7. A guide for bivoltine sericulture – K. Sengupta, Director, CSR & TI, Mysore – 1989
8. Economics of sericulture under irrigated conditions : M.S. Jolly, CSR & TI, Mysore – 1982
9. China sericulture, 1972 (24+24+24), FAO, Rome
10. Mulberry cultivation (Vol. I) written by Zheng Ting – Xing, Tan Yun – Fang, Huang Guang – Xian and Ma ben. Published by Oxford and IBH publishing Co. Pvt. Ltd., New Delhi, Bombay, Calcutta
11. Silk egg production (Vol. III) written by Wang Sang – Ming published by Oxford and IBH publishing Co. Pvt. Ltd., New Delhi, Bombay, Calcutta
12. Economics of silk industry, RC Rawley, PS king and Sons ltd., London
13. Silk production processing and marketing – MM Nanavaty, VS Johari, Wiley Estern ltd., Ansari Road, New Delhi
14. Principles of sericulture – Hisao Aruga, Mohan Primlani for Oxford and IBH publishing co., Pvt., Ltd., New Delhi