PITHAPUR RAJAH'SGOVERNMENT COLLEGE
(AUTONOMOUS)
NAAC A GRADE

KAKINADA

XXI–BOARD OF STUDIES

ZOOLOGY

DEPARTMENT OF ZOOLOGY

2020-21

(CHOICE BASED CREDIT SYSTEM)

2020 -21 XXI BOARD OF STUDIES MEETING.

THROUGH ONLINE GOOGLE MEET FROM 10:00 AM TO 11:42 AM ON Dt. 22.06.2020

DEPARTMENT OF ZOOLOGY

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
KAKINADA 533 001-ANDHRA PRADESH
An AUTONOMOUS and NAAC Accredited Institution(A Grade- 3.17 CGPA)
(Affiliated to ADI KAVI NANNAYA UNIVERSITY, Rajamahendravarm.)

ACADEMIC CELL

(Certificate to be issued by the UniversityNomine/Subject Expert/Member of BOS)

Department Name: Zoology and Aquaculture

Name of the BOS Member : Dr. K Ramaneswari
(UniversityNomine/Subject Expert/Industrilist/ Member)

I certify that the syllabus of **B.Sc Zoology** course submitted by the Zoology and Aquaculture Departments is verified by me and I recommend the following suggestions:

NIL

The syllabus is approved with the above suggested modification

Signature with Date

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head of the department along with the syllabus

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
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ACADEMIC CELL

(Certificate to be issued by the University Nomine/Subject Expert/Member of BOS)

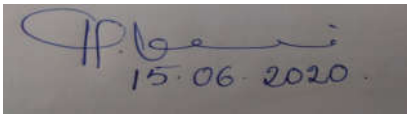
Department Name:ZOOLOGY

Name of the BOS Member :VIJAYA SANTHI MATHA
(UniversityNomine/Subject Expert/Industrilist/ Member)

I certify that the syllabus submitted for **B.Sc Zoology course** by the Department of Zoology and Aquaculture is verified by me and I recommend the following suggestions:

1. RECOMMENDED TO INTRODUCE **TYPES OF AERATORS** IN CLUSTER PAPER :AQUACULTURE MANAGEMENT :MODULE II: WATER QUALITY MANAGEMENT

The syllabus is approved with the above suggested modification



Signature with Date

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head of the department along with the syllabus

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
KAKINADA 533 001-ANDHRA PRADESH
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ACADEMIC CELL

(Certificate to be issued by the University Nomine/Subject Expert/Member of BOS)

Department Name: Zoology Department

Name of the BOS Member: **Dr. Devarapalli Padmavathi,**
(University Nomine/**Subject Expert**/Industrialist/ Member)

I certify that the syllabus submitted by the Zoology Department for the subject **B.Sc., Zoology** (Academic year 2020-2021) is verified by me and I recommend the following suggestions:

1. Include population dynamics in Zoology Paper IV, Embryology, Physiology and ecology
2. Include field trip to Poultry, Dairy in Semester VI, Zoology Paper VI, Animal Husbandry
3. Include Seafood certification guidelines and create awareness on Marine Stewardship Council in Aquaculture Cluster elective VIII-B-3, in Semester VI.
4. https://www.sgsgroup.in/en-gb/sustainability/facilities-and-production/product-and-packaging/marine-stewardship-council-msc-certification
5.

D. Padmavathi 15/6/2020
Signature with Date

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head of the department along with the syllabus

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
KAKINADA 533 001-ANDHRA PRADESH
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(Affiliated to ADI KAVI NANNAYA UNIVERSITY, Rajamahendravarm.)

ACADEMIC CELL

(Certificate to be issued by the University Nomine/Subject Expert/Member of BOS)

Department Name:

Name of the BOS Member :
(UniversityNomine/Subject Expert/Industrilist/ Member)

I certify that the syllabus submitted by the ...ZOOLOGY..... Department is verified by me and I recommend the following suggestions:

1. Mention the method using against each practical expt
2. check for spacing.
3.
4.
5.

The syllabus is approved with the above suggested modification

Signature with Date 22/6/2

Note: BOS Members are requested to fill the above details with necessary suggestions and send back to the Head department along with the syllabus

P.R.GOVT.COLLEGE (AUTONOMOUS) KAKINADA.
2020-21, XXI BOARD OF STUDIES MEETING. Dt 22.06.2020
DEPARTMENT OF ZOOLOGY

The members present have discussed the syllabi and model question papers (Theory and Practical) related to III to VI semesters in Zoology and made the following Resolutions.

ResolutionI: Resolved to Continue CBCS System as instructed by Commissioner of Collegiate Education(CCE),Amravathi with the modifications as suggested by the members.

ResolutionII: Resolved to implement of 60% external and 40% internal marks for both theory and practicals from the academic year 2020-2021 for III and IV semesters along with I and IIsemesters.

ResolutionIII: Resolved to split 40 marks of theory internal as 20 marks for mid exams and 20 marks for co-curricular activities (seminar/assignment/quiz/groupdiscussion).

ResolutionIV: Resolved to conduct practical examination also at the end of III and IV semesters along with I and II semesters

ResolutionV: Resolved to follow the same syllabus and exam pattern for the final year students(2020-2021)

Resolution VI: Resolved to continue two subject electives (Advanced electives) in the VI semester-Cellular Metabolism and Molecular Biology ; and Immunology

Resolution VII: Resolved to continue cluster papers- (-1-Principles of aquaculture and -2 Clinical Biotechnology,along with project for final year students at the end of VI semester)

ResolutionVIII: Resolved to introduce Question Bank for all the semesters, Module wise- Essay & Short AnswerQuestions.

ResolutionIX: Resolved to continue the same paper setters and examiners for all thesemesters.

ResolutionX: Resolved to include Blue Prints for model question papers for allsemesters.

ResolutionXI: Resolved to Adapt the guidelines of Authorities with respect reducing approved curriculum to Minimum Course curriculum for all semisters due to Covid Lockdown

ResolutionXII **:** Resolved to Adapt Extra Credits for **MOOCS, Arpit** like online courses, Certificate courses as per the Academic Council Decisions and also to adapt I year syllabus intotto as prescribed by the Higher officials

Chairperson
Board of Studies
Dept. of Zoology

P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF ZOOLOGY

XXI-BOARD OF STUDIES MEETING 2020-2021
CHOICE BASED CREDIT SYSTEM (WITH
EFFECTIVE FROM 2020-2021)

S. No.	Semester No.	Domain Specific course/Clusters	Title	Marks		Credits	P.No
1	I	General Core	**Animal Diversity – Biology Of Nonchordates**	**100**		**04**	
			Practicals	**50**		**02**	
2	II	General Core	**Animal Diversity – Biology Of Chordates**	**100**		**04**	
			Practicals	**50**		**02**	
1	III	General Core	**Cytology ,genetics and evolution**	**100**		**04**	
			Practicals	**50**		**02**	
2	IV	General Core	**Embryology, Physiology and Ecology**	**100**		**04**	
			Practicals	**50**		**02**	
3	V	General core	**Animal Biotechnology**	**100**		**04**	
			Practicals	**50**		**02**	
4		General Core	**Animal Husbandry**	**100**		**04**	
			Practicals	**50**		**02**	
5	VI	Elective I	**Cellular Metabolism and Mol. Biology**	**100**		**04**	
			Practicals	**50**		**02**	
		Elective II	**Immunology**	**100**		**04**	
			Practicals	**50**		**02**	
6		Cluster Elective A1	**Principles of Aquaculture**	**100**		**04**	
			Practicals	**50**		**02**	
		Cluster Elective A2	**Aquaculture Management**	**100**		**04**	
			Practicals	**50**		**02**	
		Cluster Elective A3	**Post Harvest Technology**	**100**		**04**	
			Project work	**50**		**02**	
		Cluster Elective B1	**Clinical Biotechnology**	**100**		**04**	
			Practicals	**50**		**02**	
		Cluster Elective B2	**Haematology**	**100**		**04**	
			Practicals	**50**		**02**	
		Cluster Elective B3	**Clinical Microbiology**	**100**		**04**	
			Practicals	**50**		**02**	

P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF ZOOLOGY

XXI-BOARD OF STUDIES MEETING 2020-2021
CHOICE BASED CREDIT SYSTEM (WITH EFFECTIVE FROM 2020-2021)

Online approval of the BOS is done with the following Members.

Sl No	Name and affiliation	Designation	Signature
01	Sri. B.Ahmad Ali Baba Lecturer in-charge Dept of Zoology P R College(Autonomous) KAKINADA.	Chairperson	B. Ali Baba
02	Dr.K.Ramaneswari Prof. in Zoology Dept. of Zoology AdikaviNannaya University RAJAHMAHENDRAVARM	Vice-Chancellor's Nominee, AKNUR	
03	Dr. A.Sreenivasulu Director V.S.Lakshmi Research Centre	Industralist	
04	Dr.D.Padmavathi Senior Lecturer in Zoology M.S.N. Degree College KAKINADA	Subject Expert	
05	Dr.M. VijayaSanthi Lecturer in Zoology IDEAL College KAKINADA	Subject Expert	

DEPARTMENTAL STAFF

6. Dr.N.Sreenivas — Member
   Lecturer inZoology
   P.R.Govt College (A)
   Kakinada.

7. P.JohnKiran — Member
   Lecturer in Zoology
   P.R.Govt College (A)
   Kakinada.

8. TVenkateswaraRao — Member
   Lecturer in Zoology(Contract)
   P.R.Govt College (A)
   Kakinada.

9. Sk.MadinaSaheb — Member
   Lecturer in Zoology(Contract)
   P.R.Govt College (A)
   Kakinada

10. P.VijayaChandrika — Member
    Lecturer in Zoology(Guest)
    P.R.Govt College (A)
    Kakinada

11. Y.Gouthami — Member
    Lecturer in Zoology(Guest)
    P.R.Govt College (A)
    Kakinada

12. V. Praveena — Member
    Lecturer in Zoology(Guest)
    P.R.Govt College (A)
    Kakinada

13. Bhuvan Teja — Member
    Lecturer in Zoology(Guest)
    P.R.GovtCollege(A)
    Kakinada

14. Santhi Grace — Member
    Lecturer in Zoology(Guest)
    P.R.GovtCollege(A)
    Kakinada

15. Pradeep — Member
    Lecturer in Zoology(Guest)
    P.R.GovtCollege(A)
    Kakinada

LIST OF EXAMINERS

DEPARTMENT OF ZOOLOGY

S.No	Name of the Examiners	Subject	Nameofthe College
01	Dr. K. BalaJagannadha Rao	Zoology	AMAL College, Anakapally
02	Dr. M. vijayasanthi	Zoology	Ideal college ,kakinada
03	B.VijayaBhaskara Rao	Zoology	AVN College, Vizag
04	Dr.M.Vijaya Kumar	Zoology	GDC (Men), Palakollu
05	Dr. P.Jaya	Zoology	GDC Chodavaram
06	K.Visweswara Rao	Zoology	C.R.R.College (Men) Eluru
07	P.Ramakrishna Prasad	Zoology	C.R.R.College (Men) Eluru
08	K.K.D.M.Lakshmi	Zoology	C.R.R.College (Womens) Eluru
09	Dr.K.Usha Rani	Zoology	D.N.R.College, Bhimavaram
10	Smt.D.Parvathi	Zoology	G.D.College, Ganapavaram
11	N.Suneetha	Zoology	GDC ,Nidadavolu
12	C.Vara Lakshmi	Zoology	M.R.College (W) Vizianagaram
13	M.Rajeswari	Zoology	M.R.College (W) Vizianagaram
14	B.Narayana Rao	Zoology	M.R.College (A) Vizianagaram
15	G.Mani	Zoology	M.R.College (A) Vizianagaram
16	R.Indira	Zoology	St.Theressa College, Eluru
17	V.SuryaKumari	Zoology	M.R.College (A) Vizianagaram
18	R.Prabakara Rao	Zoology	M.R.College, Peddapuram
19	Dr.V. Sandhya	Zoology	GDC, Ganapavaram
20	V.V.Padmavathi	Zoology	St.Theressa College, Eluru

Lecturer in charge- Dept of Zoology

LIST OF QUESTION PAPER SETTERS

DEPARTMENT OF ZOOLOGY

S.N	Name of the Examiners	Subject	Name of the College
01	Dr.k.Narasimhamurthy	Zoology	Pydah fisheries polytechnic college Patavala
02	Dr.K.Usha Rani	Zoology	D.N .R. College, Bhimavaram
03	Mrs, R.KrishnaBharathi	Zoology	S.K.V.T.College, Rajahmundry.
04	A.VenkatapathiRaju	Zoology	S.K.B.R.College, Amalapuram.
05	Dr. Rama Murthy	Zoology	B.V.K.College, Vizag.
06	K.Sathi Reddy	Zoology	Bullayya College, Vizag.
07	K. Chakravarthy	Zoology	DRG Govt. Degree College, Tp.gudem
08	Y.Polinaidu	Zoology	C.R.R.College (A) Eluru
09	K.V.S. Reddy	Zoology	A.N.R. College, Gudivada
10	Dr.V.SuryaKumari	Zoology	M.R.College, Vijayanagaram
11	Dr. K.S.R.Prasada Rao	Zoology	S.N.K.P.&Dr.K.S.Raju College Penugonda
12	Smt.M.Vasanthalakshmi	Zoology	D.R.G.Govt Degree College, Tp.gudem.
13	Dr. P.Jaya	Zoology	GDC Chodavaram
14	Dr.M.Vijaya Kumar	Zoology	SRR & CVR GDC Vijayawada
15	N.Suneetha	Zoology	GDC ,Nidadavolu

Lecturer in charge-Dept of Zoology

BOS-ZOOLOGY-2020-21

P.R.GOVERNMENT COLLEGE (A), KAKINADA
I B.Sc., (BZC), SEMESTER-I
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES
Course Code: ZO 1208

Hrs:4 **Credits: 3**

COURSE OUT COMES	LEARNING OUTCOMES
CO1 Describe general taxonomic rules on animal classification CO2 Classify Protozoa toCoelenterata with taxonomic keys CO3 Classify Phylum Platy hemninthes to Annelida phylum using examples from parasitic adaptation and vermin composting CO4 Describe Phylum Arthropoda to Mollusca using examples and importance of insects and Molluscans CO5 Describe Echinodermata to Hemi chordata with suitable examples and larval stages in relation to the phylogeny	1. To understand the taxonomic position of protozoa to helminthes. 2. To understand the general characteristics of animals belonging to protozoa to hemichordata. 3. To understand the structural organization of animals phylum from protozoa to hemichordata. 4. To understand the origin and evolutionary relationship of different phyla from protozoa to hemichordata. 5. To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates

MODULE-I (PROTOZOA & PORIFERA) **15 Hrs**

1.1.Principles of Taxonomy- Binomial Nomenclature- Whittaker's Five kingdom Concept

1.2 *General Characters and classification of Protozoa and Porifera upto classes*.

1.3. **Elphidium Type study-** structure and Life history*;*
Protozoan Locomotion and Reproduction – Binary fission and Conjugation.

1.4.Skeleton in sponges - Canal system in Sponges

MODULE-II (CNIDARIA, PLATYHELMINTHES &NEMATODA) **15Hrs**

2.1. General Characters and classification of Coelenterata, Platyhelminthes and Nematoda upto classes. General characters of Phylum Ctenophora

2.2. **Obelia:** Structure of Polyp and Medusa.

2.3. Polymorphism in Coelenterates; Corals and Coral reef formation.

2.4. **Fasciola *hepatica*:** Life cycle of *Fasciola hepatica*
Life Cycle and pathogenicity of *Ascaris lumbricoides*

MODULE-III (ANNELIDA, ARTHROPODA &ONYCHOPHORA) 15Hrs

3.1. General Characters and classification of Annelida, Arthropoda upto classes

3.2. Evolution of Coelom and Coelomoducts,
3.3. Vermiculture-scope, significance and economic importance of vermicompost
3.4. Vision and Respiration in arthropoda, Metamorphosis in Insects,
3.5. *Peripatus*- Affinities and Significance

MODULE-IV (MOLLUSCA, ECHINODERMATA AND HEMICHORDATA)15 Hrs

4.1. General Characters and classification of Mollusca and Echinodermataupto classes

4.2. Pearl formation in Pelecypoda, Sense organs in Mollusca

4.3. Water vascular system in Star Fish

4.4. ***Balanoglossus:*** Structure and affinities.

4.5. Non Chordate Larval Forms

Trochophore

Nauplius

Bipinnaria

Tornaria

Co-curricular activities (suggested)

- Preparation of chart/model of phylogenic tree of life, 5-kingdom classification, Elphidium life cycle etc.
- Visit to Zoology museum or Coral island as part of Zoological tour
- Charts on life cycle of Obelia, polymorphism, sponge spicules
- Clay models of canal system in sponges
- Preparation of charts on life cycles of Fasciolaand Ascaris
- Visit to adopted village and conducting awareness campaign on diseases, to people as part of Social Responsibility.
- Plaster-of-paris or Thermocol model of Peripatus
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers
- Models of compound eye, bee hive and terminarium (termitaria) by students
- Visit to apiculture centre and short-term training as part of apprenticeship programme of the govt. Of Andhra Pradesh
- Chart on pearl forming layers using clay or Thermocol
- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Phylogeny chart on echinoderm larvae and their evolutionary significance
- Preparation of charts depicting the feeding mechanism, 3 coeloms, tornaria larva etc., of Balanoglossus

1. L.H. Hyman 'The Invertebrates' Vol I, II and V. – M.C. Graw Hill Company Ltd.
2. Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
3. E.L. Jordan and P.S. Verma 'Invertebrate Zoology' S. Chand and Company.
4. R.D. Barnes 'Invertebrate Zoology' by: W.B. Saunders CO., 1986.
5. Barrington. E.J.W., 'Invertebrate structure and Function' by ELBS.
6 P.S. Dhami and J.K. Dhami. Invertebrate Zoology. S. Chand and Co. New Delhi.
7. Parker, T.J. and Haswell'A text book of Zoology' by, W.A., Mac Millan Co. London.
8. Barnes, R.D. (1982). Invertebrate Zoology, V Edition"

P.R.GOVERNMENT COLLEGE (A), KAKINADA

I B.Sc., (BZC), SEMESTER-I
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES
COURSE CODE: ZO 1208
MODEL QUESTION PAPER

Time: 2 ½ hrs. **Max Marks: 60**

PART – 1

Note:Answer any THREE questions choosing at least one question from each section. Draw labelled diagrams whenever necessary

SECTION- A

1. Write an essay on Reproduction in Elphidium.

OR

Write an essay on Canal system in sponges

2. Write an account of life history of Liver Fluke.

OR

Write an essay on the affinities of *Peripatus* and its significance.

3. Describe the pearl formation in Pelicypoda.

OR

Describe the water vascular system in *Starfish.*

Part – II

Answer any **Six** question **6x5=30M**

1. Principles of Taxonomy
2. Class Hexactinellida.
3. Outline classification of Phylum Protozoa
4. Polymorphism in Obelia
5. Ascaris life cycle
6. *Cephalic Appendages of palaemon*
7. Antennary glands
8. Affinities of Balanoglossus.
9. Vermicompost
10. Vision in Arthropoda

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
I B.Sc., (BZC), SEMESTER-I
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

BLUE PRINT FOR QUESTION PAPER SETTER

Max Marks: 60
Time: 2 ½ hrs

MODULE NO. & NAME	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTED TO THE UNIT
MODULE – I (Protozoa & Porifera)	01	03	25
MODULE – II (Cnidaria, Platyhelminthes & Nematoda)	02	02	30
MODULE – III (Annelida, Arthropoda&Onychophora)	01	02	25
MODULE – IV (Mollusca, Echinodermata &Hemichordata)	02	03	30
Total No.of Questions	**06** **Of which 3 to be answered**	**10** **Of which 6 to be answered**	**110** **Marks including choice. Of which 60 Marks to be answered**

NOTE:

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

I B.Sc., (BZC), SEMESTER-I
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

PRACTICAL SYLLABUS (with effective from 2017-18)

Learning Outcomes:
- To understand the importance of preservation of museum specimens
- To identify animals based on special identifying characters
- To understand different organ systems through demo or virtual dissections
- To maintain a neat, labeled record of identified museum specimens

I. DISSECTIONS-Only Demonstration

a) Mounting of Cephalothoracic and abdominal appendages of Prawn
b) Nervous system of Prawn
c) Digestive system of Prawn
d) Insect Mouth Parts
e) An **"Animal album**" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose
f) **Computer - aided techniques should be adopted or show virtual dissections**

II. OBSERVATION OF THE FOLLOWING SLIDES / SPECIMENS / MODELS:

1. Protozoa –Amoeba, Entamoeba, Plasmodium *Elphidium*. *Paramoecium*– binary fission and Conjugation.
2. Porifera – Cycon, *Spongilla, Euspongia*.
3. Coelenterata - *Physalia, Aurelia, , Obelia colony, Medusa Corallium, Gorgonia,*
4. Platyhelminthes and Nemathelminthes–Ascaris-male & female, *Larval stages of FasciolaMiracidium, Redia, Cercaria, Ancylostoma duodenale, Taenia solium, Wuchereria.*
5. Annelida - *Nereis*, *Hirudinaria,Trochophore*larva.*Chaetoperus*
6. Arthropoda -*Sacculina, Limulus, Julus, Scolopendra, Peripatus. Larvae: Nauplius, Mysis, Zoea, Mouthparts of Anopheles and Culex mosquitoes*
7. Mollusca - *Chiton, Unio, Sepia, Octopus, Nautilus, Glochidium larva*.
8. Echinodermata – Asterias, *Ophiothrix, Echinus,Cucumaria, Antedon*, *Bipinnaria*larva.
9. Hemichordata – *Balanoglossus*, *Tornaria*larva.

RFERENCEMANUALS:
1. Practical Zoology- Invertebrates S.S. Lal
2. Practical Zoology - Invertebrates P.S. Verma
3. Practical Zoology - Invertebrates K.P. Kurl
4. Ruppert and Barnes (2006) Invertebrate Zoology,8th Edition, Holt Saunders International Edition

I B.Sc., (BZC), SEMESTER-I
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES
PRACTICAL MODEL
PAPER
(AT THE END OF I-SEMESTER-EFFECTIVE FROM 2017-18)

Max marks: 50
Time : 2Hrs

1. Dissect and display the nervous system of Palaemon. Draw a neat labelled diagram 10M

2. Identification of spotters 4X5=20M

   A)----------

   B)----------

   C)----------

   D)----------

   E)----------

3. Record 05M

4. Continuous Internal Assessment 15M

Total **50M**

QUESTION BANK

I semester B.Sc BZC Paper Animal diversity - I

Essay questions

1. Reproduction in Elphidium.
2. Binomial nomenclature.
3. Canal system in sponges
4. Skeleton system in sponges
5. General characters of cindaria.
6. Polymorphism in Coelenterates.
7. Life history of Liver Fluke.
8. Coral Reefs.
9. Ceolom and celomducts
10. Vermicompost
11. Respiration in Arthropoda
12. Affinitives of Peripatus
13. General character of Echinodermata
14. peral formation in Pelicypoda
15. Structure and affinities of Balanoglossus.
16. Water vascular system in star fish.

SHORT ANSWERS

1. Principles of taxonomy.
2. Outline classification of protozoa.
3. Class Calcarea.
4. Class Hexactinellida
5. Class Demospongiae
6. Elphidium nutrition.
7. Elphidium locomotion.
8. Sycon canal system
9. Monaxon spicules
10. Characters of Coelenterata
11. Characters of Platyhelminthes
12. Characters of Nematoda
13. Obelia polyp
14. Obelia Medusa
15. Polymorphism
16. Corals
17. Redia larava
18. Miracidium

19. Ascaris life cycle
20. Ascaris pathogensity
21. Annelida characters
22. Arthropoda characters
23. Ceolomoducts
24. Vermicompost
25. Vermiculture importance
26. Respiration in Arthropoda
27. Metamorphosis in insects
28. Vision in Arthropoda
29. Class Oligochaeta
30. Class Polychaeta
31. Class Hyrudenia
32. Class crustacea
33. Peripatus
34. Mollusca characters
35. Echinodermata characters
36. Paral formation
37. Sense organs in Mollusca
38. Water vascular system
39. Balanoglossus structure
40. Trochophore
41. Nauplius
42. Bipinnaria
43. Tornaria larva

P.R.GOVERNMENT COLLEGE (A), KAKINADA
I B.Sc., (BZC), SEMESTER-II
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF CHORDATES
Course Code: ZO 2208

Hrs: 4 Credits: 3

OBJECTIVES	LEARNING OUTCOMES
CO1 Describe general taxonomic rules on animal classification of chordates CO2 Classify Protochordata to Mammalia with taxonomic keys CO3 Understand Mammals with specific structural adaptaions CO4 Understand the significance of dentition and evolutionary significance CO5 Understand the origin and evolutionary relationship of different phyla from Prochordata to mammalia	1. To understand the animal kingdom . 2. To understand the taxonomic position of Protochordata to Mammalia. 3. To understand the general characteristics of animals belonging to Fishes to Reptilians. 4. To understand the body organization of Chordata. 5. To understand the taxonomic position of Protherian mammals.

MODULE-I **18Hrs**

1.1.Characters and Classificatin of Chordates upto classes. Characters and Classification of Fishes upto sub class level, Salient features of Cephalochordata

1.2.Structure and life-history of *Herdmania*, Significance of retrogressive Metamorphosis.

1.3. *Scoliodon*: Morphology, Circulatory system, nervous system and sense organs.

1.4. Migration in fishes and types of scales - Dipnoi fishes

MODULE-II **12Hrs**

2.1. Characters and Classification of Amphibia upto orders

2.2. Rana : Morphology, respiratory system, structure of heart, Brain and reproductive systems only.

2.3. Parental care in amphibians –

MODULE-III **12Hrs**

3.1. Characters and Classification of Reptelia upto orders

3.2. *Calotes*: Morphology, digestive system, urinogenital system and nervous systems.

3.3. Identificatin of Poisonous snakes

MODULE-IV (AVES & MAMMALS) **18Hrs**

4.1. General characters of Aves and Classification of Mammals- comparison of Prototheria, Metatheria and Eutheria

4.2. Pigeon (*Columbia livia*) : Exoskeleton, respiratory system, structure of heart,

4.3. Migration in birds and its significance, Flight adaptation in birds

4.4. Dentition in Mammals,

Co-curricular activities (suggested)

- Preparation of charts on Chordate classification (with representative animal photos) and
- retrogressive metamorphosis
- Thermocol or Clay models of Herdmania and Amphioxus
- Visit to local fish market and identification of local cartilaginous and bony fishes
- Maintaining of aquarium by students
- Thermocol model of fish heart and brain
- Preparation of slides of scales of fishes
- Visit to local/nearby river to identify migratory fishes and prepare study notes
- Preparation of Charts on above topics by students (Eg: comparative account of vertebrate
- heart/brain/lungs, identification of snakes etc.)
- Collecting and preparation of Museum specimens with dead frogs/snakes/lizards etc.,
- and/or their skeletons
- Additional input on types of snake poisons and their antidotes (student activity).
- Collection of bird feathers and submission of report on Plumology
- Taxidermic preparation of dead birds for Zoology museum
- Chart preparation for dentition in mammals

REFERENCE BOOKS

- J.Z. Young, 2006. The life of vertebrates. (The Oxford University Press, New Delhi).
- 646 pages. Reprinted
- Arumugam, N. Chordate Zoology, Vol. 2. SarasPlublication. 278 pages. 200 figs.
- A.J. Marshall, 1995. Textbook of zoology, Vertebrates. (The McMillan Press Ltd.,
- UK). 852 pages. (Revised edition of Parker &Haswell, 1961).
- M. EkambaranathaAyyar, 1973. A manual of zoology. Part II. (S. ViswanathanPvt. Ltd., Madras).
- P.S. Dhami& J.K. Dhami, 1981. Chordate zoology. (R. Chand & Co.). 550 pages.
- Gurdarshan Singh & H. Bhaskar, 2002. Advanced Chordate Zoology. Campus Books, Vols., 1573 pp., tables, figs.
- A.K. Sinha, S. Adhikari& B.B. Ganguly, 1978. Biology of animals. Vol. II. Chordates. (New Central Book Agency, Calcutta). 560 pages.
- R.L.Kotpal, 2000. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut).

I B.Sc., (BZC), SEMESTER-II
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF CHORDATES
Course Code: ZO 2208
MODEL QUESTION PAPER

Time: 2 ½ hrs. **Max Marks: 60**

PART – 1

Note :Answer any THREE questions choosing at least one question from each section.
Draw the diagrams where ever necessary **3 X10 = 30**

SECTION- A

1. What is retrogressive metamorphosis? Discuss with special reference to the life history of an Ascidian and write its significance

OR

Explain migration in fishes

2. Write an essay on parental care in Amphibia

OR

Explain the urinogenital system of Calotes with a neat labelled diagram

3. Explain the various flight adaptations in birds

OR

Write an essay on Dentition in mammals

Part – II

Answer any **Six** questions **6x5=30**

4. Scales in Fishes
5. General Characters of Fishes
6. Sense organs of Scoliodon
7. Buccopharyngeal respiration
8. Structure of heart of Frog

12.Brain in Calotes

13.Digestive glands of Calotes

14. Quill feather

15. Short notes on Migration of birds

16. Prototheria

I B.Sc., (BZC), SEMESTER-II
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

BLUE PRINT FOR QUESTION PAPER SETTER

Time: 2 ½ hours
Max marks: 60

MODULE NO. & NAME	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTED TO THE UNIT
MODULE – I (Urochordata& Pisces)	02	03	35
MODULE – II (Amphibia)	01	02	20
MODULE – III (Reptilia)	01	02	20
MODULE – IV (Aves & Mammalia)	02	03	35
Total No.of Questions	**06** **Of which 3 to be answered**	**10** **Of which 6 to be answered**	**110 Marks including choice. Of which 60 Marks to be answered**

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

I B.Sc., (BZC), SEMESTER-II
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

PRACTICAL SYLLABUS

Learning Outcomes:

- To understand the taxidermic and other methods of preservation of chordates
- To identify chordates based on special identifying characters
- To understand internal anatomy of animals through demo or virtual dissections, thus
- directing the student for "empathy towards the fellow living beings"
- To maintain a neat, labeled record of identified museum specimens

I. Dissections-

Scoliodon III, VII, IX and X Cranial nerves (Only Demonstration
Mounting of fish scales

III Identification of slides/spotters

1. Protochordata :*Herdmania, Amphioxus, Amphioxus* T.S through pharynx.
2. Cyclostomata :*Petromyzon and Myxine.*
3. Pisces : *Pristis, Torpedo, Hippocoampus ,Exocoetus, Echeneis, Labeo, Catla, Clarius,Channa, Anguilla*.
4. Amphibia :*Ichthyophis, Amblystoma, Axolotl larva, Hyla,*
5. Reptilia: *Draco, Chamaeleon, Uromastix, ,Testudo, Trionyx, Russels viper, Naja,* Krait, *Hydrophis, Crocodile.*
6. Aves : *Psittacula, Eudynamis, Bubo, Alcedo.*
7. Mammalia: *Ornithorhynchus*,*Pteropus,Funambulus.*

REFERENCE BOOKS:

1. S.S.Lal, Practical Zoology – Vertebrata
2. P.S.Verma, A manual of Practical Zoology – Chordata

I B.Sc., (BZC), SEMESTER-II
(WITH EFFECTIVE FROM 2020-2021)

TITLE: ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

PRACTICAL MODEL PAPER
(AT THE END OF II-SEMESTER-EFFECTIVE FROM 2017-18)

Max marks: 50
Time : 2Hrs

1. Dissect and display the III & VII cranial nerves of Scoliodon. Draw a neat labelled diagram
   10M

2. Identification of 5 spotters 4 X5=20M
   A)----------
   B)----------
   C)----------
   D)----------
   E)----------

3. Record
   05M

4. Internal Assessment
   15M

Total **50M**

Question Bank

Animal diversity - II

Module - I

Essay question

1. What is retrogressive metamorphosis? Discuss with special reference to the life history of an Ascidian and write its significance.
2. Life history of Herdamania.
3. Explain migration in fishes.
4. Scolidon respiratory system.
5. Write about the different sensory organs of Scoliodon.

Module - II

1. Parental care in Amphibia.
2. Respiratory system in Rana.
3. Reproductive system in Rana.

Module - III

1. Describe the structure and functions of calotes digestive system.
2. Urino genital system of calotes
3. Identification poisonous snakes.

Module - IV

1. Write about exoskeleton of colimbia livia.
2. Explain various flight adaptations in birds.
3. Explain respiratory system in birds.
4. Explain migration in birds and their significance
5. Write essay on dentition in mammals.

SHORT ANSWERS

Module - I

1. Sailent features of Cephalochordata.
2. Petromyzon and Mixin.
3. Scales in fishes.
4. General characters of fishes.
5. Sensory organs Scoliodon.

Module - II

1. General characters of Amphibia
2. Buccopharyngeal respiration in frog.
3. Structure of heart of frog.
4. Rana external characters.

Module - III

1. Calotes brain.
2. General characters of Reptilia.
3. Digestive glands of calotes.
4. Urinogenital system of male calotes.

Module - IV

1. Quill feathers.
2. General characters of mammals.
3. Pigeon heart.
4. Air sacs.
5. Syrinx in birds.
6. Protheria.
7. Metatheria
8. Eutheria.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

II B.Sc., (BZC), SEMESTER-III
ZOOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2020-2021)
AT THE END OF SEMESTER-III

Title: CYTOLOGY, GENETICS AND EVOLUTION

Hours:4 **Credits 3**

OBJECTIVES	LEARNING OUTCOMES
1. To learn the cytological techniques, the structure and functions of various cellular components. 2. To understand the central dogma of Protein synthesis including DNA replication, transcription &Translation 3. To understand the various human chromosomaldisorders 4. To understand the various evolutionary theories and the different types of animal behaviours	11. At the end of the course, students should be able to understand the structure and function of various animal cell organelles 2. Will appreciate the central dogma of proteinsynthesis 3. Will understand the genetic basis of human Chromosomal disorders which formsthe basis of genetherapy 4. Will appreciate the scientific basis of Organic evolution and the various behaviour patterns ofanimals

Module - I

Cytology 1

1.1 Definition, history, prokaryotic and eukaryotic cells,virus

1.2 Structure of eukaryoticcell.

1.3 Structure of Plasma membrane –Differentmodels

Module - II

Cytology 2

2.1. Structure and Functions of Endoplasmic reticulum, GolgiApparatus

2.2. Structure and functions of, Lysosomes,Ribosomes,

2.3. Structure and functions ofMitochondria.

2.4. Chromosomes structure, types andfunctions

Module - III

Genetics

3.1 Mendel's Laws of Inheritance

3.2 Incomplete dominance, codominance, Epistasis,Pleotropy

3.3 Sex determination, Sex linkedinheritance

3.4 Linkage and crossingover

Module - III

Evolution

4.1. Origin ofLife

4.2. Lamarckism, Darwinism, Neo Darwinism, Hardy WeinbergEquilibrium

4.3. Types of Natural Selection (Directional, Stabilizing,Disruptive)

4.4. Speciation (Allopatric and Sympatric), Isolation-IsolatingMechanisms

REFERENCES

1. De Robertis, E.D.P. and E.M.F. De Robertis, 1988. Cell and MolecularBiology,8th edition, International edition InformesHongkong.734p.
2. Powar, C.B., 1989. Essentials of Cytology, Himalaya Publishing House, Bombay,368p.
3. Verma, P.S. and V.K. Agarwal, 1995. Cell and Molecular Biology, 8th edition, S. Chand & Co., New Delhi,567p.
4. Rastogi. S.C. Cell and Molecular Biology, 2008 2nd Edition, New AgeInternational(p) Ltd., NewDelhi.
5. G.P. Jayanthi 2009 Molecular Biology, M.J P Publ. Chennai.
6. Verma, P.S. and V.K. Agarwal, 1995 Genetics, 8th edition, S. Chand & Co, NewDelhi
7. Gardener. 1991. Principles of genetics. 8th edition. John Wiley & Sons Inc.NewYork.
8. Evolution and human origins. Harper & Row, NewYork..
9. Young, D., 1992. The discovery of Evolution. Cambridge Univ. press,England.
10. M.P. Arora, 2000. Organic evolution. (Himalaya Publ. House). 332 pages.Ibid.1990. Evolutionary biology. (Himalaya Publ. House). 134pages.
11. P.K. Gupta, 1999. Cytology, Genetics and Evolution. (Rastogi Publ.). 507pages.
12. V.B. Rastogi, 2003. Organic evolution. (KedarNath Ram Nath). 482pages.
13. P.K. Seth, 2003. Understanding evolution of man: An introduction topaleontology.

II B.Sc., (BZC), SEMESTER-III
ZOOLOGY SYLLABUS
(WITH EFFECTIVE FROM 2020-2021)
AT THE END OF SEMESTER-III

Blue print for **CYTOLOGY, GENETICS AND EVOLUTION**

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1. Cytology 1	2	01	25
2. Cytology 2	1	03	25
3.Genetics	1	03	25
4.Evolution	2	03	35
5.Total	06 Of which 3 to be answered	10 Of which 6 to be answered	110 Marks including choice. Of which 60 Marks to be answered

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

II B.Sc., (BZC), SEMESTER-III

TITLE: CYTOLOGY, GENETICS AND EVOLUTION

Course Code:
MODEL QUESTION PAPER

Time: 2½hrs. **Max Marks: 60**

PART – 1

Note :Answer any THREE questions choosing at least one question from each section. Draw the diagrams whereevernecessary **3 X10 = 30**

SECTION- A

1. Explain the Structure of Eukaryotic Cell withdiagram
2. Write an essay on structure of plasma membrane and add a note on differentmodels
3. Describe the structure and functions of EndoplasmicReticulum

SECTION-B

4. Explain the Law of independent assortment with suitableexample
5. Explain Sex Determination in Animalkingdom
6. Write an essay onSpeciation

Part – II

Answer any**Six**questions **6x5=30**

7. Prokaryoticcell
8. Lysosomes
9. Golgiapparatus
10. Structure of Chromosome and itsfunctions
11. IncomepleteDominance
12. Epistasis
13. Crossingover
14. Hardy WeinbergEquilibrium
15. NaturalSelection
16. NeoDarwinism

II B.Sc., (BZC), SEMESTER-III

ZOOLOGY PRACTICAL SYLLABUS

ZOOLOGY - PAPER – III (At the End of III semester)

CYTOLOGY, GENETICS AND EVOLUTION

Max marks: 50
Time : 2Hrs

Cytology

1. Preparation of temporary slides of Mitotic divisions with onion roottips

2. Observation of various stages of Mitosis with preparedslides
   a. Prophase b. Metaphase c. Anaphase d.Telophase

Genetics

3. Study of Mendelian inheritance using suitable examples/Problems (Any fourProblems)

4. Human KaryotypeDiagram

Evolution

5. Study ofHomologousorgan - Limbs of Limbs of Frog, Limbs of Bat and Limbs of Lizard - Diagrams

6. Study of Analogous Organs – Wings of Insect, Wings of Bat and Wings of Bird -Diagrams

II B.Sc., (BZC), SEMESTER-III

ZOOLOGY - PAPER – III (At the End of III semester)

PRACTICAL MODEL PAPER

CYTOLOGY, GENETICS AND EVOLUTION

Max marks: 50
Time : 2Hrs

1. Prepare temporary slides of Mitotic divisions with onionroottips	10M
2. Identification of 5spotters/GeneticProblems A) ---------- (Cytology) B) (Cytology C) (Genetics) D) (Genetics) E) (Evolution)	4 X5=20M
3. Record	05M
4. Internalassessment	15M
Total	**50M**

QUESTION BANK FOR CYTOLOGY, GENETICS AND EVOLUTION

MODULE -I

Essay Questions

1. Write notes on structure and functions ofprokaryote
2. Write notes on structure and functions ofeukaryotes
3. Structure and functions of plasma membranelayers
4. Explain the different plasma membranemodels

Short Answer Questions

1. Types ofcells
2. Functions of plasmamembrane
3. Intrinsic and extrinsicproteins
4. Exocytosis

MODULE II

EssayQuestions

1. Structure and functions of endoplasmicreticulum
2. Structure and functions of golgi complex
3. Structure and functions oflysosomes
4. Structure and functions ofrhibosomes
5. Structure and functions ofmitochondria

Short Answer Questions

1. Cytoplasm
2. Cellorganells
3. Nucleus

MODULE III

EssayQuestions

1. Structure and functions ofchromosomes
2. Mendalian law ofinheritance
3. Write an essay on incomplete dominance andco-dominance

4. Explain the law of independent assortment with suitbleexamples

5.Explain the sex determination in aniomal kingdom

Short Answer Questions

1. Epistatis

2. Sex linkedinheritance

3. Linkages and crossingover

4. Chromosomal structure and itsfunctions

5. Crossing over

MODULE IV

EssayQuestions

1. Explain the origin of life in the evolutionaryprocess

2. What is natural selection ? Explain the types of naturalselection

3. What is speciation ? Write an essay on speciationtypes.

Short Answer Questions

1 .Lamarckism

2. Darwinism

3. NeoDarwinism

4. Hardy-Weinberglaw

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
SEMESTER-IVCODEZO4208
ZOOLOGY - PAPER – IV (Effective from 2020-2021)

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

Hours:4 **Credits 3**

OBJECTIVES	LEARNING OUTCOMES
This course reviews the physiology of humans, placing particular emphasis on Digestion ,Respiration, circulation, Muscle, Excretion, Nervous system The approaches taken include those based on organ systems and a comparative approach describing similar organ systems in differenttaxa. Some consideration of how physiological systems are adjusted to function throughout the wide range of environments in which animalslive. Ecology : To Know The inter-relationship between organisms in population and communities. To study the principle biogeochemical cycles. Zoogeography: To study the concepts of zoogeography and, zoogeographical importance of Indian subcontinent. Embryology Define the listed key terms of embryology. Gametogenesis and Fertilization. Map the path on egg follows starting at the ovary to implantation. Name the major structures and stages involved.	On satisfying the requirements of this course, students will have the knowledge and skills to: 1. Describe the physiology of major organs and organ systems in humans and othermammals 2. Understand and interpret the interplay between different organ systems and cellular responses to environmental change 3. Apply experimental design skills to understanding 4.At the end of the course student will be equipped with the different types of community interactions and their significance at the community level and the mechanism and the process of bio geochemical cycles 5.Concepts of population dynamics and the population control measures will be imparted to thestudents. 6.Concept of zoogeography, zoogeographical importance of Indian subcontinent in terms of biodiversity will be learnt by thestudent 7. Student will learn about the conceptsof embryology 8. Significance of germinal layers will be learnt by the student. 9. Concepts of embryonic development willbe learnt.

Module - I

Embryology

1.1. Gametogenesis

1.2. Types of eggs ,Fertilization, Types ofcleavages

1.3. Development of Frog upto formation of primary germlayers

1.4. Development, types and functions of Placenta inmammals

Module - II

Physiology -1

2.1 Process of digestion and Absorption

2.2. Respiration - Pulmonary ventilation, transport of oxygen andcarbondioxide
2.3. Circulation - Structure and functioning of heart, Cardiaccycle
2.4. Excretion - Structure of nephron, urine formation, counter currentmechanism

Module - II

Physiology -2

3.1.Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinatednervefibe
3.2.Muscle contraction - Ultra structureofmusclefibre,molecularandchemical basis of musclecontraction
3.3 Endocrine glands - Structure, secreionsandthe functions(of hormones)ofpituitary, thyroid, adrenal glands andpancreas
3.4 Hormonal control of reproduction in amammal

Module - II

Ecology

4.1. Scope of Ecology; Important abiotic factors of Ecosystems – Temperature, Light, Water, Nutrient Cycles- Nitrogen, Carbon and Phosphorus
4.2. Food Chain and food web; Energy Flow in anEcosystem
4.3. Habitat, Ecological niche; Community Interations-Mutualism, Commensalism, Parasitism, Competetion, PredationDynamics
4.4. Zoogeographical regions; Study of physical and faunal peculiarities of Oriental, Australian andEthiopianregions

References

1. Cohn, N.S., 1979, Elements of Cytology, Freeman Book Co., New Delhi
2. De Robertis, E.D.P. and E.M.F. De Robertis, 1988. Cell and MolecularBiology,
3. Gies, A.C., 1979. Cell Physiology, Saunders Co., Philadelphia, London, Toronto,609p.
4. Powar, C.B., 1989. Essentials of Cytology, Himalaya Publishing House, Bombay,368p.
5. Verma, P.S. and V.K. Agarwal, 1995. Cell and Molecular Biology, 8th edition, S. Chand &Co.
6. Rastogi. S.C. Cell and Molecular Biology, 2008 2nd Edition, New AgeInternational(p) Ltd.,
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SEMESTER-IVCODE
ZO4208ZOOLOGY - PAPER – IV (Effective from 2020-2021)

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY
BLUE PRINT FOR QUESTION PAPER SETTING

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1.Embryology	2	02	30
2. Physiology 1	1	03	25
3. Physiology 2	2	02	30
4.Ecology	1	03	25
5.Total	06 Of which 3 to be answered	10 Of which 6 to be answered	110 Marks including choice. Of which 60 Marks to be answered

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

SEMESTER-IVCODE
ZO4208ZOOLOGY - PAPER – IV (Effective from 2020-2021)

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

MODEL QUESTION PAPER

Time: 2½hrs. **Max Marks: 60**

PART – 1

Note :Answer any THREE questions choosing at least one question from each section. Draw the diagrams whereevernecessary **3 X10 = 30**

SECTION- A

1. Write an essay on the spermatogenesis; write a note on the structure of the maturesperm
2. Describe different types and functions ofplacenta
3. Explain the Structure and function ofheart

SECTION-B

4. Write an essay on Nerve impulsepropagation
5. Harmonal Control of reproduction in amammal
6. Write an essay on the different types of interaction found in the community with suitable examples.

Part – II

Answer any**Six**questions **6x5=30**

7. Types ofEggs
8. Fertilization
9. Transport ofoxygen
10. Structure ofNephron
11. counter currentmechanism
12. Hormones ofpancreas
13. Sarcomere
14. Phosphoruscycle
15. Fauna of Australian region
16. foodchain

ZOOLOGY PRACTICAL SYLLABUS FOR IV SEMESTER

ZOOLOGY - PAPER – IV (At the End of IV semester)

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

Max marks: 50
Time : 2Hrs

I. Embryology

1. Study of T.S. of testis, ovary of amammal
2. Study of different stages of cleavages (2, 4, 8 cellstages)

II. Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats (2 foreach)
2. Study of prepared slides of T.S. of liver, kidney, bone, charts showingpituitary, thyroid, adrenal and pancreasglands

III. Ecology

1. Determination of pH of givensample
2. Estimation of dissolved oxygen of givensample
3. Estimation of salinity of givensample

ZOOLOGY - PAPER – IV (At the End of IV semester)

EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

PRACTICAL MODEL PAPER

Max marks: 50
Time : 2Hrs

1. Estimate DO/PH/Proteins/carbohydrates/lipids ofasample	10M
2. Identification of 5spotters/GeneticProblems	4 X5=20M
A) ---------- (Embryology)	
B) (Embryology)	
C) (Physiology	
D) (Physiology)	
E) (Physiology)	
3. Record	05M
4. Continuous InternalAssessment	15M
Total	**50M**

QUESTION BANK FOR EMBRYOLOGY, PHYSIOLOGY AND ECOLOGY

MODULE -I

Essay Questions

1. Define gametogenesis,describe the process of spermatogenesis andspermeogenesis
2. Write an essay on the oogenesisprocess
3. What is fertilisation ? Explain the process of thefertilisation
4. Write an essay on the types of placenta inmammals

Short Answer Questions

1. Write notes on the types ofeggs
2. Write an essay on the types ofcleavages
3. Development of frog upto gastrulation (or)primartgermlayers
4. Development ofplacenta
5. Significance ofplacenta
6. Fertilisation
7. Blastula
8. Gastrula

MODULE II

Essay Questions

1. What is digestion ?Explain the process of chemical digestion of food(p,c,l)
2. Describe the process of digestion inman
3. What is absorption? Explain the process of absorption of carbohydrates, fat,lipids
4. Explain the physiology of respiration inmammal
5. Explain the transport of o_2 and co_2 throughblood
6. Define and describe oxygen disassociationcurve
7. Describe the structure and functions of a mammaliankidney
8. Describe the working mechanism of mammalianheart
9. Describe the physiology of urineformation
10. Explain the structure and functions of mammaliankidney

Short AnswerQuestions

1. Contactdigestion
2. Chemical digestion of carbohydrates
3. Chemical digestion ofproteins
4. Bile and bilesalt
5. Absorption ofvitamins
6. Respiration in aquatic vertebrates
7. Inspiration andexpiration
8. Oxygen disassociationcurve
9. Chloride shift (or) hamburgersphenomenon
10. Myogenic and neurogenichearts
11. Cardiaccycle
12. Formation ofurea
13. Ammonotelic and ureotelicanimals
14. Counter current mechanism of urineformation

MODULE III

Essay Questions

1. Explain the structure and functional properties of neuron

2. What is action potential?.Explain the conduction of actionpotential
3. What is synapse ? Explain synaptic transmission of nerveimpulse
4. Explain the different theories support to the musclecontraction
5. Explain the endocrine role of gonads inreproduction
6. Give a detailed account in the menstrual cycle inhumans
7. Write the significant role of hormones in humanreproduction
8. Explain the structure and functional significance ofpituitarygland

Short Answer Questions

1. Actionpotential
2. Nature and velocity of nerveimpulse
3. Synaptictransmission
4. Types of musclecontraction
5. Chemistry of musclecontraction
6. Structure ofsarcomere
7. Pinealgland
8. Pitutarygland
9. Somatotrophic hormones(sth)
10. Luteinizing hormone(lh)
11. Thyroid gland
12. Cretinism and myxoedema
13. Effects of parathyroidgland
14. Pancreas
15. Adrenalgland
16. Estrogen and itsfunctions
17. Placenta.

MODULE IV

Essay Questions

1. Explain important abiotic factors of eco system
2. Nutrient cycles (or)biogeocycles
3. What is symbiosis ?explain the inter relation ship betweenspecies.
4. Explain different types ofmutualism
5. Write an esay on parasitism
6. Explain concept of populaton and its characteristicfeatures
7. Describe the geographical and faunal characters of orientalregion
8. Describe the geographical and faunal characters ofAustralian
9. Describe the geographical and faunal characters ofethiopia.

Short Answer Questions

1. Foodchain
2. Foodweb
3. Ecologicalpyramids
4. Consumers andproducers
5. Decomposers and transformers
6. Predation
7. Ectoparasites
8. Symbiosis
9. Mutualism
10. Commensalism

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2016-17)
SEMESTER-V CODE ZO 5508-C

ZOOLOGY - PAPER - V
ANIMAL BIOTECHNOLOGY

CREDITS:3T+2P Hrs : 3 T+ 3 P/week

OBJECTIVES	LEARNING OUTCOMES
1. To impart knowledge on Recombinant DNA Technology 2. Makes the student to comprehend the Enzyme kinetics and mechanism of enzyme action 3. Student develops the practicalknowledge in animal cell culture and preparation of culturemedium 4. To enable the student to gain knowledge and understanding in the recent advancement of biotechnology and its implication in health, agriculture, medicine, pollution, aquaculture and differentfields.	1. Understand the applications of Biotechnology.Familiar with the tools and techniques of Genetics andBiotechnology 2. Understood the recombinant technology, gene integration into the vector and with host genome and creation of transgenic animals. 3. Understood the principle and applications of biotechnology techniques – DNA finger printing, plotting technique microarray. 4. Described the applications stem cells andgene therapy and biotechnologydevices

Module 1: Tools of Recombinant DNA technology - Enzymes and Vectors

1.1. Animal Biotechnology – Scope of Biotechnology and Applications. Restriction endonucleases-Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

1.2. DNA modifying enzymes and their applications: DNA polymerases. Terminal deoxynucleotidyltransferase, kinases and phosphatases, and DNAligases

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

Module 2: Techniques of Recombinant DNA technology

2.1. Gene Cloning: Use of linkers and adaptors. Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral mediateddelivery

2.2. DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing. Basics of PCR.

2.3. Hybridization techniques: Southern, Northern and Western blotting

UNIT 3 Animal Cell Technology

3.1 Cell culture media: Natural and Synthetic. Cell cultures: primary culture, secondary culture, continuous cell lines; Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero);

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

3.3. Stem cells: Types of stem cells, applications

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

Module 4. Applied Biotechnology

4.1 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 lyophilisation

4.2. Agriculture: fisheries – monoculture in fishes, polyploidy in fishes; DNAfingerprinting

4.3. Invitro Fertilization and Embryo TransferTechnology

Additional inputs

1. Genomic and cDNA libraries: Preparation anduses
2. Protocols for Primary CellCulture

BLUE PRINT

III Year B.Sc., Zoology

SEMESTER-V CODE ZO 5508-C

ZOOLOGY - PAPER - V
ANIMAL BIOTECHNOLOGY
At the end of V Semester

Under CBCS Pattern

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1. Tools of Recombinant DNA technology - Enzymes and Vectors	**2**	**02**	**30**
2. Techniques of Recombinant DNA technology	**1**	**03**	**25**
3. Animal Cell Technology	**2**	**02**	**30**
4. Applied Biotechnology	**1**	**03**	**25**
Total	**06** **Of which 3 to be answered**	**10** **Of which 6 to be answered**	**110 Marks including choice.** **Of which 60 Marks to be answered**

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

MODEL QUESTION PAPER

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., SEMESTER-V CODE ZO 5508-C

ZOOLOGY - PAPER - V
ANIMAL BIOTECHNOLOGY
MODEL QUESTION PAPER

Time: 2½hrs. **Max Marks: 60**

PART – 1

Note :Answer any THREE questions choosing at least one question from each section. Draw the diagrams whereevernecessary **3 X10 = 30**

SECTION- A

1. Write an essay on the Animal Biotechnology and itssignificance
2. What are various types of CloningVectors
3. Explain the Sanger's method of DNAsequencing

SECTION-B

4. Write an essay on the production of MonoclonalAntibodies
5. Write notes on Transgenesis and TrangenicAnimals
6. ExplainInvitrofertilization

Part – II

Answer any**Six**questions **6x5=30**

7. DNA Ligases
8. RestrictionEndonucleases
9. Viral Mediated gene delivery
10. Western blotting
11. Gene gun
12. HeLa
13. Types of StemCells
14. Polyploidy inFishes
15. What isFermentations
16. Lyophilisation

III Year B.Sc.,Zoology

ZOOLOGY - PAPER - V
ANIMAL BIOTECHNOLOGY

CODE ZO 5508-CP

At the end of VSemesterUnder CBCS Pattern

PRACTICAL SYLLABUS

Any SIX of the following:

1. Preperation of Media and Inoculation ofExplant
2. DNA Quantification Using Agarose GelElectrophoresis
3. Cell Viability Test (Trypan Bluetest)
4. DNA finger Printing(procedure)
5. Interpretation of sequencing gel electropherograms(Procedure)
6. Identification of Transgenic animals (4Photographs)
7. Identification of Vectors (4 Photographs)
8. Identification of Genetic Disorders (4Photographs)

Model paper for Practical semester End Examination

Max.Marks 50 Time: 2 Hours

1. Prepare culture medium/Cell Viability Test using Trypan Blue Test/Interpret the given Gel Eletrophorogram – andWriteProcedure 15M
2. Identify thefollowingspotters: 15 M (5x3)
   A Transgenic animal
   B. Transgenicanimal
   C. Vector
   D. Genetic disorder
   E Geneticdisorder
3. Record 05M
4. InternalAssessment 15 M

Total **50M**

Animal biotechnology

Question bank

Module - I

Essay type questions.

1. Explain different types restriction enzymes used in geneticengineering.
2. What is DNA polymerase mention its function andapplications.
3. What is a vector? Explain plasmids asvectors.
4. Explain different vectors used in rDNAtechnology.

Short answer questions

1. Applications of DNApolymerase
2. Characteristics of pUCvector
3. Short notes on action of DNAligase.
4. Short notes on RMsystem.

Module IIEssay questions

1. Describe briefly about different techniques of genetransfer.
2. Define blotting and explain steps involved in southernblotting.
3. Describe various steps involved in construction of cDNAlibraries.
4. Explain different steps involved in Sanger's method of DNAsequencing.

Short answer questions

1. Short notes onlinkers.
2. Define PCR and explain steps in PCRtechniques.
3. Applications of genomic DNA libraries.
4. Steps in northernblotting
5. Liposome mediatedtechnology.

Module IIIEssay questions

1. Define animal cell technology and describe various cell culturetechniques.
2. Describe the applications of stem celltechnology.
3. Describe various methods in the process of organculture.
4. Describe the process of cell fusion (somatichybrids).

Short answer questions

1. Natural and syntheticmedia.
2. Short notes on organculture
3. Short notes monoclonal antibodies(MAB's).
4. Short notes oncryopreservation.
5. Short notes on applications of monoclonalantibodies.
6. Short notes on types of stemcells.

Module – IVEssay questions

1. Define fertilization? Describe solid and semi solidmethods.
2. Describe working mechanism of stirred tankfermenter.
3. What is monoculture. Explainit.

4. Explain different steps in DNA finger printingtechnology.

Short answer questions

1. Short notes on submergedfermentation.
2. Illustration of downstreamprocessing.
3. Short notes onlyophilization.
4. Short notes onfiltration.
5. Short notes on batchculture.

REFERENCES

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 LaboratoryPress
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 SciencePublishers
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 PublishersLimited.
9. Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998. Animal Cell Culture Methods AcademicPress.
10. P.K. Gupta: Biotechnology and Genomics, Rastogi publishers(2003).
11. B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
(WITH EFFECTIVE FROM 2020-2021)
SEMESTER-V CODE ZO 5508-C

ZOOLOGY - PAPER - VI
ANIMAL HUSBANDRY

CREDITS:3T+2P Hrs : 3 T+ 3 P/week

OBJECTIVES	LEARNING OUTCOMES
1. To give general introduction to poultry farmimg, management ofchicks 2. to make the student understand the feed management techniques in poultryindustry. 3. To impart knowledge and skill in handling of hatching eggs,breeding 4. Imparts knowledge on the breeds of diarycattle buffaloes and theirclassification	1. Familiar with introduction topoultry farming, Management ofchicks 2. Understand the principles offeeding, Nutrient requirements and Poultry diseases 3. Gains knowledge in methods of hatching, brooding and sexing ofchicks 4. Be able to distinguish betweenbreeds of cattle, Classification. Gains knowledge in selection of site for diary farm, weaning ofcalf

Module – I

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

Module– II:

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, controlandmanagement.

Module– III:

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

Module-IV:

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 adairyfarm

BLUE PRINT

III Year B.Sc.,Zoology

SEMESTER-V CODE ZO 5508-C

ZOOLOGY - PAPER - VI
ANIMAL HUSBANDRY
At the end of V Semester

Under CBCS Pattern

Module	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
Module - I	**1**	**03**	**25**
Module - II	**2**	**02**	**30**
Module - III	**1**	**03**	**25**
Module - IV	**2**	**02**	**30**
Total	**06** **Of which 3 to be answered**	**10** **Of which 6 to be answered**	**110 Marks including choice.** **Of which 60 Marks to be answered**

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

SEMESTER-VI

ZOOLOGY - PAPER – VI(Effective from 2020-202120)

ANIMAL HUSBANDRY

MODEL QUESTION PAPER

Time: 2½hrs. **Max Marks: 60**

PART – 1

Note :Answer any THREE questions choosing at least one question from each section. Draw the diagrams whereevernecessary **3 X10 = 30**

SECTION- A

1. Describe the various rearing methods of poultrybirds.
2. Describe the various ingredients of poultryfeed.
3. Explain role of vaccination in poultrybirds.

SECTION-B

4. Describe the various methods of hatching ofeggs.
5. Describe the various indigenous breeds of dairy cattle ofindia.
6. Describe the methods of vaccination for dairycattle.

Part – II

Answer any**Six**questions **6x5=30**

7. Siteselection.
8. Brooding.
9. Cagesystem.
10. Gomboradisease.
11. Feedingmechanism.
12. Selection ofeggs.
13. Exoticbreeds.
14. Culling.
15. Inbreeding.
16. Site selection ofdairy.

ANIMAL HUSBANDRY QUESTION BANK

Module – I Essay question

1. Eenumarate the importance of animalhusbandry.

2. Describe the various rearing methods of poultrybirds.

3. What are the management practices followed in poultryfarms.

4. Describe the various implements used inpoultrysheds.

Short answer questions

1. Site selection

2.Debeaking

3.Brooding

4. Medicines used in poultryshed

5.Cage system

6.Broodershed

Module - II

Essay questions

1. Describe the various ingredients of poultryfeed

2. Various viral diseases in poultrybirds

3. Fungal diseases in poultrybirds

4. Internal and external parasites in poultrybirds

5. Role of vaccination in poultrybirds

Short questions

1. Gomboradisease.
2. Cholera
3. Brooderpneumonia
4. Ticks andmites
5. Typhoid
6. Feedingmechanisms

Module III Essay questions

1. Describe the process of selection of eggs for brooding and theirprecautions.
2. Describe the various methods of hatching ofeggs.
3. What are the steps taken for hatching of eggs artificially inincubators.
4. What are the various brooding methods used in the rearing of chicks and their management practices.

Short questions

1. Brooding
2. Culling
3. Leghorn
4. Bird-flu
5. Selection ofeggs
6. Exoticbreeds

Module – IV

Essay questions

1. What are the important aspects for the selection of dairycattle.
2. Describe the various indigenous breeds of dairy cattle ofindia.
3. What is animal breeding, and its variousmethods.
4. Describe the construction of dairyfarm.
5. Describe the methods of vaccination for dairycattle.

Short answer questions

1. Inbreeding
2. Out breeding
3. Dehorning
4. Sanitation and hygiene in dairyfarm.
5. Site selection fordairy.

III Year B.Sc.,Zoology

ZOOLOGY - PAPER - VI
ANIMAL HUSBANDRY

CODE ZO 5508-CP

At the end of V SemesterUnder CBCS Pattern

PRACTICAL SYLLABUS

1. Study of various breeds of layers andbroilers(photographs)
2. Identification of disease causing organisms in poultry birds (aspertheory)
3. Study of the anatomy of a poultry bird by way of dissecting abird.(Demonstration)
4. Study of various activities in a poultry farm (layers and broilers) and submission of areport.
5. Study of various breeds ofcattle(photographs/microfilms).
6. Study of various activities carried out in a dairy farm and submission ofareport.

Model paper for Practical semester End Examination

Max.Marks 50 Time: 2 Hours

1. Identify thefollowingspotters/Charts/Photographs 30 M (6x5)
   A Layer breed
   B. Broiler Breed
   C. Diseasepoultry
   D. Disease Poultry
   E Diseasediary
   F. Breed of cattle
2. Record 05M
3. InternalAssessment 15 M

Total **50M**

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ZOOLOGY SYLLABUS FOR VI SEMESTER
ZOOLOGY - ELECTIVE PAPER: VII-(B)

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

Max. Marks:60

Module I: Biomolecules:.1 Carbohydrates - Classification of carbohydrates, Structure of glucose.
1.2 Proteins - Classification of proteins. General properties of aminoacids.
1.3 Lipids - Classification oflipids.
1.4 Nucleic acids - DNA – Structure and function; RNA - Structure, types andfunctions.

Module II: Enzymes and Cellular Metabolism
2.1. Introduction to biocatalysis, Enzymes and their classification, Mechanism of action. Inhibition and Regulation.
2.2 Carbohydrate Metabolism - Glycolysis, Krebs Cycle, Gluconeogenesis,
2.3 Glycogenmetabolism.

Module - III : Cellular Metabolism and Cell Physiology
3.1 Lipid Metabolism - Biosynthesis and β oxidation of palmiticacid.
3.2 Protein metabolism - Transamination, Deamination andUreaCycle. 3.3 Transport functions of plasma membrane – Active, passive and facilitatedtransport.
3.4 Cell junctions – Tight junctions, desmosomes, gap junctions

Module -IV: 4.1 DNA structure, types (A,B,Z); DNA as genetic material (Griffith's Transformation, Hershey Chase experiment, McKarthy experiment)
4.2 Fine structure ofgene.
4.3 Transcription and Translation -Prokaryotes.
4.3 Gene Expression in prokaryotes (Lac Operon)

Additional Inputs:
Enzyme kinetics, Review of electron transport chain, Gene expression in eukaryotes.

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.

ZOOLOGY – ELECTIVE PAPER: VII-(B)

BLUE PRINT FOR CELLULAR METABOLISM AND MOLECULAR BIOLOGY

MODULE NO.& NAME	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5MARKS	MARKS ALLOTED TO THE UNIT
MODULE -I (BIOMOLCULES)	02	03	35
MODULE -II (ENZYMES AND CELLULAR METABOLISM)	01	02	20
MODULE -III (CELLULAR METABOLISM &CELL PHYSIOLOGY	01	03	25
MODULE -IV (GENE & Its EXPRESSION)	02	02	30
Total No. of Questions	06 Of which 3 to be answered	10 Of which 6 to be answered	110 Marks including choice. Of which 60 Marks to be answered

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

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

Question bank

Module
IEssays

1. Write an essay on classification of carbohydrates.
2. Write an essay on general properties and classification of aminoacids.
3. Write an essay on classification oflipids.
4. Describe the structure and function ofDNA.
5. Describe the structure, types and function ofRNA.

Short Answers

6.Glucose, 7. Lactose, 8. Sucrose, 9. Starch, 10. Cellulose, 11. Glycogen,12. Peptide bond, 13. Homo polysaccharides, 14. Heteropolysaccharides

Module II

Essays

15. Explain about classification of Enzymes and its mechanism ofaction.
16. Write an essay onGlycolysis.
17. Write an essay on Krebs cycle /citric acid / tricarboxyliccycle.

ShortAnswers

19. Bio-catalysts, 20. Gluconeogenesis, 21.Glycogen metabolism,22. Induced Fit Theory,23. Oxidoreductase

Module III

Essays

24. Write an essay on Active and Passive Transport of plasmamembrane.
25. Explain about proteinmetabolism.

Short Answers

26.Cell junctions- Tight junctions ,27. Desmosomes, 28. Gap junctions, 29. Urea cycle,30. Transamination 31. Deamination.

Module IV

Essays

32. Write an essay on Gene Expression in Prokaryotes (LACOPERON)
33. Write an essay on DNA is the geneticmaterial.
34. Describe fine structure of gene and explain about Griffiths Transformationexperiment.

Short Answers

35. Transcription, 36. Translation ,37. Types of DNA, 38. Structure of D.N.A, 39. McCarthy Experiment.

MODEL QUESTION PAPER

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

VII (B)*CELLULAR METABOLISM AND MOLECULAR BIOLOGY

(CBCS) W. E. F., 2020-2021

At the end of VI SEMSTER

MAXMARKS: 60 (Time: 2 ½Hours)

PART-I 3×10=30M

Note: Answer any THREE questions choosing at least one question from each section.

Draw the diagrams where ever necessary.

SECTION – A

1. Write an essay on general properties and classification of aminoacids.
2. Describe the structure and functions ofDNA.
3. Explain the classification of Enzymes and its mechanism ofaction.

SECTION -B

4. Write an essay on Active and Passive Transport of Plasmamembrane.
5. Describe the gene expression inProkaryotes.
6. Write an essay on DNA is the geneticmaterial.

PART – II

Answer any six ofthefollowing 6×5=30M

7. Structure ofGlucose
8. Gluconeogenesis
9. Urea cycle
10. Gapjunctions
11. bio-catalysts
12. cellulose
13. Transamination
14. Types ofDNA
15. peptidebond
16. Translation

ZOOLOGY PRACTICAL SYLLABUS

ZOOLOGY - ELECTIVE PAPER: VII-(B)

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

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'smethod.

3. Study of activity of salivary amylase under optimum conditions.

4. Preparation of permanent slide to show the presence of Barr body in Human female blood cells or cheek cells.

5. Onion root tip for observation for mitosis stages.

6. Gaint Chromosomes: Polytene Chromosomes, Lamp brushChromosomes.

7. Meta Centric, Sub Meta Centric, Telo Centric, Acro Centric and Acentricchromosomes.

AT THE END OF THE VI SEMESTER

MODEL PRACTICAL PAPER

I. Preparation of permanent slide to show the presence of Barr body in Human female blood cells orcheckcells. 15×1=15 M

II. Spotters of poletene and lampbrush chromosomes. 05×2=10M

III. RECORD 05×1=05M

IV. VIVA 05×5=05M

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE –VIII-B:
VI SEMESTER

AQUACULTURE

Cluster Elective Paper: VIII-B-1
PRINCIPLES OF AQUACULTURE

CREDITS:3T+2P Hrs : 3 T+ 3 P/week

OBJECTIVES	LEARNING OUTCOMES
1. The student Inculcates knowledge on basic principles ofaquaculture 2. Understand the types of different aquaculturesystems 3. Develops skill in design and construction of fishfarm 4.Will be able to manage the culturepond	**1.** Described the fisheries and fishery industries, Understood the various types and Methods of aquaculturepractices. **2.**Understood the physiology and reproductive mechanisms of important fishes. **3.** Understood the modern techniques and methods of fisheryindustries. **4.**Attained knowledge about important cultivable fin fishes, shell fishes and importance of value added fisheryproducts

PRINCIPLES OF AQUACULTURE

Module – I

Introduction / Basics of Aquaculture
1.1 Definition, Significance and History ofAquaculture
1.2 Present status of Aquaculture – Global and National scenario
1.3 Major cultivable species for aquaculture: freshwater, brackish water andmarine.
1.4 Criteria for the selection of species forculture

Module – II

Types of Aquaculture
2.1 Freshwater, Brackishwater and Marineresources
2.2 Concept of Monoculture, Polyculture,Composite culture, Monosex culture and Integrated fish farming

2.3. Culture systems - Ponds, Raceways, Cages, Pens, Raftsculture
2.4. Culture practices -Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish andshrimp.

Module – III

3.1 Design and construction of aquafarms - Criteria for the selection of site for freshwater pond farms- Design and construction of fishfarms
3.2 Nutrition and feeds - Nutritional requirements of a cultivable fish and shellfish - Natural food and Artificial feeds and their importance in fish and shrimpculture
3.3 Culture of Pearl oysters, culture of seaweeds, culture of ornamentalfishes

Module – IV

4.1. Management of carp culture ponds - Culture of Indian major carps: Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming andfertilization;
4.2. Stocking management – Stocking density andstocking;
4.3 Post-stocking management – Feeding, water quality, growth and health care; and Harvesting of ponds
4.4. Culture of Penaeusmonodon or litopenaeusvannamei

Additional inputs
a. Culture systemsraceways
b. Bluerevolution

BLUE PRINT

III Year B.Sc.,Zoology

ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE –VIII-B:
VI SEMESTER
AQUACULTURE
Cluster Elective Paper: VIII-B-1
PRINCIPLES OF AQUACULTURE At the end of V Semester

Under CBCS Pattern

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1. Introduction / Basics of Aquaculture	**2**	**02**	**30**
2. Types of Aquaculture	**1**	**03**	**25**
3. Design and construction of aquafarms	**2**	**02**	**30**
4. Management of culture ponds	**1**	**03**	**25**
Total	**06** **Of which 3 to be answered**	**10** **Of which 6 to be answered**	**110 Marks including choice.** **Of which 60 Marks to be answered**

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

MODEL QUESTION PAPER

P R GOVERNMENT COLLEGE (AUTONOMOUS),KAKINADA
ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE –VIII-B:
VI SEMESTER

AQUACULTURE

Cluster Elective Paper: VIII-B-1
PRINCIPLES OF AQUACULTURE

Time: 2½hrs. **Max Marks: 60**

PART – 1

Note :Answer any THREE questions choosing at least one question from each section. Draw the diagrams whereevernecessary **3 X10 = 30**

SECTION- A

1. What is the current status of aquaculture at global and national level
2. What are the major cultivable species of freshwaterfishes
3 What are various culture practices of fishes

SECTION-B

4. Write an essay on design and construction of fishfarm
5. Explain Natural and artificial feeds and their importance in fishculture
6. write an essay on Stocking management of a fishpond

Part – II

Answer any**Six**questions **6x5=30**

7. Food fishes of Marinewaters
8. criteria of Selection of species fishculture
9. Polyculture
10. Penculture
11. Freshwaterresouces
12. Selection of site for fishpond
13. Sea weed culture
14 Algalblooms
15. Ornamentalfishes
16. Liming andFertilization.

III Year B.Sc.,Zoology

ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE –VIII-B:
VI SEMESTER
Cluster Elective Paper: VIII-B-1
PRINCIPLES OF AQUACULTURE

PRACTICAL SYLLABUS

Cultivable fishes

1. Identification and study of important cultivable and edible fishes - Anyfive
2. Identification and study of important cultivable and edible crustaceans - Anyfive
3. Identification and study of common aquarium fishes – Anyfive
4. General description and recording biometric data of a givenfish.

Diseases

1. Identification and study of fish and shrimp diseases - Using specimens / pictures Any Five

Pond Management

1. Water Quality -Determination of temperature, pH, salinity in the pond water sample; Estimation of dissolved oxygen, total alkalinity, totalhardness.
2. Soil analysis – Determination of soil texture, pH,conductivity,
3. Identification of common zooplankton, aquatic insects and aquatic weeds – Each3

Model paper for Practical semester End Examination

Max.Marks 50 Time: 2 Hours

1. Estimate the dissolved oxygen/salinity/hardness of a given pondwatersample 10M
2. Identify thefollowingspotters: 15 M (5x3)
   A Freshwater/Marinefish
   B. Fishdisease
   C. Aquarium fish
   DCrustacian
   E Zooplankton/Aquatic weed
3. Record 05M
4. InternalAssessment 15 M

Total **50M**

Question Bank for Principles of Aquaculture

Module I

Essay Questions

1. What is the current status of aquaculture at global and nationallevel?
2. Explain the concept of BlueRevolution
3. Describe Major Cultivable Fresh waterfishes
4. What are the characters to be present in cultivable fishes

Short AnswerQuestions

1. Any 2 Brachish water foodfishes
2. Any 2 Marine foodfishes
3. Criteria for selection of Fishes forcultivation
4. Significance ofAquaculture

Module II

Essay Questions

1. What are different Freshwater fishery resources ofIndia
2. What are different culture practices ofaquaculture
3. What are different brachish water fishery resources of India

Short AnswerQuestions

1. Polyculture
2. Cage culture
3. Penculture
4. Raftculture
5. Mono sex culture
6. Integrated fish farming
7. Mackerel fishery
8. Oil Sardinefishery

Module III

Essay Questions

1. Explain Design and Construction ofAquafarm
2. Write an essay on Natural and Artificialfeeds
3. Explain in detail the culture of Pearloysters
4. Write notes on Criteria for selection of site for freshwater pond farm

Short AnswerQuestions

1. Culture of seaweeds
2. Breeding of ornamentalfishes
3. Nursarypond
4. Live feed

Module IV

EssayQuestions

1. Describe the culture ofLitopenaeusvannamei
2. Write an essay on Prestocking management of fishpond
3. Write an essay on Post stocking management of fish pond

Short AnswerQuestions

1. Liming
2. Algal blooms and their control
3. Stockingdensity
4. Penaueusmonodon
5. Predators
6. Fertilization
7. White spotdisease
8. Waterquality

REFERENCES BOOKS

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4. FAO. 2007. *Manual on Freshwater PrawnFarming*.
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15. Pillay TVR &Kutty MN. 2005. *Aquaculture- Principles and Practices*. 2nd Ed.Blackwell
16. Rath RK. 2000. *Freshwater Aquaculture*. ScientificPubl.
14. Stickney RR. 1979. *Principles of Warmwater Fish Culture*, John Wiley &Sons
15. Wheaton FW. 1977. *Aquacultural Engineering*. John Wiley &Sons.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE – VIII-B-2
VI SEMESTER

AQUACULTURE MANAGEMENT

CREDITS:3T+2P Hrs : 3 T+ 3 P/week

OBJECTIVES	**LEARNING OUTCOMES**
Understands the Hatchery management techniques Comprehends Water quality parameters Be aware of the feed management and quality assurance Familiar with disease diagnostics and treatment in aquaculture	1. Understands the Breeding techniques, Induced breeding, Hatchery management in fishes andShrimps 2. Develops Skill in testing the waterquality suitable for fish culture, different aeration methods and emergencyaeration 3. Attains knowledge of fish feeds, live feeds, feed formulation, feedadditives 4. Be familiar with the various diseases and their control in fishes, varioustraining

Syllabus

Module – I

Breeding and Hatchery Management

1.1.Induced breeding of carp by Hypophysation; and use of synthetic hormones
1.2.Hatchery management of Indian major carps
1.3 Breeding and Hatchery management of *Penaeusmonodon*/ *Litopenaeusvannamei*

Module – II

Water quality Management

2.1 Water quality and soil characteristics suitable for fish and shrimpculture
2.2 Identification of oxygen depletion problems and its control in cultureponds
2.3 Aeration: Principles of aeration and Emergencyaeration
2.4 Liming materials, Organic manures and Inorganic fertilizers commonly usedand their implications in fishponds

Module – III

Feed Management

3.1 Live Foods and their role in shrimp larvalnutrition.

3.2 Supplementary feeds; Types of feeds; Feed additives and Preservatives; role ofprobiotics.
3.3 Feed formulation and manufacturing; feed conversion efficiencies andratios

Module – IV

4.1 Principles of disease diagnosis and health management;Fish immunization andvaccination
4.2 Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish andshrimp diseases
4.3 Fisheries Training and Education in India; Role of extension incommunity
4.4 Gynogenesis, Androgenesis, Polyploidy, Transgenic fish, Cryopreservation of gametes, Production of monosex and sterile fishes and their significance inaquaculture.

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III Year B.Sc.,Zoology

ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE – VIII-B-2
VI SEMESTER

AQUACULTURE MANAGEMENT
Under CBCS Pattern

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1. Breeding and Hatchery Management	**2**	**02**	**30**
2. Water quality Management	**1**	**03**	**25**
3. Feed Management	**1**	**03**	**25**
4. Diseases, training and genetics	**2**	**02**	**30**
Total	**06** **Of which 3 to be answered**	**10** **Of which 6 to be answered**	**110 Marks including choice.** **Of which 60 Marks to be answered**

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

MODEL QUESTION PAPER

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc.,Zoology

ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE – VIII-B-2
VI SEMESTER

AQUACULTURE MANAGEMENT
MODEL PAPER

Time: 2½hrs. **Max Marks: 60**

PART – 1

Note :Answer any THREE questions choosing at least one question from each section.Draw the diagrams whereevernecessary **3 X10 = 30**

SECTION- A

1. Describe Induced breeding in carps
2. Give detailed account of Hatchery Management of Litopenaeusvannamei
3 Describe water quality Management for fishculture

SECTION-B

4. Write an essay on Feed formulation andManufacturing
5. Describe symptoms, Prophylaxis and therapy of any 4 fishdiseases
6. Explain fishery training and Education inIndia

Part – II

Answer any**Six**questions **6x5=30**

7. Types ofHatcheries
8. Larval Stages ofPrawn
9. Limingmaterials
10. OrganicManures
11. Principles ofaeration
12. Live feed
13. Role of Probiotics
14 Feed Additives
15. Gynogenesis andAndrogenesis
16. FishVaccination.

III Year B.Sc.,Zoology

ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE – VIII-B-2
VI SEMESTER

AQUACULTURE MANAGEMENT
PRACTICAL SYLLABUS

Nutrition
1. Identification and study of Live food organisms – Anyfive
2. Formulation and preparation of a balanced fish feed (procedure)
3. Gut content analysis to identify the foodintake.
4. Proximate estimation of aquaculture feeds for protein, carbohydrates, moisture, ashcontent

Post harvest Technology
1. Identification and evaluation of fish/ fisheryproducts
2. Preperation of Isinglass, Collagen and Chitosan(procedure)
4. Developing flow charts and exercises in identification of hazards in processing offish.

Model paper for Practical semester End Examination

Max.Marks 50 Time: 2 Hours

5. Analyse the gut contents of a given fish/Estimate the Protein/carbohydrate/ash content of the givenfishfeed 10M
6. Identify thefollowingspotters: 15 M (5x3)
   A Livefeed
   B. Livefeed
   C. Fish feed type
   D Fish byproduct
   E Fishbyproduct
7. Record 05M
8. InternalAssessment 15 M

Total **50M**

Question Bank for Aquaculture Management

Module I

Essay Questions

1. Describe Induced breeding incarps
2. Give detailed account of Hatchery Management ofLitopenaeusvannamei
3. Give detailed account of Hatchery Management of Indian Majorcarps
4. Describe Hypophysiation and use of synthetic hormones in fishes

Short AnswerQuestions

5. Types ofHatcheries
6. Larval Stages ofPrawn
7. Advantages of Inducedbreeding
8. Ovaprim

Module II

Essay Questions

4. Describe water quality Management for fishculture
5. Write an essay on identification of oxgen depletion problems and itscontrol
6. What are principles of aeration and emergencyaeration
7. Describe water quality and soil characteristics suitable for fish culture

Short AnswerQuestions

9. Limingmaterials
10. OrganicManures
11. Reasons for Oxygendepletion
12. Water quality for fishculture
13. Soil characters required for fishculture
14. Emergency control of oxygendepletion

Module III

Essay Questions

5. Write an essay on Feed formulation andManufacturing
6. Explain Live foods and their role in shrimp larvalrearing
7. Describe different types offeeds
8. Explain supplementary feeding

Short AnswerQuestions

5. Types offeeds
6. Feed additives andpreservatives
7. Probiotics and theirsignificance
8. Feed ConversionRatio
9. Feedformulations

Module IV

Essay Questions

4. Describe symptoms, Prophylaxis and therapy of any 4 fishdiseases
5. Explain fishery training and Education inIndia
6. Describe symptoms, Prophylaxis and therapy of any 4 shrimpdiseases
7. Write an essay on production of monosex and sterile fishes and theirsignificance
8. Describe genetic improvement of fish stocks

Short AnswerQuestions

9. Gynogenesis
10. Androgenesis
11. Transgenic fish
12. Any two viral diseases inprawns
13. Any two bacterial diseases infish
14. Fishvaccination
15. Any two fungal diseases offish
16. SIFT
17. CIFE
18. NIFPHATT

REFERENCE BOOKS

1. Boyd CE. 1979. *Water Quality in Warm Water Fish Ponds*. AuburnUniversity
2. Boyd, CE. 1982. *Water Quality Management for Pond Fish Culture.* Elsevier Sci. Publ.Co.
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7. ICAR. 2006. *Handbook of Fisheries and Aquaculture*.ICAR.
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12. MPEDA. 1993. *Handbook on Aqua Farming - Live Feed. Micro Algal Culture.* MPEDA Publication
13. New MB. 1987. *Feed and Feeding of Fish and Shrimp. A Manual on the Preparation and Preservationof Compound Feeds for Shrimp and Fish in Aquaculture.* FAO –ADCP/REP/87/26
14. Pandian TJ, Strüssmann CA & Marian MP. 2005. *Fish Genetics and Aquaculture Biotechnology*. Science Publ.
15.Pilley, TVR & Dill, WMA. 1979. *Advances in Aquaculture*. Fishing News Books, Ltd.England.
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23. Swain P, Sahoo PK &Ayyappan S. 2005. *Fish and Shellfish Immunology: An Introduction*. Narendra Publ.
24. Thomas PC, Rath SC &Mohapatra KD.2003.Breeding and Seed Production of Finfish andShellfish. DayaPubl.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE – VIII-B-3
VI SEMESTER

POSTHARVEST TECHNOLOGY

CREDITS:3T+2P Hrs : 3 T+ 3 P/week

OBJECTIVES	LEARNING OUTCOMES
Aquires knowledge on the fish preservation Be familiar with the principles of fish preservation and spoilage Aquires knowledge on fish byproducts Learns various sanitation and quality control in fish processingunits	**1.** Learns to handle fish during transport. Understands the post-mortem changes **2.** Understands the principle behind the preservation of fishes like icing, salting, freezing **3.** Attains knowledge on processing and preservation and fish byproducts and quality control duringmarketing **4.** Be faimiliar with various hygiene precautions during processing of aquatic products. Understandthe importance of seaweed culture

Syllabus

Module – I

Handling and Principles of fish Preservation

1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), spoilage infishes.
1.2 Principles of preservation– cleaning, lowering of temperature, rising oftemperature, denudation, use of salt, use of fish preservatives, exposure to low radiation of gammarays.

Module II

Methods of fish Preservation

2.1. Traditional methods - sun drying, salt curing, pickling and smoking.
2.2 Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Module -III

Processing and preservation of fish and fish by-products and quality control

3.1 Fish 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.
3.2 Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.
3.3. Seafood 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

Module – IV

Sanitation and Quality control

4.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.
4.2 Quality Control of fish and fishery products – pre-processing control, control during processing and control afterprocessing.
4.3 **Seaweed Products:** Use of seaweeds as food for human consumption, preparation of therapeuticdrugs.

Additional inputs

1. National and International standards – ISO 9000: 2000 Series of Quality Assurance System

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ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE – VIII-B-3
VI SEMESTER

POSTHARVEST TECHNOLOGY

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1. Handling and Principles of fish Preservation	**1**	**03**	**25**
2. Methods of fish Preservation	**2**	**02**	**30**
3 Processing and preservation of fish and fish by-products and quality control	**2**	**02**	**30**
4. Sanitation and Qualitycontrol	**1**	**03**	**25**
Total	**06** **Of which 3 to be answered**	**10** **Of which 6 to be answered**	**110 Marks including choice.** **Of which 60 Marks to be answered**

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

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE – VIII-B-3
VI SEMESTER

POSTHARVEST TECHNOLOGY
MODEL QUESTION PAPER

Time: 2½hrs. **Max Marks: 60**

PART – 1

Note :Answer any THREE questions choosing at least one question from each section. Draw the diagrams whereevernecessary **3 X10 = 30**

SECTION- A

1. Describe various aspects of storage and transport offishes
2. What are different traditional methods of fish preservation
3 Explain Chilling, Freezzing and Accelerated Freezedrying

SECTION-B

4. Write an essay on various fishby-products
5. Write an essay on Seafood Quality Assurance andSystems.
6. Explain various environmental hygiene and personal hygiene in processingplants

Part – II

Answer any**Six**questions **6x5=30**

7. Handling of freshfish
8. Post MortemChanges
9. Reasons for spoilage offishes
10. Canning
11. Smoking offish
12. FishOils
13. Good Laboratory Practices
14 Seaweeds
15. Preprocessing control ofquality
16. Sanitation.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
CHOICE BASED CREDIT SYSTEM
ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE – VIII-B-3
VI SEMESTER

POSTHARVEST TECHNOLOGY
MODEL QUESTION PAPER

PRACTICAL – III

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

Question Bank for POSTHARVEST TECHNOLOGY

Module I

Essay Questions

1. Describe various aspects of storage and transport offishes
2. What are various principles ofstorage
3. Write an essay on fishspoilageh

Short Answer Questions

4. How to identify a freshfish
5. Need for preservation of fish
6. Handling of freshfish
7. Post MortemChanges
8. Reasons for spoilage offishes
9. Disadvantages of fishpreservation

Module II

Essay Questions

10. What are different traditional methods of fishpreservation
11. Explain Chilling, Freezzing and Accelerated Freezedrying
12. What are different modern methods of fish preservation

Short AnswerQuestions

13. Canning
14. Smoking offish
15. DeepFreezing
16. Drying
17. Salting
18. Canning

Module III

EssayQuestions

9. Write an essay on various fishby-products
10. Write an essay on Seafood Quality Assurance andSystems
11. Describe fish products – Fish minced meat, fish meal, fish oil, fish liquid, fish protein concentratebriefly
12. What are good manufacturing Practices GMPs

Short AnswerQuestions

10. FishEnsilage
11. Isinglass
12. Sharkfins
13. Fishglue
14. HACCP

Module IV

EssayQuestions

15. Explain various environmental hygiene and personal hygiene in processingplants
16. Describe use of seaweeds as food for human consumption and preparation ofdrugs
17. Write an essay on quality control of fish and fishery products

Short AnswerQuestions

19. Preprocessing qualitycontrol
20. Post processing qualitycontrol
21. Seaweeds
22. Drugs from seaweeds
23. Sanitation in processingplants

24. Personal hygiene in processingplants

CLUSTER II

ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE VIII-A: VI SEMESTER

MEDICALDIAGNOSTICS

Cluster Elective Paper:VIII-A-1

CLINICAL BIOCHEMISTRY

Hours60 Marks60

UNIT – I: Basic Medical Laboratory PrinciplesandProcedures: 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 BiochemistryofEnzymes: 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 andAcid-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-basebalance

UNIT - V:FunctionTests: 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 PublishingHouse
- Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
- 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.

Cluster Elective Paper: VIII-A-2

HAEMATOLOGY

Hours60 Marks 60

UNIT – I: Laboratory Preparationin 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: 15 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 andHaematologicalDiseases: 15 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, Aplasticanaemia, Periniciousanaemia, Sideroblasticanaemia and Sickel cell anaemia. Other haematologicaldiseases – HDNB, Thalassaemia, Leukaemia. Parasitic infections of blood – structure and life cycle of Plasmodium vivax, types of malaria, Structure and life cycle ofWchereriabancrofti.

UNIT- IV: Automation in Haematology:

General considerations. Blood cell counters. Automated coagulated systems. Flowthrough cytochemicaldifferentialcounter **10 Hours**

UNIT - V: Immunohaematology and Blood banking:Human Blood Group Systems. Inheritanceof blood group systems.Bloodtransfusion. 10 Hours

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 PublishingHouse
- Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
- 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 andCo. Ltd.

Cluster Elective Paper: VIII-A-3

CLINICAL MICROBIOLOGY

Hours60 Marks 60

UNIT – I: Introduction toClinical 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 &Stainingmethods: 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 ofbacteria.

UNIT – III: Culturing of Microorganisms and IdentificationofBacteria: 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 andCorynebacterium. Study of Mycobacteria, Spirocahetes and Rickettsia. Basic sterilization principles - autoclaving.

UNIT- IV: Clinical Mycologyand 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, PoliovirusesHerpes viruses, Rabies viruses, Hepatitis viruses. . General transmission routes for viruses.

UNIT - V:DiagnosticSerology: 10 Hours

General view of immune system. Antibodies. Harmful effect of immunity. Autoimmune diseases. Principles of Serodiagnostic tests - Flocculation test, Agglutination test, Slide agglutination test, Tube agglutination test, Complement test, Micro titration test, Precipitin test and ELISA.

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 PublishingHouse
- Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis forTraining Courses
- 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 andCo. Ltd.

ZOOLOGY PRACTICAL SYLLABUS

CLUSTER ELECTIVE –VIII-A: VI SEMESTER

MEDICAL DIAGNOSTICS

PRACTICAL – 1 CLINICAL BIOCHEMISTRY

- Collection of blood specimen and serumpreparation.
- Blood glucose and urine glucoseestimation.
- LFT, Kidney Function and Cardiac Profiletests.
- Determination of serum proteins, SGOT, SGPT, S.ALP,S.ACP
- Determination of sodium, potassium andchlorides

PRACTICAL – 2 HAEMATOLOGY & CLINICAL MICROBIOLOGY

- Routine haematological tests – Blood smear preparation, TC, DC, ESR, Plateletcount.
- Determination ofHaemoglobin.
- Determination ofPCV.
- Determination of bleedingtime.
- Determination of blood clottingtime.
- BloodGrouping.
- Preparation of nutrient agar, culture plates and isolation of bacteria on nutrient agarplate.
- Study of permanent slides of *Candida albicans, Enterobactersps, Pseudomonas, Salmonellasps, Shigellasps, Staphylococcusaureus*, *Streptococcus pyogenes*and *Vibrio cholera*.
- Staining methods – Albert's and Gram's stainingmethods.
- Hepatitis test and Pregnancy test usingELISA
- VDRL qualitative and quantitativetest.
- WIDAL slide agglutination and tube agglutinationtest.

PRACTICAL - III:PROJECT WORK

Associated with a Clinical Diagnostic Laboratory.