**PITHAPUR RAJAH’S GOVTCOLLGE (A),**

**KAKINADA**

Accredited by NAAC with B++Grade

DEPARTMENT OF

ZOOLOGY & AQUACULTURE

BOARD OF STUDIES

B.Sc. (Honours) ZOOLOGY

(Single Major System)

(2025-2026)

CHOICE BASED CREDIT SYSTEM

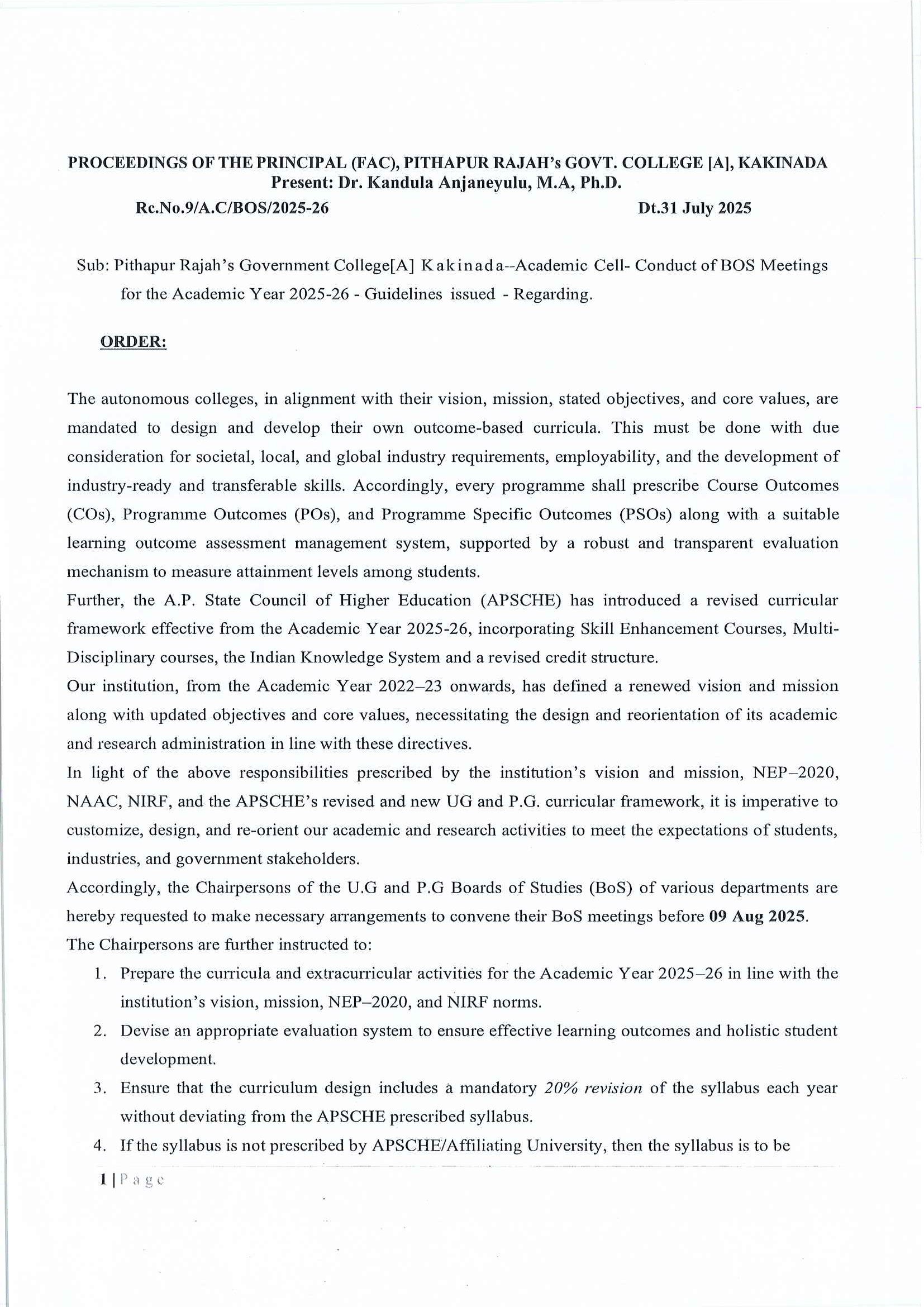
Convened on 11-08-2025

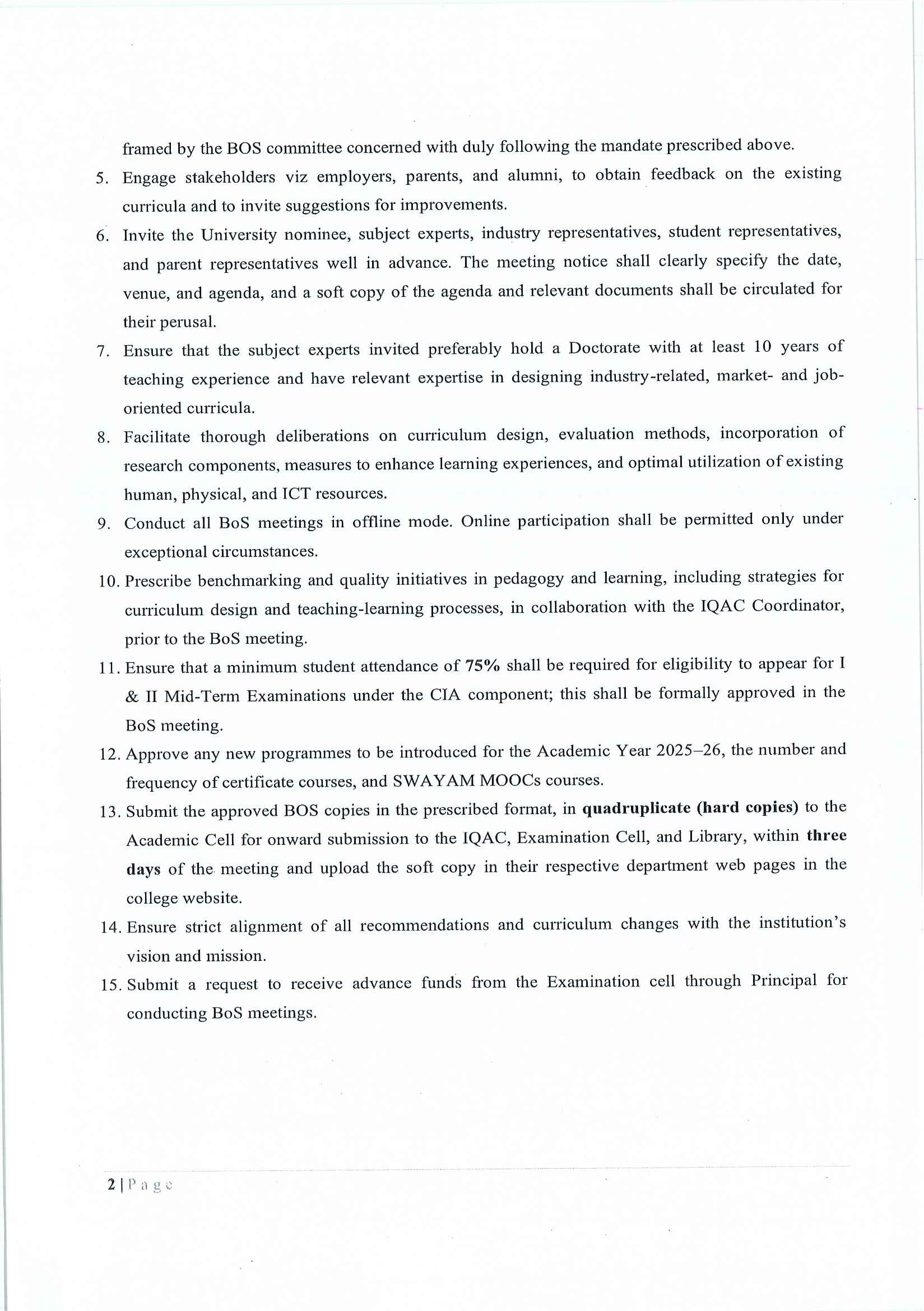
B.Sc. Honours - ZOOLOGY (Single Major)

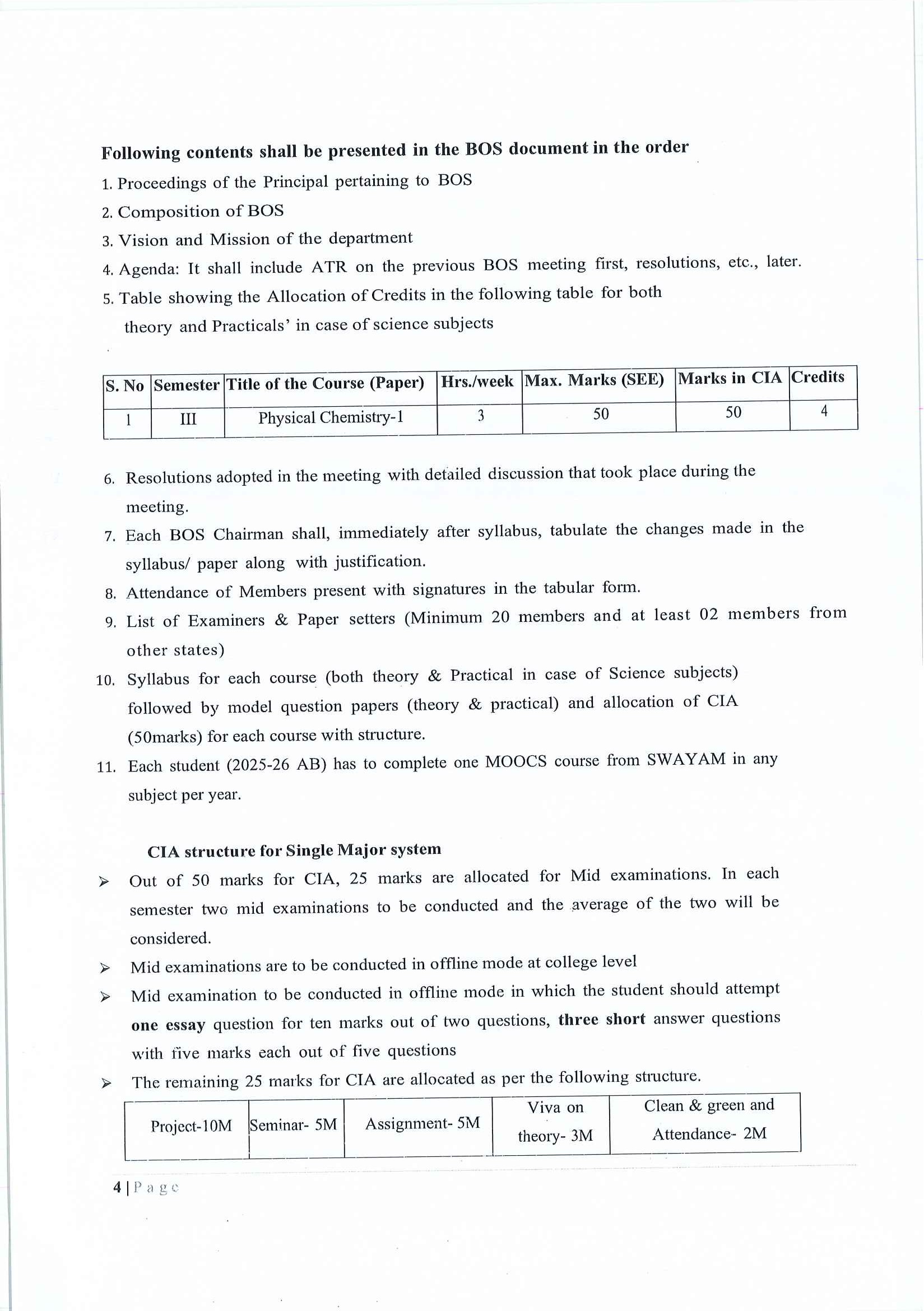
2025-2026

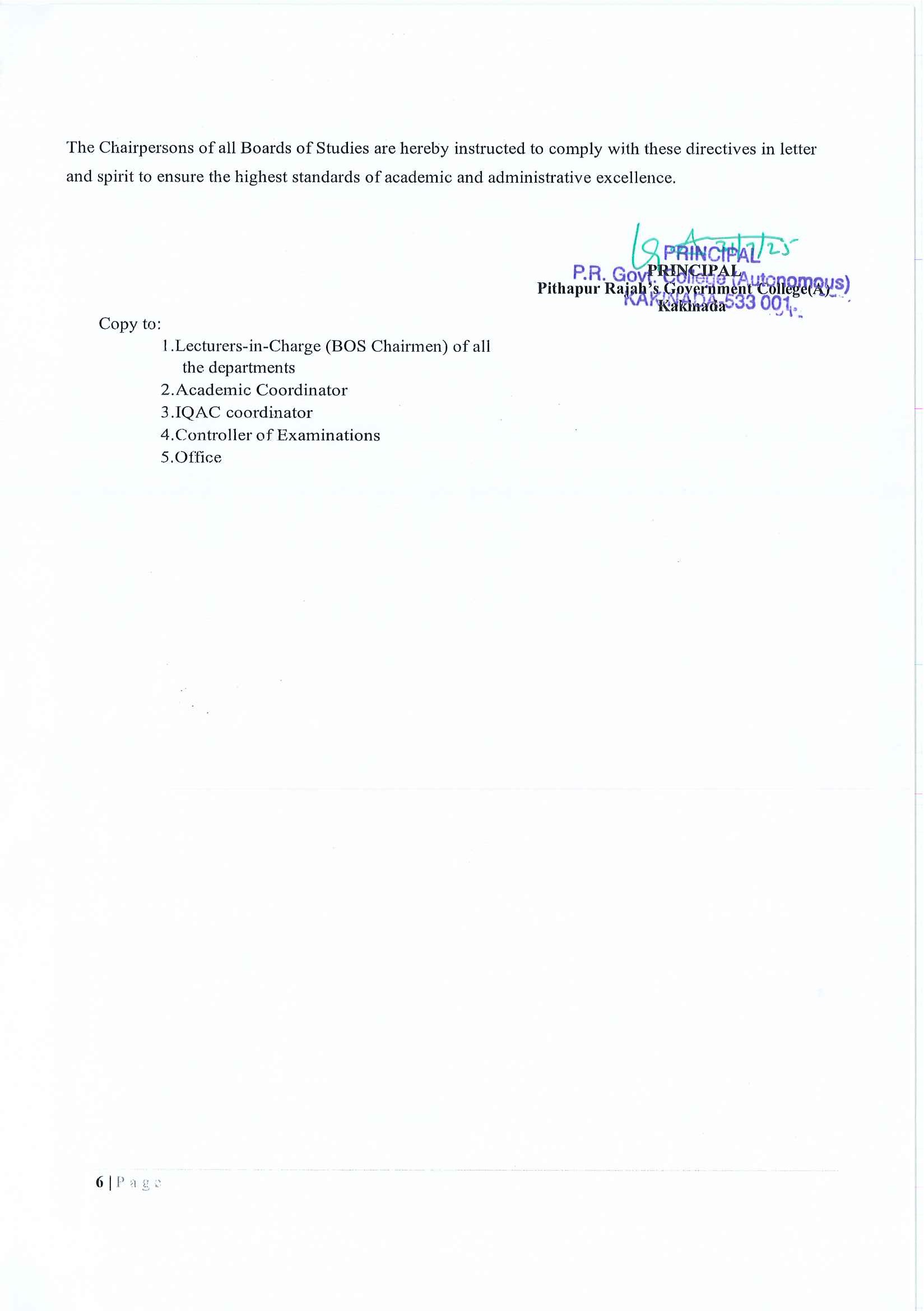
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PROCEEDINGS O F THE PRINCIPAL, P.R. GOVERNMENT COLLEGE (A), KAKINADA – A.P

Present: Dr. Kandula. Anjaneyulu, M.A., Ph.D.

R.C.No.2/A.C./BOS- Members Nominations/2025-2026, Dated:31-07-2025.

SUB: P.R. Government College (A), Kakinada – UG/PG Boards of studies (BOS) –Program /Course-B.Sc.., /Zoology,

Nomination of members—Orders issued

REF:1. Progc.Rc.NO1/AC/BOS/2025-26 dated 31 july 2025 of the Principal, Pithapur Rajah’s Govt. College (A), Kakinada

ORDER: The Principal, P.R. Government College (A), Kakinada is pleased to constitute UG /PG Boards of Studies in Zoology for framing the syllabi in Zoology subject for the all semesters duly following the norms of the UGC Autonomous guidelines.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S. No | | Name of the Person | Designation | |
|  | Sri.B. Chakravarthi | | | Chairman & Lecturer Incharge, Department of zoology &  Aquaculture |
|  | Dr.K. Ramaneswari | | | University Nominee, Adikavi nannaya University, Rajamahendravaram |
|  | . Smt.M. Vasantha Lakshmi | | | Subject Expert: I, Lecturer in Zoology, ASD Govt. college for women (A), Kakinada |
|  | Dr. D. Sailaja | | | Subject Expert: II, Lecturer in Zoology, GDC (A), Rajamahendravaram |
|  | Dr.P. Rama MohanRao | | | Representative from Industry, Aqua industry Consultant |
|  | Dr. P Kiran Kumar | | | Member |
|  | Dr.B. Elia | | | Member |
|  | Ms, M, S.V. Lakshmi | | | Member |
|  | Sri.T. VenkateswaraRao | | | Member |
|  | Ms.Y. Gowthami | | | Member |
|  | Ms.B. Devi | | | Member |
|  | Ms.T. Sushma | | | Member |
|  | Ms.C. Smyrna | | | Member |
|  | Ms.V.Lakshminarasamma | | | Alumni |
|  | Ms. Sanjana | | | Student Member III B.SC. Zoology |
|  | K. Chandini | | | Student Member II B.SC. Zoology |

The above members are requested to attend the BoS meeting on 11- 08 -2025 and share their valuable reviews, and suggestions on the following functionaries.

* The above members are requested to attend the BoS meeting on 11- 08 -2025 and share their valuable reviews, and suggestions on the following functionaries.
* Prepare syllabi for the subject keeping in view the objectives of the college and interests of the stake holders
* Suggeste methodologies for innovative teaching and evaluation techniques.
* Suggest the panel of Names to the academic council for appointment of Examiners.
* Coordinate research, teaching, extension and other activities in the Department of the college

AGENDA FOR BOARD OF STUDIES MEETING-2025-2026

11/08/2025

1. Approval of Single major system for UG B.Sc. Honors (Zoology)
2. Approval of Syllabus for all the Semesters and implementation of Choice Based Credit System
3. Model question papers, Blue Print Panel of paper setters and examiners.
4. Methodologies of Teaching–Learning and Evaluation.
5. Implementation of Skill Enhancement Courses (SEC’s) in Zoology & Aquaculture Technology by APSCHE through affiliating University for the fifth semester and select one pair of courses based on the choice of majority of the stakeholders.
6. 75% 0f Attendance is compulsory to appear for any examination
7. Conduct of guest lectures, field visits, assigning of project works etc.
8. Additional inputs and changes in the curriculum.
9. Continuation of Certificate courses choosing from the entitled Certificate Course on Diseases of Human Importance/Applied and Economic Zoology/Ornamental Fishery/Water quality Assessment
10. Continuous Internal Assessment pattern (CIA)introduced by APCCE
11. Designing and conduct of workshops and seminars
12. Arrangement of skill development, training programmes and MOUs.
13. Conduct of Bridge Course and Remedial Coaching.
14. Approval of new courses introduced in the academic year 2025-26
15. Actionplan2025-2026
16. Any other proposal with the permission of the Chair.

Discussion:

The members of BOS have discussed all the points of Agenda extensively and approved with following suggestions which are incorporated in the resolutions.

PITHAPUR RAJAH’S GOVT COLLGE(A), KAKINADA

DEPARTMENT OF ZOOLOGY & AQUACULTURE

BOARD OF STUDIES MEETING (2025-26) CONVENED ON 11 August 2025

The members, Board of Studies, Zoology met through online and offline on 11 August 2025 11.00AM to discuss the agenda points and to approve the course structure, theory and Practical syllabus, Blue Print, Model question papers, Additional inputs in the Curriculum, Study Projects, Co- curricular and extracurricular activities of Department, Skill Development Courses and Certificate Courses offered , Internship programs, Continuous Internal Assessment pattern (CIA) and Semester End examination Pattern.

The following resolutions are made.

Resolution-1

It is resolved to adapt Outcome based Single major system for UG B. Sc Hounours Zoology for the adamic year 2025-26 as per the Guidelines of APSCHE.

It is resolved to follow the syllabus for single major system as well as Choice Based Credit System introduced by UGC/APSCHE through Adikavi Nannaya University, Rajamahendravaram for I, II -III, IV, V & VI semesters from the academic year 2023-24. Also resolved to implement syllabus given by APSCHE in toto for III, IV, V & VI semesters in the AY 2025-2026

Resolution-2

Resolved to approve the panel of Examiners and Question paper setters, Model papers-and blueprint for all Semesters

Resolution-3

Resolved to implement 50 %external and 50% internal marks for theory exams from the academic year 2021- 22,2023-2024admitted batches, and 60% -40% for 2020-2021 admitted batch as mentioned below and resolved to split up 50marks of internal exams as 25 marks for mid exams and 10 marks for project, 3 marks for viva,5marks for assignment,2 marks for clean and green activity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Internal Assessment 50M | | | | | | Ext’ l Assessment |
| I Mid | II  Mid | Project | Viva | Seminar | Assignment | Clean &  Green | 50 M (2023  admitted Batch) |
| 25M | 25M | 10 | 03 | 05 | 05 | 02 |
| I Mid | II Mid | Project | | Seminar | Assignment etc, | Total | 50 M (2021  Admitted batch) |
| 25M | 25M | 10M | | 5M | 10M | 50M |  |
| 25M | 25M |  | | 5M | 10M | 40M | 60 M (2020  Admitted batch) |

Resolution-4

It is resolved to adopt newly introduced Skill Enhancement Courses (SEC’s) in Zoology V Semester for the academic year 2025-2026. It is also resolved to choose Courses12 ,13, 14A & 15A from the list of Skill Enhancement Courses (SEC’s) for V Semester for the academic year 2025-2026 as detailed below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Semester | Course | Title of the Course | No. of Hrs  /Week | No. of Credits |
| III | V | 12 | Poultry Management-I (Poultry Farming) | 3 | 3 |
| Poultry Management-I (Poultry Farming)  Practical Course | 2 | 1 |
| 13 | Poultry Management-II (Poultry  Production and Management) | 3 | 3 |
| Poultry Management-II (Poultry Production and Management)Practical  Course | 2 | 1 |
| 14 A | Sustainable Aquaculture Management | 3 | 3 |
| Sustainable Aquaculture Management  Practical Course | 2 | 1 |
| OR | | | |
| 14 B | Live Stock Management- I (Biology of  Dairy Animals) | 3 | 3 |
| Live Stock Management- I (Biology of  Dairy Animals)Practical Course | 2 | 1 |
| 15 A | Post-Harvest Technology of Fish and  Fisheries | 3 | 3 |
| Post-Harvest Technology of Fish and  Fisheries Practical Course | 2 | 1 |
| OR | | | |
| 15 B | Live Stock Management-II (Dairy  Production and Management) | 3 | 3 |
| Live Stock Management-II (Dairy  Production and Management)Practical Course | 2 | 1 |
|  |  |  |  |  |  |
|  | VI | Internship | | | |

Resolution-5

Resolved to offer choice-based Skill Development Courses by Department of Zoology entitled Health and Hygiene as SD course in III Semester and ES in V Semester as instructed by APSCHE / AKNU

Resolution-6

Resolved to allow students who have put up 75% of attendance to any examination conducted by the institution. It is also resolved to offer Certificate courses choosing from the entitled list Diseases of Human Importance/Applied and Economic Zoology/Ornamental Fishery/Water quality Assessment in the academic year 2025-26.

Resolution-7

Resolved to implement the SOPs given by APSCHE for CSP at the end of II semester, short term Internship at the end of IV semester, and Semester Internship for VI semester.

Resolution-8

Resolved to approve assessment process for CSP, Short-term and semester Internships in the following manner.

First internship (Community Service Project) will be taken up after the I year II semester end examinations or the summer vacation in the intervening 1st and 2nd years of study. The assessment is to be conducted for 100 marks. The number of credits assigned is 4. Later the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightage shall be:

|  |  |
| --- | --- |
| Project Log | 20% |
| Project Implementation | 30% |
| Projec treport | 25%, |
| Presentation | 25% |

Second Internship shall be undertaken by the students in the intervening summer vacation between 2nd and 3rd years or after the II-year IV semester end examinations. There will be only internal evaluation for this internship. The assessment is to be conducted for 100 marks and the credits assigned are 4. The marks are converted into grades and grade points to include finally in the SGPA and CGPA.

|  |  |
| --- | --- |
| Project Log | 20% |
| Project report | 25% |
| Presentation | 25% |

The weightage shall be:

Third internship shall be for the entire 6th Semester; the student shall undergo Apprenticeship / Internship / On the Job Training. The assessment for the Semester long apprenticeship is for200 marks and credits assigned are 12. The assessment for this internship / on the job training will be both internal and external assessment. The internal assessment will be for 25% of marks which will be continuous and the assessment by the industry/enterprise/organization where the student does his/her internship will be indicated in grades. The Project Presentation is to be made by the student after he/she reports back to the College. Grading given by the Company / Business unit / Enterprise where the student has undergone the training and these grades shall be converted into marks on the scale followed by the University.

The weight age shall be:

|  |  |  |
| --- | --- | --- |
| Internal Assessment Component | Max. Marks | Marks Awarded |
| Project Log | 10 |  |
| Project Implementation | 20 |  |
| Project Report | 10 |  |
| Presentation | 10 |  |
| TOTAL | 50 |  |
| External Assessment Component | Max.  Marks | Marks  Awarded |

|  |  |  |
| --- | --- | --- |
| Performance Assessment by the Evaluation Committee, converting the grades awarded by the  industry, enterprise, etc | 100 |  |
| External Viva Voce | 50 |  |
| Total | **150** |  |
| Grand Total | **200** |  |

Resolution-9

It is resolved to implement 100% external assessment for Skill Development Courses and 100% internal assessment for Certificate Course and resolved to follow the standard operating procedures given by APSCHE through Adikavi Nannaya University for the evaluation of CSP/Short term Internship/Apprenticeship (AnnexureII)

Resolution-10

Resolved to arrange Bridge Course for the newly admitted students and remedial classes for slow learners

Resolution-11

It is resolved to conduct Co- curricular activities like Student Seminars, quiz programmes, elocution, debate, Group discussion, Extension Activities, Study Projects and field trips and to encourage experiential learning and student participation in extracurricular activities of the college.

Resolution-12

Resolved to conduct Student and Staff Exchange Programmes with ASD Government College for Women(A), Kakinada, GDC Ravulapalem, GDC Vidavaluru, Silver jubilee Government College, Kurnool as a part of fulfilling the norms of MoU. Resolved to enter MOUs with Industries or training institutes

Resolution-13

It is resolved to take Feedback on Curriculum design and development from Students, Alumni, Teachers, and industry at the end of the semester.

Resolution-14

It is resolved to introduce the following new courses in—B.Sc. (Honours) Zoology, from the AY2024-25 as per the curriculum given by APSCHE for V semester

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Semester | Course | Title of the Course | No. of Hrs  /Week | No. of Credits |
| III | V | 12 | Poultry Management-I (Poultry Farming) | 3 | 3 |
| Poultry Management-I (Poultry Farming)  Practical Course | 2 | 1 |
| 13 | Poultry Management-II (Poultry  Production and Management) | 3 | 3 |
| Poultry Management-II (Poultry Production and Management)Practical  Course | 2 | 1 |
| 14 A | Sustainable Aquaculture Management | 3 | 3 |
| Sustainable Aquaculture Management  Practical Course | 2 | 1 |
| OR | | | |
| 15 A | Post-Harvest Technology of Fish and  Fisheries | 3 | 3 |
| Post-Harvest Technology of Fish and  Fisheries Practical Course | 2 | 1 |

Resolution 15

Resolved to implement the action plan for the academic year 2025-26

|  |  |  |  |  |  |  |  |
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| S.No | Activity planned  ACTION PLAN 2025-26 | Date/ Period | Outcomes/ Objectives | Approximate Budget | Remarks |  |
| 1 | Preparation of Annual Curricular Plans and Pre BOS arrangements | Ist week of June 2025 | \*To deliver content in a systematic way  \* To design, develop and enrich curriculum |  |  |  |
| 2 | \*Free Medical Camp for all staff | July IV week |  | 5000 |  |  |
| 4 | \*Publications By Faculty in UGC Care /Scopus Journals  \*Launch of Certificate Course  BOS Meetings  \*MOU with Industry  \*Invited Lecture  Field Trips to II- & III-Year students | August 2025  1-08-2025  2nd Week of August  3rd week of August  4th week of August | Research and academic excellence  Faculty welfare,  Curriculum Enrichment  Experiential Learning | 1000  50000 |  |  |
| 5 | \*Student Seminars  \*Field trip to I Year students  \*Blood Donation Camp/Blood Group Identification  \*Remedial coaching | Ist week of September  II week of September  4th week of September | Curriculum enrichment & Evaluation  Experiential Learning  Community service | 25000 |  |  |
| 6 | \*Awareness program on Seasonal diseases  \*Remedial coaching | 1st week of October 2025 | Extension Activity at nearby schools | 2500 |  |  |
| 7 | \*World Fisheries Day  \*National Conference on “Zoology Reimagined: AI Tools for Wildlife and Ecosystems” | 21-11-2025  4th week of November | To highlight the importance of fisheries sector  To Explore and to integrate AI tools for Wild life conservation | 3000  100000 |  |  |
| 8 | \*Student Training Program at SIFT  \*Student Seminars | December 2025 | Skill Development | 20000 |  |  |
| 9 | \*Faculty Exchange Program under MOU | January 2025 | To Exchange academic resources and Knowledge sharing |  |  |  |
| 10 | \*Student Exchange Program under MOU  \*PG CET Coaching | February 2025 | To Exchange academic resources and Knowledge sharing | 10000 |  |  |
| 11 | \*Publications By Faculty in UGC Care /Scopus Journals  \*Remedial Coaching | March 2025 | Research/Academic Excellence  Outcome achievement |  |  |  |
| Total Rs. 227500 |
|  |  |  |  |  |  |  |

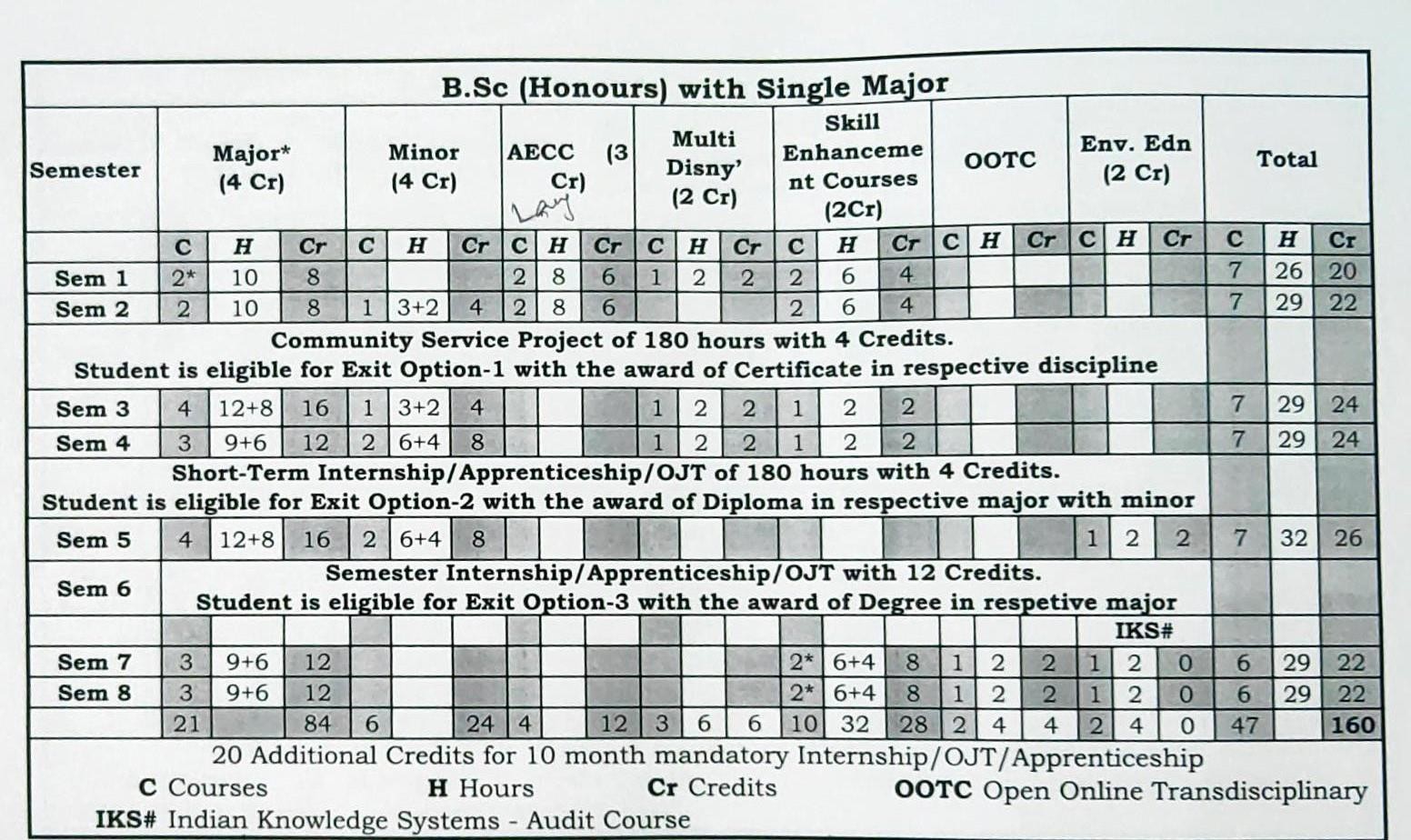
Resolution-16

Resolved that the chairman, BOS is authorized to take up necessary amendments, changes, additions, and others as and when required as per the instructions of the University, APSCHE and other exigencies in consultation with the controller of examinations if necessary

Single major System

2023-2024 Admitted Batch onwards

Framework of Courses and Credits



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Programme: B.Sc. Honours in Zoology (Major)

w.e.f. AY 2023-24

COURSE STRUCTURE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Semester | Course | Title of the Course | No. of Hrs  /Week | No. of Credits |
| I | I | 1 | Introduction to Classical Biology | 3+2 | 4 |
| I | 2 | Introduction to Applied Biology | 3+2 | 4 |
| II | 3 | Animal Diversity-I Biology of Non-  Chordates | 3 | 3 |
| Animal Diversity-I Biology of Non-  Chordates Practical Course | 2 | 1 |
| II | 4 | Cell and Molecular Biology | 3 | 3 |
| Cell and Molecular Biology Practical  Course | 2 | 1 |
| II | III | 5 | Animal Diversity-II Biology of  Chordates | 3 | 3 |
| Animal Diversity-II Biology of  Chordates Practical Course | 2 | 1 |
| 6 | Principles of Genetics | 3 | 3 |
| Principles of Genetics Practical Course | 2 | 1 |
| 7 | Animal Biotechnology | 3 | 3 |
| Animal Biotechnology Practical Course | 2 | 1 |
| 8 | Evolution and Zoogeography | 3 | 3 |
| Evolution and Zoogeography Practical  course | 2 |  |
| IV | 9 | Embryology | 3 |  |
| Embryology Practical Course | 2 |  |
| 10 | Animal Physiology: Life Sustaining  Systems | 3 |  |
| Animal Physiology: Life Sustaining  Systems Practical Course | 2 |  |
| 11 | Immunology | 3 |  |
| Immunology Practical Course | 2 | 1 |

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| --- | --- | --- | --- | --- | --- |
| Year | Semester | Course | Title of the Course | No. of Hrs  /Week | No. of Credits |
| III | V | 12 | Poultry Management-I (Poultry Farming) | 3 | 3 |
| Poultry Management-I (Poultry Farming)  Practical Course | 2 | 1 |
| 13 | Poultry Management-II (Poultry  Production and Management) | 3 | 3 |
| Poultry Management-II (Poultry Production and Management)Practical  Course | 2 | 1 |
| 14 A | Sustainable Aquaculture Management | 3 | 3 |
| Sustainable Aquaculture Management  Practical Course | 2 | 1 |
| OR | | | |
| 14 B | Live Stock Management- I (Biology of  Dairy Animals) | 3 | 3 |
| Live Stock Management- I (Biology of  Dairy Animals) Practical Course | 2 | 1 |
| 15 A | Post-Harvest Technology of Fish and  Fisheries | 3 | 3 |
| Post-Harvest Technology of Fish and  Fisheries Practical Course | 2 | 1 |
| OR | | | |
| 15 B | Live Stock Management-II (Dairy  Production and Management) | 3 | 3 |
| Live Stock Management-II (Dairy  Production and Management) Practical Course | 2 | 1 |
|  |  |  |  |  |  |
|  | VI | Internship | | | |

**B.Sc. Honours Zoology with Minor**

**III Semester Structure**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S. No | Subject/ paper | Title | Total hrs /week | No. of Credits | Remarks |
| 1. | Course V/ Minor II | Biology of chordates | 3+2= 5 Hrs | 3+2 |  |
| 2. | Course VI | Principles of Genetics | 3+2= 5 Hrs | 3+2 |  |
|  | Course VII | Animal Biotechnology | 3+2= 5 Hrs | 3+2 |  |
|  | Course VIII | Evolution and ZG | 3+2=5 hrs | 3+2 |  |
| 3 | Minor | Biology of chordate | 3+2= 5 Hrs | 3+2 |  |
| 4 | First Language | English | 3 Hrs | 4 |  |
|  | Second Language | Tel/San/Hindi | 3 Hrs | 4 |  |
|  | Skill Courses  (2 Papers) | ICT | 2+2= 4 Hrs | 2+2 | A student must choose any TWO of four courses |
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**B.Sc. Honours Zoology with Minor**

**IV Semester Structure**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S. No | Subject/ paper | Title | Total hrs /week | No. of Credits | Remarks |
| 1. | Course IX/Minor III | Embryology | 3+2= 5 Hrs | 3+2 |  |
| 2. | Course X/Minor IV | Animal Physiology- Life sustaining systems | 3+2= 5 Hrs | 3+2 |  |
| 3 | Course XI | Immunology | 3+2= 5 Hrs | 3+2 |  |
|  | Minor | Embryology |  |  |  |
|  | Minor | Animal Physiology- Life sustaining systems |  |  |  |
| 4 | First Language | English | 3 Hrs | 3 |  |
|  | Second Language | Tel/San/Hindi | 3 Hrs | 3 |  |
|  | Skill Courses  (2 Papers) |  | 2+2= 4 Hrs | 2+2 | A student must choose any TWO of four courses |
|  |
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**B.Sc. Honours Zoology with Minor**

**V Semester Structure**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S. No | Subject/ paper | Title | Total hrs /week | No. of Credits | Remarks |
| 1. | Course XII/ Minor V | Poultry Management-I (Poultry Farming) | 3+2= 5 Hrs | 3+2 |  |
| 2. | Course XIII/ Minor VI | Poultry Management-II (Poultry  Production and Management) | 3+2= 5 Hrs | 3+2 |  |
| 3 | Course XIV A | Sustainable Aquaculture Management | 3+2= 5 Hrs | 3+2 |  |
| 4 | Course XV A | PostharvestTechnology of fish and fisheries | 3+2=5hrs | 3+2 |  |
| 5 | Minor | Poultry Management-I (Poultry Farming) | 3+2=5hrs | 3+2 |  |
| 6 | Minor | Poultry Management-II (Poultry  Production and Management) | 3+2=5hrs | 3+2 |  |
| 7 | Skill Courses  (2 Papers) |  | 2+2= 4 Hrs | 2+2 | A student must choose any TWO of four courses |
|  |
|  |
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B.Sc. Honours- Zoology IV Year

AP STATE COUNCIL OF HIGHER EDUCATION REVISED UG SYLLABUS UNDER CBCS

(Implemented from Academic Year 2020-21)

PROGRAMME: FOUR YEAR B.Sc. (Hons)

Domain Subject: ZOOLOGY

Courses for Semesters VII& VIII

(Syllabus with Learning Outcomes, References, &Co-curricular Activities)

Higher Order Courses for semester-VII

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| (To choose any three of the following courses Course no | | Course Title (Theory + Lab) | | | Marks | | Credits |
| Choose any  THREE  Courses | 8A | | ENDOCRINOLOGY | 100+50 | | 4+1 | |
| 8B | | DEVELOPMENTAL BIOLOGY AND REPRODUCTIVE TECHNOLOGIES | | | 100+50 | | 4+1 |
| 8C | | PARASITOLOGY | | | 100+50 | | 4+1 |
| 8D | | HUMAN HEALTH AND INFECTIOUS DISEASES | | | 100+50 | | 4+1 |
| 8E | | BIODIVERSITY AND SYSTEMATICS | | | 100+50 | | 4+1 |
| 8F | | WILDLIFE AND CONSERVATION BIOLOGY | | | 100+50 | | 4+1 |

Skill Enhancement Courses for Semester–VII

|  |  |  |  |
| --- | --- | --- | --- |
| (To choose one pair from the four alternate pairs of SECs) Course no | Course Title (Theory + Lab) | Marks | Credits |
| 9A | HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS | 100+50 | 4+1 |
| 9B | FISH NUTRITION AND FEED TECHNOLOGY | 100+50 | 4+1 |
| (OR) | | | | |
| 10A | MILK AND MILK PRODUCTS TECHNOLOGY | 100+50 | 4+1 |
| 10B | MILK AND MEAT HYGIENE, FOOD SAFETY AND PUBLIC HEALTH | 10 | 4+1 |
| (OR) | | | | |
| 11A | POULTRY PRODUCTS AND MANAGEMENT | 100+50 | 4+1 |
| 11 B | POULTRY WASTE MANAGEMENT | 100+50 | 4+1 |
| (OR) | | | | |
| 12 A | MULBERRY PHYSIOLOGY AND MULBERRY BREEDING &GENETICS | 100+50 | 4+1 |
| 12 B | SILKWORM PHYSIOLOGY AND SILKWORM BREEDING &GENETICS | 100+50 | 4+1 |
| 13 | ONE ONLINE COURSE FROM ANY DISCIPLINE | 100+50 |  |

Of the 6 courses in Semesters VII, 5 courses (3+2) are Subject related and 1 course shall mandatorily be OPEN ONLINE COURSE in any discipline, encouraging trans disciplinary

Higher Order Courses for semester-VIII

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| (To choose any three of the following combination) Choose any  THREE  Courses | Course no | Course Title (Theory + Lab) | | Marks | Credits |
| 14 A | TOOLS AND TECHNIQUES IN BIOLOGY | | 100+50 | | 4+1 |
| 14 B | TOXICOLOGY AND BIOSTATISTICS | | 100+50 | | 4+1 |
| 14 C | ENVIRONMENT BIOLOGY AND ENVIRONMENT PHYSIOLOGY | | 100+50 | | 4+1 |
| 14 D | ANIMAL BEHAVIOUR AND CHRONOBIOLOGY | | 100+50 | | 4+1 |
| 14 E | MOLECULAR AND HUMAN GENETICS | | 100+50 | | 4+1 |
| 14 F | BIOSYSTEMATICS & TAXONOMY | | 100+50 | | 4+1 |

Skill Enhancement Courses for Semester–VIII

|  |  |  |  |
| --- | --- | --- | --- |
| (To choose one pair from the four alternate pairs of SECs) Course no. | Course Title (Theory + Lab) | Marks | Credits |
| 15 A | MARICUTLURE | 100+50 | 4+1 |
| 15 B | ORNAMENTAL FISHERY | 100+50 | 4+1 |
| (OR) | | | |
| 16 A | LIVESTOCK ECONOMICS, MARKETING & BUSINESS MANAGEMENT | 100+50 | 4+1 |
| 16 B | LIVESTOCK ENTREPRENEURSHIP | 100+50 | 4+1 |
| (OR) | | | |
| 17 A | POULTRY ECONOMICS, MARKETING AND INTEGRATION | 100+50 | 4+1 |
| 17 B | POULTRY ENTERPRENUERSHIP | 100+50 | 4+1 |
| (OR) | | | |
| 18 A | SERICULTURE MARKETING | 100+50 | 4+1 |
| 18 B | SERICULTURE ENTREPRENUERSHIP HUMAN RESOURCE DEVELOPMENT | 100+50 | 4+1 |
| 19 | ONE ONLINE COURSE FROM ANY DISCIPLINE | 5 |  |

Of the 6 courses in Semesters VIII, 5 courses (3+2) are Subject related and 1 course shall mandatorily

be OPEN Online course in any discipline, encouraging trans disciplinary learning.

COURSE OUTCOMES

B.Sc. (Honors) ZOOLOGY

Single Major System

1. Student will be able to learn the diversity and classification of living organisms and understand their chemical, cytological, evolutionary, and genetic principles.
2. Able to learn the principles of classification and preservation of Biodiversity
3. Learn the history, ultra structure, Diversity, and importance of micro-organisms
4. Acquire logic to evaluate fundamental biological concepts at various levels of biological organization including the molecular, cellular, organismal and system levels
5. Able to understand the taxonomic position from protozoa to hemicordate
6. Gains knowledge about mendelian inheritance, variations, mutations, and genetic disorders able to learn blood group inheritance, multiple alleles, genetic disorders, and karyotyping.
7. learn to acquire the knowledge about embryonic development, types of eggs, types of cleavages organogenesis in higher grade animals.
8. student can understand the structure and physiological functions of various internal as well as external systems that are present in the bodies of animals.
9. acquirethe knowledge of bio molecules, molecular genetics and nucleic acids for the benefit of mankind.
10. Students will be able to evaluate the present status of aquaculture at national and global level.
11. Acquire critical knowledge and commercial importance of shrimps.
12. student can understand the applications of biotechnology in the field of industry, agriculture, tissue culture stem cell technology and genetic engineering

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| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | Pithapur Rajah’sGovt.Degree College(A) Kakinada. | Program& Semester  B.Sc. Honours Zoology (Major)  Semester-III | | | |
| CourseCode | TITLEOFTHECOURSE  COURSE5: ANIMALDIVERSITY-II BIOLOGYOF CHORDATES |
| Teaching | HoursAllocated:45(THEORY) | L | T | P | C |
| Pre-requisites: | Basics of Zoology | 3 | 1 | - | 3 |

**SEMESTER III**

Course Objectives:

To understand the animal kingdom.

To understand the taxonomic position of Protochordata to Mammalia.

To understandthe general characteristics of animals belonging to Fishes toReptilians.

To understand the body organization of Chordata.

To understand the taxonomic position of Protherian mammals.

|  |  |
| --- | --- |
| LEARNING OUTCOMES:  By the completion of the course the graduate should able to– | |
| CO1 | Describe general taxonomic rules on animal classification of chordates |
| CO2 | Classify Protochordata to Mammalia with taxonomic keys |
| CO3 | Understand Mammals with specific structural adaptations |
| CO4 | Understand the significance of dentition and evolutionary significance |

SYLLABUS

UNIT - I

1.1 General characters and classification of Chordata upto classes

1.2 Salient features of Cephalochordata, Salient features of Urochordata

1.3 Structure and lifehistory of *Herdmania*, Retrogressive metamorphosis–Process and Significance

14 Cyclostomata, Generalcharacters, Comparison of Petromyzon and Myxine

*Activity: Model preparation/Assignment/Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT II

2.1 General characters of Fishes, Salient features Dipnoi

*2.2 Scoliodon*: External features, Digestive system, Respiratory system

*2.3 Scoliodon* Structure and function of Heart, Structure and functions of the Brain.

2.4 Migration in Fishes, Types of Scales

*Activity: Model preparation /Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT-III

3.1 General characters of Amphibia, General characters of Reptilia

*3.2 Rana hexadactyla*: Externa features, Respiratory system, Structure and function of Heart

*3.3 Ranahexadactyla* structure and functions of the Brain

*3.4 Calotes*: External features, Digestive system, structure and function of Brain

Identification of Poisonous snakes

*Activity: Modelpreparation/Assignment/StudentsSeminar/Quiz/Project/Peerteaching/Report writing after watching any video on the above*

*Evaluation: InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheabove activity*

UNIT-IV

4.1 General characters of Aves

*4.2 Columbalivia*: External features, Digestivesystem, Respiratorysystem

*4.3 Columbalivia*: Structure and function of Heart, structureandfunctionofBrain

4.4 Migration in Birds, Flight adaptation in birds

*Activity: Model preparation/Assignment/StudentsSeminar/Quiz/Project/Peerteaching/Report writing after watching any video on the above*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT-V

5.1 General characters of Mammalia

5.2 Classification of Mammalia upto sub-classes with examples

5.3 Comparison of Prototherians, Metatherians and Eutherians

5.4 Dentition in mammals, Aquatic mammals Adaptations

*Activity: Model preparation/Assignment/StudentsSeminar/Quiz/Project/Peerteaching/Report writing after watching any video on the above*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

Co-curricular activities (suggested)

Preparation of charts on Chordate classification (with representative animal photos) and retrogressive metamorphosis

Clay models of Herdmania and Amphioxus

Visit to local fish market and identification of local cartilaginous and bonyfishes

Maintaining of aquarium by students

Preparation of slides of scales of fishes

Visit to local/nearby river to identify migratory fishes and prepare study notes

Preparation of Charts ona bove 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/lizardsetc., and/ortheir skeletons

Additional input on types of snake poisons and their antidotes (student activity).

Collection of bird feathers and submission of report on Plumonology

Taxidermic preparation of dead birds for Zoology Museum

Reference books:

J.Z. Young, 2006.The life of vertebrates. (The Oxford University Press, NewDelhi).646pages. Reprinted

Arumugam, N. Chordate Zoology, Vol.2.Saras Publication.278pages.200figs.

A.J. Marshall, 1995.Textbook of zoology, Vertebrates. (The Mc Millan Press Ltd, UK). 852 pages. (Revised edition of Parker &Haswell, 1961).

M.Ekambaranatha Ayyar, 1973.Amanual of zoology. PartII. (S.ViswanathanPvt.Ltd., Madras).

P.S.Dhami&J.K.Dhami,1981.Chordatezoology.(R.Chand&Co.).550pages.

GurdarshanSingh&H. Bhaskar, 2002. Advanced Chordate Zoology.CampusBooks,6Vols., 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, 2022. Modern text book of zoology, Vertebrates. (RastogiPubl., Meerut).632pages.

E.L. Jordan&P.S. Verma, 1998.Chordatezoology. (S. Chand&Co.).1092pages.

G.S. Sandhu, 2005.Objective Chordate Zoology. Campus Books, vii,169pp.

Sandhu, G.S.&H. Bhaskar, H.2004. Text book of Chordate Zoology.Campus Books,2vols., xx, 964 p., figs.

Veena, 2008. Lower Chordata. (SonaliPubl.),374p., tables,117 figs.

WebLinks:

[MigrationInFishes-Definition,Types,Significance,Examples(microbiologynote.com)](https://microbiologynote.com/migration-in-fishes-definition-types-significance-examples/)[Morphological Adaptations to Migration in Birds | SpringerLink](https://link.springer.com/article/10.1007/s11692-015-9349-0)

**CO-POMapping:**

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 | 1 | 2 | 2 | 1 | 2 | 1 | 3 | 2 | 3 | 2 | 1 | 2 | 2 |
| CO2 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 2 | 2 |
| CO3 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 1 |
| CO4 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO5 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |

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BLUEPRINT

Time:2hrs Max.Marks:50

|  |  |  |
| --- | --- | --- |
| Unit | Essay | Short |
| I | 1 | 1 |
| II | 1 | 1 |
| III | 1 | 2 |
| IV | 1 | 1 |
| V | 2 | 2 |
| Total | Out of 6, 3 questions should be answered 3X10=30M | Out of 7,4 questions should be answered  4X5=20M |

QUESTIONBANK

UNIT-I ESSAYQUESTIONS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVE L | CO | PO |
| 1 | Explain the life history of Herdmania | BT1 | CO1 | PO2 |
| 2 | Explain the origin and general characters of chordates | BT2 | CO1 | PO2 |
| 3 | Describe the process of retrogressive metamorphosis and its significance | BT1 | CO1 | PO2 |
| 4 | Illustrate the comparison between Petromyzon and Myxine | BT2 | CO1 | PO2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | Retrogressive metamorphosis | BT1 | CO1 | PO2 |
| 2 | Urochordata | BT2 | CO2 | PO2 |
| 3 | Chepalochordata | BT2 | CO1 | PO1 |
| 4 | Cyclostomata | BT1 | CO2 | PO2 |
| 5 | Notochord | BT1 | CO1 | PO2 |

SHORTQUESTIONS

UNIT-II ESSAY QUESTIONS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.No. | | QUESTION | BT LEVEL | | | CO | PO | |
| 1 | | Describe the structure of heart of *Scoliodon* | BT1 | | | CO1 | PO2 | |
| 2 | | Explain the process of migration in fishes | | | BT2 | CO1 | | | PO2 | |
| 3 | | Explain the process of digestion in Scoliodon | | | BT1 | CO1 | | | PO2 | |
| 4 | | Discuss the general characters of fishes and add a note on the salient features of dipnoi | | |  |  | | |  | |

SHORT QUESTIONS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | Placoidscale | BT1 | CO1 | PO2 |
| 2 | Lateralline | BT2 | CO1 | PO2 |
| 3 | Elasmobranch | BT1 | CO1 | PO2 |
| 4 | Dogfish | BT1 | CO1 | PO2 |

UNIT-III ESSAYQUESTIONS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT- LEVEL | CO | PO |
| 1 | Describe the brain of *Rana hexadactyla* | BT1 | CO1 | PO2 |
| 2 | Explain the external features of *Calotes* | BT2 | CO1 | PO2 |
| 3 | Describe the general characters of Amphibia | BT1 | CO1 | PO2 |
| 4 | Describe the Structure and function of heart in Rana | BT1 | CO1 | PO2 |
| 5 | Give a detailed description on the process of identification of poisonous snakes | BT1 | CO1 | PO2 |

SHORT QUESTIONS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sl.no | QUESTION | BT LEVEL | CO | PO |
| 1 | *Apoda* | BT1 | CO1 | PO2 |
| 2 | Crocodilia | BT2 | CO1 | PO2 |
| 3 | Neoteny | BT1 | CO1 | PO2 |
| 4 | Hybernation | BT2 | CO1 | PO2 |
| 5 | Venom | BT1 | CO1 | PO2 |

UNIT-IV ESSAYQUESTIONS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S. No  . | QUESTION | BT LEVEL | CO | PO |
| 1 | Describe the flight adaptations in birds | BT1 | CO1 | PO2 |
| 2 | Explain the respiratory system of *Columbalivia* | BT2 | CO1 | PO2 |
| 3 | Describe the general charactersof Aves | BT1 | CO1 | PO2 |
| 4 | Describe the structure and function of brain in Columbia livia | BT1 | CO1 | PO2 |

SHORT QUESTIONS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.No. | QUESTION | | BT LEVEL | | CO | | PO | |
| 1 | Quilfeather | | BT1 | | CO1 | | PO2 | |
| 2 | | Archaeopteryx | BT2 | | CO1 | | PO2 | |
| 3 | | syrinx | BT1 | | CO1 | | PO2 | |
| 4 | | Claws | BT1 | | CO1 | | PO2 | |
| 5 | | Adaptation | BT2 | | CO1 | | PO2 | |

UNIT-V ESSAYQUESTIONS

|  |  |
| --- | --- |
| S.no | question |
| 1 | Compare the characters of Metatheria and  Eutheria |
| 2 | Write an essay on dentition in mammals |
| 3 | Describe the Aquatic adaptation in mammals |
| 4 | Explain the general characters of mammals |
| 5 | Explain the classification of mammals upto classes |
| 6 | Illustrat the comparison between Prototherians, Metatherians and eutherians |

|  |  |
| --- | --- |
| S.No. | QUESTION |
| 1 | Prototheria |
| 2 | Canines |
| 3 | Mammaryglands |
| 4 | Eutheria |
| 5 | Diphidont |
| 6 | Marsupials |

SHORTQUESTIONS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Pithapur Rajah’s Government College (Autonomous), Kakinada  II-year B.Sc., Degree Examinations  SEMESTER-III:  COURSE 5: ANIMAL DIVERSITY-I BIOLOGY OF CHORDATES  Model question  Time:2Hrs. Max.Marks:50 | | | | | |  |
|  | SECTION–A  Answer any Three of the following choosing at least one question from part I and II Draw labeled diagrams wherever necessary  3x10=30M  PART- I | | | | | |  |
| 1 | Explain the life history of Herdmania | BT1 | CO1 | PO2 |  |  |
| 2 | Compare the characters of Petromyzon and Myxine | BT1 | CO1 | PO2 |
| 3 | Describe the brain of Rana hexadactyla | BT1 | CO1 | PO2 |
| PART-II | | | | | |  |
| 4 | Write an essay on flight adaptations in birds | BT2 | CO1 | PO2 |  |  |
| 5 | Compare the characters of Metatheria and Eutheria | BT1 | CO1 | PO2 |
| 6 | Write an essay on dentition in mammals | BT2 | CO1 | PO2 |
| SECTION- B  I.Answer any FOUR of the following:  Draw labelled diagrams wherever necessary 4x5=20M | | | | | |  |
| 7 | Amphioxous | BT1 | CO1 | PO2 |  |  |
| 8 | Placoid Scales | BT1 | CO1 | PO2 |
| 9 | Hybernation | BT1 | CO1 | PO2 |
| 10 | Apoda | BT1 | CO1 | PO2 |
|  | | | | | |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | | | | |
| 11 | Migration | BT1 | CO1 | PO2 |  |
| 12 | Metatheria | BT1 | CO1 | PO2 |
| 13 | Rodentia | BT1 | CO1 | PO2 |
|  | | | | | |

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|  | Pithapur Rajah’s Govt. College (A)  Kakinada | Program & Semester  B.Sc. Honours Zoology (Major)  Semester-III | | | |
| CourseCode | TITLE OF THE COURSE  COURSE5: ANIMAL DIVERSITY-II BIOLOGY OF CHORDATES |
| Teaching | Hours Allocated:30(Lab) | L | T | P | C |
| Pre-requisites: |  | 0 | 0 | 3 | 2 |

SYLLABUS:

PRACTICALS

Protochordata: Herdmania, Amphioxus, AmphioxusT.Sthroughpharynx.

Cyclostomes: PetromyzonandMyxine.

Pisces: Pristis, Torpedo, Hippocampus, Exocoetus, Echeneis, Labeo, Catla, Clarius, Channa, Anguilla.

Amphibia: Ichthyophis, Amblystoma, Axolotllarva, Hyla,

Reptilia: Draco, Chamaeleon, Uromastix, Testudo, Trionyx, Russelsviper, Naja,

Krait, Hydrophis, Crocodile.

Aves: Psittacula, Eudynamis, Bubo, Alcedo.

Mammalia: Ornithorhynchus, Pteropus, Funambulus.

Dissections-As per UGC guidelines Scoliodon IX andX, Cranial nerves Scoliodon Brain

Mounting of fish scales

Note:1. Dissections are to be demonstrated only by the faculty or virtual.

2.Laboratory Recordwork shall be submitted at the time of practical examination.

RFERENCE WEB LINKS:

https://nt7-mhe-complex-assets.mheducation.com/nt7-mhe-complex-assets/Upload-20190715/InspireScience6-8CA/LS15/index.html

https://themammallab.com/

<http://abacus.bates.edu/acad/depts/biobook/LabConCh.htm>

https://virtualzoology.wordpress.com/scoliodon/

<http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>

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| --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | Pithapur Rajah’s Govt.Degree College (A) Kakinada. | Program& Semester  B.Sc. Honours in Zoology (Major)  Semester-III |
| CourseCode | TITLE OF THE COURSE  COURSE5: ANIMAL DIVERSITY-I BIOLOGY OF CHORDATES  Model question paper for practicals |
| Maxmarks:50 |  | Time3hrs |

I. Identify the following specimens or spotters & slides, draw neat labeled diagrams–write notes

6x5=30M

A. Herdmania

B. Hippocampus

C. Draco

D. Russels Viper

E. Psittacula

F. ornithorhynchus

II. Dissect and draw the labeled diagram of Scoliodon IX and X, Cranial nerves

1x10=10M

Viva–Voce 5M

Record 5M

Total 50

**PITHAPUR RAJAH’S GOVT.DEGREECOLLEGE(A) KAKINADA.**

**DEPARTMENTOFZOOLOGY**

SEMESTER-III

COURSE 6: PRINCIPLES OF GENETICS

Theory Credits:3 3hrs/week

LEARNING OBJECTIVES.

To provide the required knowledge on the genetic interactions



T, distinguish between polygenic, sex-linked, and multipleallelicmodes of inheritance and extrachromosomal inheritance.

To understand the principles of sex determination in animals with a reference to human beings, and sex- linked inheritance

To understand the human karyotyping and the concept of pedigree analysis basics.

LEARNING OUTCOMES: To understand the history of genetics, gain knowledge basic terminology of genetics



To acquire knowledge on interaction of genes, various types of inheritance patterns existing in animals with reference to non-Mendelian inheritance.

To acquire knowledge on chromosomal inheritance



Acquiring in-depth knowledge on various of aspects of genetics involved in sex determination,

Acquiring in-depth knowledge on human karyotyping, pedigree analysis and chromosomal disorders concepts of proteomics and genomics

CO-PO–PSO Mapping:

(1: Slight [Low];2: Moderate [Medium];3: Substantial [High],'-’NoCorrelation)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | 3 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 |
| CO2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| CO3 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 1 |
| CO4 | 1 | 2 | 3 | 2 | 2 | 3 | 1 | 2 | 2 | 2 |
| CO5 | 1 | 2 | 3 | 2 | 3 | 3 | 1 | 2 | 3 | 3 |

SYLLABUS

UNIT-I:

1.1 History of Genetics- Concepts of Phenotype, Genotype, Heredity, Variation, Pure lines and

Inbreed Lines

1.2 Mendelian Principles on Monohybrid cross, back cross and Test cross

1.3 Mendelian Principles on Dihybrid cross

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after

watching any video on the above/Problem solving on Mendelian principles

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

UNIT-II:

2.1 Linkage - Definition, Types of linkage-complete linkage and incomplete linkage, Significance

of linkage.

2.2 Crossing over - definition; Mechanism of crossing over: Chiasma Interference and

coincidence

2.4 Gene Interactions: Incomplete dominance, codominance, Pleiotropy

2.5 Gene Interactions: Lethal alleles, Epistasis, Non- Epistasis

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after

watching any video on the above/Model preparation of linkage/crossing over

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

UNIT-III:

3.1 Polygenes (General Characteristics & examples)

3.2 Multiple Alleles (General Characteristics and Blood group inheritance)

3.3 Rh inheritance erythroblastosis foetalis

3.4 Extra chromosomal inheritance- Kappa particles in Paramecium and Shell coiling in snails

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after

watching any video on the above/Case study on Rh/Erythroblastosis foetalis

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

UNIT-IV:

4.1 Sex determination- Chromosomal theory and Genic Balance theory

4.2 Sex determination- Hormonal, Environmental and Haplo-diploidy types

4..3 Sex linked inheritance: X-linked inheritance

4.4 Sex linked inheritance: Y-linked & XY-linked inheritance

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after

watching any video on the above/ Preparation of animated model /chart on sex determination

methods

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

UNIT-V:

5.1 Human karyotyping, Pedigree Analysis(basics)

5.2 Autosomal Recessive disorder-Sickle cell anaemia – causes, treatment, inheritance pattern,

modes of testing and prevention

5.3 Autosomal Dominant disorder- Huntington disease

5.4 Basics on Genomics and Proteomic

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after

watching any video on the above/ Case study of a family for pedigree analysis

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

**Co-curricular activities (Suggested)**

 Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden

or local village as a student study project activity

 Observation of blood group inheritance in students, from their parents and grandparents

 Karyotyping and preparation of pedigree charts for identifying diseases in family history

 Charts on chromosomal disorders

REFERENCE BOOKS:

 Harper, P. (2010). Practical genetic counselling. CRC Press.

 Kessler, S. (Ed.). (2013). Genetic counselling: psychological dimensions. Academic Press. 3.

Stevenson, A. C., & Davison, B. C. (2016). Genetic counselling. Elsevier.

 Evans, C. (2006). Genetic counselling: a psychological approach. Cambridge University Press.

 References:

 Atlas of Inherited Metabolic Diseases

 Mendelian Inheritance in Man: A Catalog of Human Genes and Genetic Disorders, Victor A.

McKusick, Vol I & II

 Stacy L Blachford (Editor) 2001. The Gale Encyclopedia of Genetic Disorders. Gale Group

Publishers, Vol.1 (A-L), Vol.II (M-Z).

 Limoine, W.R. and Cooper, D.NB. 1996: Gene Trophy, Bios Scientific Pub.Oxford.

 REFERENCES:

 Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley

India

 Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley

and Sons Inc.

 Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition.

Benjamin Cummings.

 Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin

Cummings.

 Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to

Genetic Analysis. IX Edition. W. H. Freeman and Co.

 James D. Watson, Nancy H. Hopkins ‘Molecular Biology of the Gene’

 Gupta P.K., ‘Genetics

**PITHAPUR RAJAH’SGOVT. DEGREE COLLEGE(A) KAKINADA.**

**DEPARTMENT OF ZOOLOGY**

**III SEMESTER ZOOLOGY – PAPER-6**

**COURSE 6: PRINCIPLES OF GENETICS**

**BLUE PRINT**

Time: 2 hrs Max.Marks:50

|  |  |  |  |
| --- | --- | --- | --- |
| Unit | Essay | Short | Marks allotted  To the unit |
| I | 1 | 1 | 15 |
| II | 2 | 2 | 30 |
| III | 1 | 2 | 20 |
| IV | 1 | 1 | 15 |
| V | 1 | 1 | 15 |
| Total | 6 | 7 | 95 |
|  | Out of 6,3questions should  Be answered 3X10=30M | Outof7, 4questions  Should be answered 4X5=20M |  |

**PITHAPUR RAJAH’S GOVT. COLLEGE(A) KAKINADA.**

**DEPARTMENT OF ZOOLOGY**

**MODEL QUESTION PAPER**

**III SEMESTER-ZOOLOGY-**

**COURSE 6: PRINCIPLES OF GENETICS**

Time:2hrs Max.Marks:50

SECTION-A

Answer any THREE of the following. Choosing at least one from each part.

Draw labeled diagrams wherever necessary 3x10=30

PART- I

1.Explain the Mendelian principle behind the dihybrid cross?

2.What is crossing over? Explain the mechanism of crossing over in chromosomes?

3.What is epistasis? Explain epistasis with a suitable example?

PART-II

4.What is extra chromosomal inheritance? Explain the inheritance of kappa particles in Paramecium?

5.What is Hemophilia? Explain how it is inherited among the family members?

6.Write an essay on the basics of Genomics and Proteomics?

Answer any FOUR of the following:

SECTION-B

Draw labeled diagrams wherever necessary 4x5=20 M

7. Mono hybrid Cross

8. Types of Linkage

9. Incomplete Dominance

10. Multiple Alleles

11. Erythroblastosis fetalis

12. Haplo-diploidy

13. Sickle Cell Anemia

SEMESTER-III

COURSE6: PRINCIPLES OF GENETICS

Practical Credits:1 2hrs/week

LEARNING OBJECTIVES:

To acquire practical knowledge on the importance of Mendelian principles by solving the problems. To provide the required knowledge on the gene interactions



To acquire the students on Human karyotype & pedigree analysis basics to understand the various genetic concepts through Virtual labs

SYLLABUS:

1.Study of Mendelian inheritance using suitable examples/Problems.

2.Study of linkage recombination, gene mapping using the data.

3.Study of human karyotypes.

4.Blood grouping and Rh in humans.

5.Demonstration of prenatal diagnosis (Virtual lab).

6.Amniocentesis demo or virtual lab.

7.Demonstration of Ultra sonography (Virtual lab).

8. Scoring dysmorphic features in syndromic patients.

9.Genetic Counselling methods based on case history.

10.Construction and analysis of Pedigree.

RFERENCE WEB LINKS:

<https://www.iitg.ac.in/cseweb/vlab/anthropology/Experiments/Mendels%20law/index.html>

<https://learn.genetics.utah.edu/content/labs/>

<https://virtuallabs.merlot.org/vl_biology.html>

<https://blog.praxilabs.com/2020/06/30/dna-extraction-virtual-lab/>

<https://jru.edu.in/studentcorner/lab-manual/agriculture/Fundamentals%20of%20Genetics.pdf>

<https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1008&context=ny_oers>

<https://sjce.ac.in/wp-content/uploads/2018/04/Cell-Biology-Genetics-Laboratory-Manual-17-18.pdf>

<https://www.rlbcau.ac.in/pdf/Agriculture/AGP%20113%20%20Fundamentals%20of%20Genetics.pdf>

<https://coabnau.in/uploads/1610707528_GPB3.2PracticalManual-Final.pdf>

PITHAPUR RAJAH’S GOVT.DEGREE COLLEGE (A) KAKINADA.

DEPARTMENT OF ZOOLOGY

MODEL QUESTION PAPER

III SEMESTER-ZOOLOGY-PAPER-6

COURSE 6: PRINCIPLES OF GENETICS

PRACTICAL MODEL QUESTION PAPER

Time:3Hrs MaxMarks:50

I. Determination of human blood Group 10M

II. Problems on Mendelian inheritance 2X5=10M

III.

A.Syndromes 4x5=20M

B.Klinefelter Syndrome

C.Turners Syndrome

D.Down Syndrome

Record- 5M

Viva- 5M

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PR GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA

DEPARTMENT OF ZOOLOGY

ZOOLOGY -MAJOR,

SEMESTER –III COURSE 7: ANIMAL BIOTECHNOLOGY

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | PR GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA DEPARTMENT OF ZOOLOGY | Program & Semester  PAPER VII HONOURS ZOOLOGY SEMESTER-IV | | | |
| Course 7 | Animal Biotechnology |
| Theory | Credits:3 | 3hrs/week | | | |
| Teaching | Hours Allocated :60 (Theory) | L | T | P | C |
| Pre-requisites: | Knowledge ON Basics of Animal Biotechnology | 4 | 0 | 2 | 4 |

HOURS:60 Maxi marks:50

LEARNING OBJECTIVES:

• To provide knowledge on animal cell and tissue culture and their preservation

• To empower students with latest biotechnology techniques like stem cell technology, genetic engineering, hybridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms

• To explain in vitro fertilization, embryo transfer technology and other reproduction manipulation methodologies.

• To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.

• To understand principles of animal culture, media preparation.

LEARNING OUTCOMES:

This course will provide students with a deep knowledge in animal biotechnology, by the completion of the course the graduate shall able to –

• CO 1: Get knowledge of the Vectors and Restriction enzymes used in biotechnology

• CO 2: Describe the gene delivery mechanism and PCR technique

• CO 3: Acquire basic knowledge on media preparation and cell culture techniques

• CO 4: Understand the manipulation of reproduction with the application of biotechnology

• CO 5: Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-'/0: No Correlation)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1 | 3 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 3 |
| CO2 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 2 | 3 |
| CO3 | 2 | 2 | 0 | 1 | 1 | 2 | 2 | 1 | 3 | 3 |
| CO4 | 3 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 3 | 3 |
| CO5 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 3 |
| Average | 2.6 | 2 | 1.2 | 1.8 | 1.4 | 1.4 | 1.4 | 1 | 2.2 | 3.0 |

SYLLABUS:

UNIT-I:

1.1 Enzymes and Vectors Restriction modification systems: Types I, II and III.

1.2 Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

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

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

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Preparation of models of Cloning vectors with biodegradable material/

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT- II:

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

2.2 PCR: Basics of PCR.

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

2.4 Hybridization techniques: Southern, Northern and Western blotting

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to any clinical testing laboratory for hands on experience of PCR Use

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-III:

3.1 Natural and Synthetic Cell cultures: primary culture, secondary culture, continuous cell lines

3.2 Organ culture; Cryopreservation of cultures.

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

mAb

3.4 Stem cells: Types of stem cells, applications

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to any clinical testing laboratory for observation of various cultures

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-IV:

4.1 Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization

4.2 Manipulation of reproduction in animals: Super ovulation, Embryo transfer, Embryo cloning

4.3 Transgenic Animals: Strategies of Gene transfer;

4.4 Transgenic - sheep, - fish; applications

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/ Visit to laboratory for observation of Artificial Insemination, In vitro fertilization/model preparation of transgenic animal

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-V:

5.1 DNA fingerprinting

5.2 Application of biotechnology in fisheries – monoculture in fishes, polyploidy in fishes

5.3 Gene therapy-application

5.4 Bio informatics- concept-definition-database types

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Case study

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

Additional topics:

1. Nature & scope of Biotechnology

2. Applications of Gene delivery

3. Trends in stem cell technology

4. ART

5. Applications of Biotechnology

REFERENCES BOOKS:

• Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.

• Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier Academic Press, USA

• Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.

• Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press

• Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein’s Microbiology. McGraw Hill Higher Education

• Brown TA. (2007). Genomes-3. Garland Science Publishers

• Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell Publishing, Oxford, U.K.

• Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994.BIOS Scientific Publishers Limited.

• Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998. Animal Cell Culture Methods Academic Press.

• P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).

• B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

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DELETIONS AND ADITIONS OF SYLLUBUS

|  |  |  |  |
| --- | --- | --- | --- |
| S. No | Unit | Addition | Justification |
| 1 | UNIT-II | PCR APPLICATIONSIN ANIMAL BIOTECHNOLOGY | Applications of PCR is very essential to learn in Biotechnology |
| 2 | UNIT II | Genetic testing | Genetic tests are available for many conditions, but vary in their clinical validity. Genetic tests can have social and ethical  implications. |

PRGOVERNMENTCOLLEGE(AUTONOMOUS): KAKINADA

DEPARTMENT OF ZOOLOGY

MAJOR–ZOOLOGY, SEMESTER-III

COURSE7: ANIMAL BIOTECHNOLOGY

Blueprint

|  |  |  |  |
| --- | --- | --- | --- |
| Module Name | PARTI  EssayTypeQuestions10marks each | PartII ShortAnswer Questions  5 marks each | Marks Allotted to the Chapter |
| 1.Immunology– I (Over view of Immune system) | 1 | 02 | 20 |
| 2.Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity) | 1 | 01 | 15 |
| 3.Biotechnology Techniques | 2 | 02 | 30 |
| 4. Applications of Animal Biotechnology | 1 | 01 | 15 |
| 5 module | 1 | 01 | 15 |
| 6.Total | 06  Of which 3 to be answered | 07  Of which 4 to be answered | 95 Marks including choice. Of which 50 Marks to be answered |

QUESTIONBANK

Unit-1 Essay questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | Applications of Type II restriction enzymes in genetic engineering | BT1 | CO1 | PO2 |
| 2 | Describe the DNA modifying enzymes and their applications | BT2 | CO1 | PO2 |
| 3 | Write an essay on Cloning Vectors (Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors) | BT1 | CO1 | PO2 |
| 4 | Explain the different cosmid vectors: BACs, YACs | BT2 | CO1 |  |

Short Answer Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S. No. | QUESTION | BT LEVEL | CO | PO |
| 1 | State the type I restriction enzymes | BT1 | CO1 | PO2 |
| 2 | Polymerases | BT2 | CO1 | PO2 |
| 3 | P UC vector | BT1 | CO1 | PO2 |
| 4 | YACs | BT1 | CO1 | PO2 |
| 5 | M13 based vector | BT2 | CO1 | PO2 |
| 6 | DNA polymerase | BT1 | CO2 | PO2 |

Unit-2 Essay questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | Describe the deferent types of genedelivery methods | BT1 | CO1 | PO2 |
| 2 | What is PCR? Explain the Basics of PCR | BT2 | CO1 | PO2 |
| 3 | What is Sequencing? Explain Sanger’smethod of DNA sequencing | BT1 | CO1 | PO2 |
| 4 | Illustrate the different types of Hybridization techniques in |  |  |  |

Short Answer Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | Gene gun | BT1 | CO1 | PO2 |
| 2 | Traditional method of Sequencing | BT2 | CO1 | PO2 |
| 3 | Automative method of sequencing | BT1 | CO1 | PO2 |
| 4 | Western Blotting method | BT1 | CO1 | PO2 |
| 5 | Southern blotting method |  |  |  |

Unit-3 Essay questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | What is culture? Differentiate the primary culture, secondary culture | BT1 | CO1 | PO2 |
| 2 | Cryopreservation of cultures | BT2 | CO1 | PO2 |
| 3 | Describe the Applications of mAb | BT1 | CO1 | PO2 |
| 4 | Define mAb .and explain Production of Monoclonal antibodies (mAb), | BT1 | CO1 | PO2 |
| 5 | Whatisstem cell? Explain different Types of stem cells and their applications | BT2 | CO1 | PO2 |

Short Answer Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | Cell culture | BT1 | CO1 | PO2 |
| 2 | Continuous cell lines | BT2 | CO1 | PO2 |
| 3 | Cryopreservation | BT1 | CO1 | PO2 |
| 4 | Stem cells | BT1 | CO1 | PO2 |
|  |  |  |  |  |

Unit-4 Essay questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | question | BT LEVEL | CO | PO |
| 1 | Whatis the process of Invitro fertilization? Explain | BT1 | CO1 | PO2 |
| 2 | Deescribe the Embryo transfer technology in Animals | BT2 | CO1 | PO2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 3 | Writean essay on Transgenic Animals | BT1 | CO1 | PO2 |
| 4 |  |  |  |  |

Short Answer Questions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |  |
| 1 | Artificial Insemination | BT1 | CO1 | PO2 |
| 2 | Superovulation | BT2 | CO1 | PO2 |
| 3 | Genetransfer strategy | BT1 | CO1 | PO2 |
| 4 | Transgenic-sheep, | BT1 | CO3 | PO2 |
| 5 | Transgenic-fish | BT2 | BT1 | CO1 | PO2 |

Unit-5 Essay questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | Illustrate the DNA finge rprinting process | BT1 | CO1 | PO2 |
| 2 | Explain Applications of biotechnology in fisheries | BT2 | CO1 | PO2 |
| 3 | Write an essay on Gene therapy process and their application | BT1 | CO3 | PO2 |
| 4 | Describe the Bio-informatics-concept-definition- data base types of Bio informatics | BT1 | CO1 | PO2 |

Short Answer Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | QUESTION | BT LEVEL | CO | PO |
| 1 | Monoculture in fishes | BT1 | CO1 | PO2 |
| 2 | Polyploidy in fishes | BT2 | CO1 | PO2 |
| 3 | Gene therapy | BT1 | CO1 | PO2 |
| 4 | Bio-informatics | BT2 | CO1 | PO2 |

P.R. GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA

DEPARTMENT OF ZOOLOGY

Course 7: Animal Biotechnology

Model Question Paper

Time:2.Hrs. MaxMarks :50

SECTION–A

Answer any THREE questions choosing at least one question from each section 3x10=30Marks

PART-I

|  |  |  |  |
| --- | --- | --- | --- |
| 1.Applications of Type II restriction enzymes in genetic engineering | BT1 | CO1 | PO2 |
| 2. What is PCR? Explain the Basics of PCR | BT1 | CO1 | PO3 |
| 3.What is culture? Differentiate the primary culture, secondary culture | BT1 | CO2 | PO2 |

PART-II

|  |  |  |  |
| --- | --- | --- | --- |
| 4. What is stem cell? Explain different Types of stem cells and their applications | BT1 | CO2 | PO2 |
| 5.What is the process of Invitro fertilization? Explain | BT2 | CO1 | PO3 |
| 6.Illustrate the DNA finger printing process | BT1 | CO2 | PO3 |

SECTION-B

Answer any FOUR of the following. Draw labeled diagrams wherever necessary

4x5=20Marks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7.State the type I restriction enzymes | BT1 | | | CO1 | | PO2 |
| 8.pUC vector | BT2 | | | CO3 | | PO2 |
| 9.Gene gun | BT1 | | | CO1 | | PO2 |
| 10.Cryopreservation of cultures | BT2 | | | CO1 | | PO2 |
| 11.Stem cells | | | BT1 | CO2 | | PO3 | |
| 12.Transgenic-fish | | | BT2 | CO1 | | PO2 | |
| 13.Gene therapy | | | BT1 | CO3 | | PO2 | |

Course 7: Animal Biotechnology

Practical Syllabus Credits:1 2hrs/week

LEARNING OBJECTIVES

This course will provide students with a practical knowled gein animal biotechnology, by the completion of the course the graduates hall able to–

Acquire knowledge on Cloning vectors ,biotechnology Empower with the process of DNA quantification and amplification Explain purification of biological compounds by paper chromatography Getan sight maintenance of laboratory apparatus Understand principles of animal culture, media preparation

SYLLABUS:

1.Cloning Vectors: Plasmid vectors: p BR and p UC series, Bacteriophage lambda and M13 based vectors, Cosmides, BACs, YACs, (Charts/Images/Models)

2.DNA quantification using DPA Method.

3.Techniques: DNA Finger printing

4.Separation, Purification of biological compounds by paper chromatography

5.Cleaning and sterilization of glass and plastic wares for cell culture.

6.Preparation of culture media.

7.Amplifications of DNA by PCR

*Note: above practical may be demonstrated in the laboratory demonstrated by V-lab*

RFERENCE WEB LINKS: <https://vlab.amrita.edu/>

<https://www.vlab.co.in/broad-area-biotechnology-and-biomedical-engineering><https://blog.praxilabs.com/2020/06/30/dna-extraction-virtual-lab/>

<http://mbvi-au.vlabs.ac.in/><https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC203J-lab-manual.pdf>[https://webstor.srmist.edu.in/web\_assets/srm\_mainsite/files/files/BT%200312%20-](https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/BT%200312%20-%20ANIMAL%20CELL%20AND%20TISSUE%20CULTURE%20LABORATORY.pdf)

[%20ANIMAL%20CELL%20AND%20TISSUE%20CULTURE%20LABORATORY.pdf](https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/BT%200312%20-%20ANIMAL%20CELL%20AND%20TISSUE%20CULTURE%20LABORATORY.pdf)

[https://davjalandhar.com/dbt/biotechnology/SOP/BSc%20Biotechnology%20Semester%20V%20](https://davjalandhar.com/dbt/biotechnology/SOP/BSc%20Biotechnology%20Semester%20V%20%26%20VI.pdf)

[%26%20VI.pdf](https://davjalandhar.com/dbt/biotechnology/SOP/BSc%20Biotechnology%20Semester%20V%20%26%20VI.pdf)

P.R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA

DEPARTMENT OF ZOOLOGY & AQUACULTUIRE

SEMESTER-III

Model question Paper

COURSE-7 ANIMAL BIOTECHNOLOGY

1. DNA quantification using DPA Method 15 Marks

.2. Preparation of culture media 10Marks

3. Slides/Models/Charts 3x5=15marks

Slide -A

Slide B-

Slide- C

4. Record 05Marks

5.VivaVoce 05 Marks

Total 50Marks

SEM III COURSE 8: EVOLUTION AND ZOOGEOGRAPHY

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | P.R. GOVERNMENLEGE (A) KAKINADA | Program & Semester  III Semester | | | |
| CourseCode | COURSE 8: EVOLUTION AND ZOOGEOGRAPHY |
| Teaching | Hours Allocated: 60 (Theory) | L | T | T | C |
| Pre-requisites: | Credits 3 | 4 | 2 | 2 | 5 |

Course with focus on employability / entrepreneurship / Skill Development modules

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Skill Development |  | Employability |  | Entrepreneurship |  |

|  |  |
| --- | --- |
| OBJECTIVES | LEARNING OUT COME |
| To provide knowledge on origin of life, theories and forces of evolution  To explore the evidences of evolution  To Explain the theories of evolution  To understand the role of variations and mutations in evolution of organisms  To understand the zoogeographical distribution of animals | The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Evolution and zoo geography, by the completion of the course the graduate shall able to –  Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals  Explain the different evidences of evolution  Understand the theories of evolution  n Explain the various tools for evolution  n Map the distribution of animals according to zoological realms |

SYLLABUS

UNIT-I

1.1 Origin of life: different ancient concepts -Origin of Earth and Solar system: Big Bang theory, Primitive atmosphere, formation of macromolecules1.2 Biological evolution: Coacervates, Microspheres, formation of Nucleic acids, Nucleoproteins 1.3 Formation of primary organisms, evolution of modes of nutrition, oxygen revolution, present day atmosphere, evolution of eukaryotes.1.4 Experimental evidences in support of Biochemical origin of life (Miller and Urey experiment)

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-II

2.1 Paleontological and taxonomical evidences of evolution2.2 Morphological and anatomical evidences of evolution2.3 Embryological and physiological evidences of evolution 2.4 Evidences from connecting links, missing links and bio geographical distribution

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Visit to Archaeological Museum for observation of fossils

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT -III3.1 Lamarckism-Neo Lamarckism3.2 Germplasm theory-August Weismann3.3 Darwinism-Theory of Natural selection3.4 Modern synthetic theory of evolution (Neo Darwinism)

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-IV4.1 Variations-types-sources of variations- importance in evolution4.2 Mutations-classification-causes-significance in evolution4.3 Isolation mechanisms-role in evolution4.4 Sewall wright effect, Hardy Weinberg Principle

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

UNIT-V5.1 Animal distribution and barriers of distribution5.2 Zoogeographical realms – Palearctic & Nearctic regions5.3 Zoogeographical realms – Neotropical & Ethiopian regions5.4 Zoogeographical realms – Oriental & Australian regions

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Case study on the observation of fauna in the college locality/in the residential areaEvaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

Co-curricular activities (Suggested) Chart on industrial melanism to teach directed selection, Darwin’s finches to teach genetic drift, collection of data on weight of children born in primary health centers to teach stabilizing selection etc.

REFERENCES BOOKS:

Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing Hall, B. K. and

Hall Grimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publisher

Douglas, J. Fatuma (1997). Evolutionary Biology. Sinauer Associates.

Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.

Organic evolution by Organic evolution by Dr. Veer Bala Rastogi,2019 Kedar Nath Ramnath

Paleontology and Zoogeography Organic evolution by Dr. Veer Bala Rastogi,2019 Kedarnath Ramnath

Rastogi VB. 1991. Organic Evolution. Kedar Nath Ram Nath Publications, Meerut, Uttar Pradesh, India.

Stahl FW. 1965. Mechanics of Inheritance. Prentice-Hal.

White MJD. 1973. Animal Cytology and Evolution. Cambridge Univ.Press

**P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTUR**

**TITLE: COURSE 8: EVOLUTION AND ZOOGEOGRAPHY**

**BLUE PRINT**

|  |  |  |  |
| --- | --- | --- | --- |
| MODULENO. | ESSAY QUESTIONS 10 MARKS | SHORT ANSWER QUESTIONS  5 MARKS | MARKS ALLOTEDTO THE UNIT |
| Module-I | 01 | 02 | 20 |
| Module-II | 01 | 01 | 15 |
| Module-III | 01 | 02 | 20 |
| Module-IV | 02 | 01 | 25 |
| Module-V | 01 | 01 | 15 |
| TOTAL | 06 Of which 3to be answered | 7 out Of which 5to be answered | 95 marks including choice Of which 50marks to be answered |

PITHAPUR RAJA’S GOVT. COLLEGE (AUTONOMOUS), KAKINADA

DEPARTMENT OF ZOOLOGY AND AQUACULTURE

MAJOR ZOOLOGY SEMESTER - III- COURSE – 8

EVOLUTION AND ZOO GEOGRAPHY

MODEL QUESTION PAPER

Time: 3 hrs. Max Marks: 50

SECTION –I

Answer Any THREE of the following by choosing at least one question from each section

(Draw labelled diagrams wherever necessary) 3X10=30

PART- I

| S. No | Questions | BT  Level | CO | PO | Marks |
| --- | --- | --- | --- | --- | --- |
| 1 | Explain origin of solar system with reference to big bang theory | BT1 | 1 | 2 | 10 |
| 2 | Discuss evidences from Embryology in support of Evolution | BT2 | 2 | 0 | 10 |
| 3. | Write an essay on Darwinism | BT2 | 2 | 0 | 10 |

PART- II

| S. No | Questions | BT  Level | CO | PO | Marks |
| --- | --- | --- | --- | --- | --- |
| 3 | What is Isolation and Describe various isolating mechanisms and their role in evolution | BT1 | 1 | 2 | 05 |
| 4 | Hardy Weinberg law | BT2 | 2 | 2 | 05 |
| 5 | Describe Oriental and Australian Zoogeographical realms | BT2 | 1 | 2 | 05 |

SECTION - B

I. Answer any FOUR of the following: Draw labeled diagrams wherever necessary

4x5=20 M

| S. No | QUESTION | BT  LEVEL | CO | PO | MARKS |
| --- | --- | --- | --- | --- | --- |
| 7 | Miller &Urey’s experiment | BT1 | 2 | 1 | 01 |
| 8 | **Biological evolution** | BT1 | 0 | 1 | 01 |
| 9 | Homologous organs | BT2 | 1 | 2 | 01 |
| 10 | Natural selection | BT3 | 2 | 2 | 01 |
| 11 | August Weisman’s theory | BT1 | 2 | 1 | 01 |
| 12 | Types of mutations | BT1 | 0 | 1 | 01 |
| 13 | Barriers of distribution | BT2 | 1 | 2 | 01 |

QUESTIONBANK

Unit-I

ESSAYQUESTIONS

1Write an essay on big bang theory and origin of solar system

2.Describe Biological evolution

3Explain formation of coacervates, microspheres, Nuclic acids

SHORT ANSWER QUESTIONS

1.evolution of eukaryotes

2. Pasteur’s experiment.

UNIT-II

Essay questions

Explain evidences from Embryology in support of Evolution

Explain palaentalogical evidences in support of Evolution

Narrate evolutionary evidences based on connecting links and missing links

Short answer questions

1.Geological time scale

2. Analogous organs

3. Homologous organs

UNIT – III

Essay questions

1.Describe Modern Synthetic Theory

2.Describe Darwin Theory

3.Explain Theory Of Natural Selection

Short Answer Questions

1.Germplasm Theory

2. Struggle For Existence

3.Neo Lamarckism

UNIT – IV

Essay questions

1.What is isolation explain isolating mechanisms

2. Explain mutations

3. write an essay on Hardy Weinberg principle

Short answer questions

Variations

Mutations

Genetic drift

Significance of evolution

UNIT – V

Essay questions

1.Describe Palaearctic Region

2. Describe Oriental Regions

3. Describe Australia Region

Short answer questions

Animal Distribution

Barriers of distribution

Fauna of Nearctic region

\*\*\*

SEMESTER-III

COURSE 8: EVOLUTION AND ZOOGEOGRAPHY

Practical Credits: 1 2 hrs/week

LEARNING OBJECTIVESAcquainting and skill enhancement in the usage of laboratory equipment

To apply the basic concept of inheritance for applied research To get familiar with phylogeny ad geological history of origin & evolution of animals To understand the zoogeographical distribution of animals

SYLLABUS:1. Study of fossil evidences2. Study of homology and analogy from suitable specimens and pictures3. Study of embryological evidences by charts/ pictures4. Study of Lamarckism with images /animations5. Study of Darwinism with images/ animation6. Study of connecting links/missing links images/charts7. Phylogeny of horse with pictures8. Study of Genetic Drift by using examples of Darwin’s finches (pictures)9. Visit to Natural History Museum and submission of report10. Mapping distribution of animals according to zoogeographical regions.11. Mapping zoogeographical regions

SEMESTER-III

COURSE 8: EVOLUTION AND ZOOGEOGRAPHY

Practical model paper

Time 2hrs Marks 50 M

1.study of fossil evidences............. 10 M

II. Identification of spotters............. 5x5=25

A Homology pictures

B Lamarckism

C Darwinism

D. Horse phylogeny

E Connecting links

III Museum Visit report ................5M

IV Record + Viva....... .............. 10M

Total= 50 Marks

MULTIDISCIPLINARY COURSE

SEMESTER-III

HEALTH AND HYGIENE

Credits:2 2 hrs/week

Unit I: Basics of Nutrition

10 Hrs.

1. Nutrition – definition, importance, Good nutrition and mal nutrition; Balanced Diet:

Basics of Meal Planning

2. Carbohydrates –functions, dietary sources, effects of deficiency.

3. Lipids –functions, dietary sources,effects of deficiency.

4. Proteins –functions, dietary sources, effects of deficiency.

5. Brief account of Vitamins- functions, food sources,effects of deficiency,

6. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium,

Potassium and Sodium; food sources of Iron, Iodine and Zinc

7. Importance of water– functions, sources, requirement and effects of deficiency.

Unit II: Health

10 Hrs.

8. Health - Determinants of health, Key Health Indicators, Environment health & Public

health; Health-Education: Principles and Strategies

9. Health Policy & Health Organizations: Health Indicators and National Health Policy of

Govt. of India-2017; Functioning of various nutrition and health organizations in India

viz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR

(Indian Council of Medical Research), IDA (Indian Dietetics Association),WHO-India,

UNICEF-India

10. National Health Mission: National Rural Health Mission (NRHM) Framework,

National Urban Health Mission (NUHM) Framework

11. Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child

and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK);

Rashtriya Bal Swasthya Karyakram(RBSK); India Newborn Action Plan (INAP);

Adolecent Heatlh- Rashtriya Kishor Swasthya Karyakram (RKSK)

12. Disaster Management – Containment, Control and Prevention of Epidemics and

Pandemics – Acts, Guidelines and Role of Government and Public

Unit III: Hygiene

10 Hrs.

13. Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH

(WAter, Sanitation and Hygiene) programme

14. Rural Community Health: Village health sanitation & Nutritional committee (Roles

& Responsibilities); About Accredited Social Health Activist (ASHA); Village

Health Nutrition Day, Rogi Kalyan Samitis

15. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public

places

16. Public Awareness through Digital Media - An Introduction to Mobile Apps of

Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri

Surakshit Mantritva Abhiyan (PM Suman Yojana), My Hospital (Mera aspataal),

India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid 19AP

REFERENCES

 Bamji, M.S., K. Krishnaswamy & G.N.V. Brahmam (2009) Textbook of Human

Nutrition(3rd edition) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi

 Swaminathan (1995)Food & Nutrition(Vol I, Second Edition) The Bangalore Printing

&Publishing Co Ltd., , Bangalore

 Vijaya Khader (2000)Food, nutrition & health, Kalyan Publishers, New Delhi

 Srilakshmi, B., (2010)Food Science, (5th Edition) New Age International Ltd., New Del

**SEMESTER III**

**Health & Hygiene**

**Time: 2 Hours Maximum Marks: 50**

**Section–A**

Answer any THREE questions. Choosing at least 1 question from each part

3 × 10 = 30 Marks

PART I

1. Explain the functions, dietary sources and deficiency effects of **carbohydrates, lipids and proteins**.
2. Discuss the **National Health Mission** frameworks – NRHM and NUHM – and their key objectives.
3. Describe the types of **Hygiene** and elaborate on the **WASH programme**.

PART II

1. Give a detailed account of **vitamins** – their functions, sources and deficiency disorders.
2. Write an essay on the **Women and Child Health Care Schemes** in India.
3. Explain the **role of digital media** and important mobile apps of Government of India in creating public awareness of health and hygiene.

**Section–B**

Answer any Four questions. **4× 5 = 20 Marks**  
 7. Define **balanced diet**. What are the basics of meal planning?

8.Write the functions and deficiency effects of **iron, iodine and zinc**.

9. List the **key health indicators** and determinants of health.

10.Briefly describe the functioning of **NIN and ICMR**.

11.What are the **roles and responsibilities** of Village Health Sanitation & Nutritional Committee?

12. Write short notes on **environmental sanitation** and sanitation in public places.

13.Explain the role of an **Accredited Social Health Activist (ASHA)** in rural health.

PITHAPUR RAJAH’S GOVTCOLLEGE (A), KAKINADA

DEPARTMENT OF ZOOLOGY &AQUACULTURE

IVSEMESTER

COURSE: EMBRYOLOGY

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| prgc logo png.png | P.R. GOVERNMENT COLLEGE (A) KAKINADA | Program & Semester  SEMESTER–IV Course: 9 | | | |
| TITLE | EMBRYOLOGY |
| Teaching | Hours Allocated:60(Theory) | L | T | P | C |
| Pre-requisites: | Credits3 | 4 | 1 | 2 | 5 |

LEARNING OBJECTIVES

The objective of this course is to provide a comprehensive understanding of the concepts of early animal development.

Students taking this course must develop a critical appreciation of methodologies specifically used to study the process of embryonic development in animals.

In this course different concepts of animal development will be elaborated

Students will be made familiar with different approaches that have been used to study embryology.

Topics that will be discussed are organogenesis and regeneration.

LEARNING OUTCOMES:

The overall course outcome is that the student shall develop deeper understanding of concepts of embryology. This course will provide students with a deep knowledge in embryology by the completion of the course the graduate shall able to –

CO 1: Understand the historical perspective and concepts of embryology

CO 2: Acquire knowledge on gametogenesis, fertilization and cleavage patterns

CO 3: Understand the fate of germinal layers and extraembryonic membranes

CO 4: Explain the process of regeneration in certain animals

CO 5: Examine the process of organogenesis

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-'/0: No Correlation)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 3 | 3 |
| CO2 | 3 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 3 | 3 |
| CO3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 |
| CO4 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 3 |
| CO5 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 |
| Average | 2.6 | 2.6 | 1.4 | 2.0 | 1.6 | 1.6 | 2.1 | 1.4 | 3.0 | 3.0 |

SYLLABUS:

UNIT-I:

1.1 Historical perspective and basic concepts: Phases of development

1.2 Cell-Cell interaction, Pattern formation, Differentiation and growth

1.3 Differential gene expression,

1.4 Cytoplasmic determinants and asymmetric cell division

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching

any video on the above

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

UNIT-II:

2.1 Gametogenesis, Spermatogenesis, Oogenesis;

2.2 Types of eggs, Egg membranes; Fertilization (External and Internal)

2.3 Planes and patterns of cleavage; Types of Blastulae; Fate maps

2.4 Early development of frog and chick up to gastrulation

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching

any video on the above/Model preparation on cleavage planes

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

UNIT-III:

3.1 Fate of Germ Layers

3.2 Extra-embryonic membranes

3.3 Placenta (Structure, types and functions of placenta)

3.4 Amniocentesis

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching

any video on the above/Chart preparation on the placenta

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

UNIT-IV:

4.1 Metamorphosis: Changes, hormonal regulations in amphibians

4.2 Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory

regeneration (in Turbellarians)

4.3 Ageing: Concepts and Theories

4.4 Teratogenic agents and their effects on embryonic development

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching

any video on the above /Flow chart preparation on the process of metamorphosis highlighting the

periodical changes vs hormone activity

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

UNIT-V:

5.1 Organogenesis of Central Nervous system

5.2 Organogenesis of Eye, Ear

5.3 Organogenesis of Skin

5.3 Organogenesis of Circulatory system

(\* Organogenesis in Human need to be explained)

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching

any video on the above /Flow chart preparation on the process of organogenesis highlighting the

gradual developments of organ systems

Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above

activity

Co-curricular activities (Suggested)

 Preparation of models of different types of eggs in animals

 Chart on frog embryonic development, fate map of frog blastula, cleavage etc.

 Chart on the organogenesis

 RBPT on the Placenta

 Model of extra embryonic membrane

 Laboratory observation of chick embryonic development

REFERENCES BOOKS:

 Developmental Biology by Balinksy

 Developmental Biology by Gerard Karp

 Chordate embryology by Varma and Agarwal

 Embryology by V.B. Rastogi

 Austen CR and Short RV. 1980. Reproduction in Mammals. Cambridge University Press.

 Gilbert SF. 2006. Developmental Biology, 8th Edition. Sinauer Associates Inc., Publishers,

Sunderland, USA.

 Longo FJ. 1987. Fertilization. Chapman & Hall, London.

 Rastogi VB and Jayaraj MS. 1989. Developmental Biology. KedaraNath Ram Nath Publishers,

Meerut, Uttar Pradesh.

**PITHAPUR RAJAH’SGOVT.COLLEGE (AUTONOMOUS)**

**KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTURE**

Embryology – List of Additions and deletions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Nameofthe Department | Semester, Program, Paper Number& Titleofthe  Paper, | Titlesof Topics deleted | Topic added in 2025 bos | Percentageof changes made in syllabus | Justification per each topic deleted/ added |
| Zoology &Aquaculture | Sem IV, Major Zoology Paper-9 embryology | Nil | Polyspermy, cortical granule reaction. | 20% | Useful for Competitive exams |

**PITHAPUR RAJAH’SGOVT.COLLEGE (AUTONOMOUS)**

**KAKINADA**

**SEMESTER IV**

**EMBRYOLOGY– PAPER 9**

**BLUEPRINT**

|  |  |  |  |
| --- | --- | --- | --- |
| MODULENO. | ESSAY QUESTIONS 10 MARKS | SHORT ANSWER QUESTIONS  5 MARKS | MARKS ALLOTED TO THE UNIT |
| Module-I | 01 | 02 | 20 |
| Module-II | 02 | 01 | 25 |
| Module-III | 01 | 01 | 15 |
| Module-IV | 01 | 01 | 15 |
| Module-V | 01 | 02 | 20 |
| TOTAL | 06 Of which 3to be answered | 07 Of which 4 to be answered | 95marks including choice of which 50 Marks to be answered |

**PITHAPUR RAJA’SGOVT.COLLEGE (AUTONOMOUS), KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTURE**

**SEMESTER-IV EMBRYOLOGY**

MODELQUESTIONPAPER

Time:3 hrs. MaxMarks:50

SECTION–I

Answer Any THREE of the following by choosing at least one question from each section

Draw labeled diagrams wherever necessary 3x10=30 Marks

PART - I

|  |  |  |  |
| --- | --- | --- | --- |
| S NO | Question | co | po |
| 1 | Discuss the phases of development in embryology and explain how they contribute to the formation of a complex organism. | 1 | 2 |
| 2 | Explain the types of eggs and egg membranes. How do these structures facilitate fertilization in both external and internal environments? | 2 | 3 |
| 3 | Explain the process an types of cleavage occurring in the zygote during embryo development | 1 | 2 |

PART - II

|  |  |  |  |
| --- | --- | --- | --- |
| 4 | Explain the process of organogenesis in the central nervous system. | 1 | 3 |
| 5 | Describe the modes of regeneration, including epimorphosis, morphallaxis, and compensatory regeneration inTurbellarians. | 1 | 1 |
| 6 | Discuss the fate of germ layers during embryonic development. How do these layers give rise to different tissues and organs in the developing organism? | 2 | 2 |

SECTION - B

Answer Any FOUR of the following questions 4x5=20Marks

|  |  |  |  |
| --- | --- | --- | --- |
| s.no | Short Question | Co | po |
| 7 | What are the main phases of embryonic development | 2 | 1 |
| 8 | Describe the structures of different types of eggs and their role in fertilization. | 1 | 2 |
| 9 | What is meant by “differential gene expression," | 1 | 3 |
| 10 | Explain the structure and functions of the placenta | 2 | 1 |
| 11 | Briefly explain the process of metamorphosis in amphibians. | 2 | 2 |
| 12 | How does organogenesis occur in the central nervous system? | 3 | 1 |
| 13 | Briefly explain how the skin develops during organogenesis. | 1 | 2 |

**PITHAPUR RAJA’SGOVT.COLLEGE (AUTONOMOUS),**

**KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTURE**

**QUESTION BANK**

**EMBRYOLOGY**

MODULE -I

Essay Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BBT LEVEL | CO | PO |
| 1 | Discuss the phases of development in embryology and  Explain how they contribute to the formation of a complex organism. | BT1 | co 1 | Pso1 |
| 2 | Cell-cell interactions play a crucial role in embryonic development. Explain the significance of these  Interactions in pattern formation, differentiation, and growth. | BT3 | co 2 | Pso1 |

Short Answer Question

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUEQUESTION | BT LEVEL | CO | PO |
| 1 | What are the main phases of embryonic development? | BT1 | CO2 | PSO3 |
| 2 | How do cell-cell interactions influence pattern of formation of embryo? | BT1 | CO1 | PSO 2 |
| 3 | What is meant by" differential gene expression," | BT2 | CO3 | PSO 3 |

Essay questions

MODULEII

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BT LEVEL | CO | PO |
| 1 | Compare and contrast spermatogenesis and oogenesis, highlighting their similarities and differences. | BT1 | CO3 | PSO |
| 2 | Explain the types of eggs and egg membranes. How do these structures facilitate fertilization in both external and internal environments? | BT2 | CO3 | PSO 5 |
| 3 | Expla in the process an types of Cleavage occurring in the zygote during embryo development? | BT1 | CO3 | PSO 5 |

Short Answer Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BT LEVEL | CO | PO |
| 1 | Define spermatogenesis and oogenesis? | BT1 | CO3 | PSO 5 |
| 2 | Describe the structures of different types of eggs and their role in fertilization. | BT2 | CO1 | PSO 3 |
| 3 | What are the planes and patterns of cleavage | BT2 | CO3 | PSO 5 |

Essay Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BT LEVEL | CO | PO |
| 1 | Discuss the fate of germ layers during embryonic development. How do these layers give rise to  Different tissues and organs in the developing organism? | BT 3 | CO4 | PSO4 |
| 2 | Explain the functions of extra-embryonic membranes in embryonic development.? | BT 1 | CO5 | PSO5 |
| 3 | Describe the structure, types, and functions of the placenta? | BT 1 | CO5 | PSO4 |

Short AnswerQuestions

MODULE-III

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BTLEVEL | CO | PO |
| 1 | Writea brief note on germlayers? | BT2 | CO3 | PSO2 |
| 2 | Describe the functions of extra-embryonic membranes | BT1 | CO4 | PSO5 |
| 3 | Explain the structure and functions of the placenta. | BT2 | CO3 | PSO2 |

Essay Questions

MODULE-IV

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BT LEVEL | CO | PO |
| 1 | Discuss the significance of metamorphosis in the life cycle of amphibians. | BT3 | CO3 | PSO2 |
| 2 | Describe them odesofregeneration, including  epimorphosis, morphallaxis, andcompensatory regeneration in Turbellarians. | BT1 | CO1 | PSO2 |
| 3 | Discuss the concepts and the oriesofageing. | BT1 | CO1 | PSO2 |

Short Answer Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BTLEVEL | CO | PO |
| 1 | Brieflyexplain the process of metamorphosis in amphibians. | BT2 | CO1 | PSO3 |
| 2 | Whatare the different modes of regeneration | BT1 | CO2 | PSO2 |
| 3 | Whatareteratogenic agents, and how do they affect embryonic development | BT1 | CO2 | PSO2 |

Essay Questions

MODULE-V

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BT LEVEL | CO | PO |
| 1 | Expla in the process of organogenesis in the central nervous system. | BT3 | CO3 | PSO2 |
| 2 | Describe the organogenesis of the eye and ear and what are the key molecular mechanisms involved? | BT1 | CO1 | PSO2 |
| 3 | Discuss the organogenesis of the skin. How do different layers of the skin develop, and what factors regulate the formation of skin appendages  Suchas hair follicles and sweatglands? | BT1 | CO1 | PSO2 |

Short Answer Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.NO | QUESTION | BTLEVEL | CO | PO |
| 1 | Howdoes organogenesis occur in the central nervous system? | BT2 | CO3 | PSO2 |
| 2 | Describe the process of organogenesis in the eye and ear. | BT1 | CO4 | PSO5 |
| 3 | Briefly explain how the skin develops during organogenesis. | BT2 | CO3 | PSO2 |
| 4 | What is the process of organogenesis in the circulatory system? | BT1 | CO4 | PSO3 |

REFERENCES BOOKS:

Developmental Biology by Balinsky

Developmental Biology by GerardKarp

Chordate embryologybyVarmaandAgarwal

EmbryologybyV.B. Rastogi

AustenCRandShortRV. 1980.ReproductioninMammals. CambridgeUniversityPress.

GilbertSF. 2006.DevelopmentalBiology, 8

thEdition.SinauerAssociatesInc., Publishers, Sunderland, USA.

Longo FJ. 1987.Fertilization. Chapman&Hall, London.

RastogiVBandJayarajMS. 1989.DevelopmentalBiology. KedaraNath Ram NathPublishers, Meerut, Uttar Pradesh.

SchattenH andSchattenG. 1989.MolecularBiologyofFertilization.

AcademicPress, NewYork.

**PITHAPUR RAJA’S GOVT.COLLEGE (AUTONOMOUS),**

**KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTURE**

**SEMESTER-IV**

**COURSENO.:9-EMBRYOLOGY**

credits:1

PRACTICAL SYLLABUS

1.Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages)

2.Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)

3.Study of different sections of placenta (photomicrograph/ slides)

4.Project report on chick embryo development

PRACTICAL MODEL PAPER

EMBRYOLOGY

1.Project report on chick embryo development. 12M

2.Study of different sections of placenta 8M

3.Identification 5X4=20M

A.Embryology slide

B.Embryology slide

C.Embryology slide

D.Embryology slide

E.Embryology slide

4.Record 05M

5.Viva voce 05M

Total 50 M

P.R GOVT COLLEGE (A), KAKINADA DEPARTMENT OF ZOOLOGY & AQUACULTURE

IV SEMESTER

COURSE 4: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

Theory Credits:3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| prgc logo png.png | P.R. GOVERNMENT COLLEGE(A) KAKINADA | Program&Semester  SEMESTER 4 | | | |
| TITLE | ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS |
| CourseCode | X |
| Teaching | Hours Allocated:60(Theory) | L | T | P | C |
| Pre-requisites: | Credits :3 | 4 | 1 | 2 | 5 |

LEARNING OBJECTIVES

To acquire knowledge of organ systems function.

To develop the ability to integrate physiology from the cellular and molecular level to the organ system and organismic level of organization.

To Effectively read, evaluate and communicate scientific information related to physiological processes in the body.

To gain a deep knowledge of current topics in physiology.

LEARNING OUTCOMES:

The overall course outcome is that the student shall develop deeper understanding of concepts of Physiology. This course will provide students with a deep knowledge in physiology by the completion of the course the graduate shall able to –

CO 1: Understand the physiology of digestion and hormonal control of digestion

CO 2: Develop a comprehensive picture of respiratory physiology

CO 3: Acquire knowledge on the Renal physiology

CO 4: Understand the physiology of Nerve and muscle

CO 5: Understand the physiology of heart

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-'/0: No Correlation)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 2 | 1 | 1 | 3 | 2 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 2 | 1 | 0 | 2 | 1 | 3 | 3 |
| CO4 | 3 | 3 | 2 | 2 | 2 | 0 | 3 | 1 | 3 | 3 |
| CO5 | 3 | 3 | 1 | 2 | 2 | 0 | 3 | 1 | 3 | 3 |
| Average | 3.0 | 2.8 | 1.8 | 1.8 | 1.4 | 0.2 | 2.4 | 1.0 | 3.0 | 3.0 |

SYLLABUS:

UNIT-I: Physiology of Digestion

1.1Structural organization and functions of gastrointestinal tract and associated glands;

1.2Vitamins & Mineral composition of food & Mechanical and chemical digestion of food;

1.3Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins;

1.4Hormonal control of secretion of enzymes in Gastrointestinal tract.

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Chart preparation on the hormonal control of secretion of enzymes Evaluation: The Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT-II: Physiology of Respiration

2.1Structural organization of Respiratory system, Mechanism of respiration, Control of respiration

2.2Pulmonary ventilation; Respiratory volumes and capacities;

2.3Transport of oxygen in blood and dissociation curves and the factors influencing it

2.4Transport of Carbon dioxide in blood; dissociation curves and the factors influencing it, Carbon monoxide poisoning

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the CO poisoning/Debate on the dissociation curves*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT-III: Renal Physiology `

3.1Structure of kidney and its functional unit

3.2Mechanism of urine formation

3.3Regulation of water balance

3.4Regulation of acid-base balance

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the Urine formation/Working model of Kidney Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT-IV: Physiology of exciting tissues

4.1Neuron structure and types

4.2Nerve impulse transmission- (Myelinated, Non-myelinated, synaptic)

4.3Ultra structure of muscle

4.4Molecular and chemical basis of muscle contraction

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the impulse trasnmisson/Debate on the dissociation curves*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT- V: Physiology of Heart

5.1Structure of mammalian heart, Coronary circulation;

5.2Structure and working of conducting myocardial fibers. Origin and conduction of cardiac impulses

5.3Cardiac Cycle-Cardiac output and its regulation

5.4Nervous and chemical regulation of heart rate. Blood pressure and its regulation

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above /Group discussion on the phases of Cardiac output /case study on the Blood Pressure*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

**Additional topics:**

1.Classification of animals based on Feeding habits

2.Excretory Products.

3.Structure and types of Neurons

4.Types of muscles

5.Blood Pressure

Co-curricular activities (Suggested)

Chart on cardiac cycle, human lung, kidney/nephron structure etc.

Working model of human / any mammalian heart.

Working model of human / any mammalian urine formation

Chart/model of sarcomere

Chart/model on nerve impulse transmission

REFERENCES BOOKS:

Eckert H. *Animal Physiology: Mechanisms and Adaptation.* W.H. Freeman &Company.

Floray E. *An Introduction to General and Comparative Animal Physiology.* W.B. Saunders Co., Philadelphia.

Goel KA and Satish KV. 1989. *A Text Book of Animal Physiology*, RastogiPublications, Meerut, U.P.

Hoar WS. *General and Comparative Physiology.* Prentice Hall of India, New Delhi.

Lehninger AL. Nelson and Cox. *Principles of Biochemistry.* Lange MedicalPublications, New Delhi.

Prosser CL and Brown FA. *Comparative Animal Physiology.* W.B. SaundersCompany, Philadelp

**P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTURE**

**SEMESTER-IV**

**TITLE: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS**

**COURSE :X**

**BLUE PRINT**

|  |  |  |  |
| --- | --- | --- | --- |
| **MODULE NO.** | **ESSAY QUESTIONS 10 MARKS** | **SHORT ANSWER QUESTIONS 5 MARKS** | **MARKS ALLOTED TO THE UNIT** |
| **Module-I** | 01 | 02 | 20 |
| **Module-II** | 01 | 02 | 20 |
| **Module-III** | 02 | 01 | 25 |
| **Module-IV** | 01 | 01 | 15 |
| **Module-V** | 01 | 01 | 15 |
|  | 06  Of which 3 to be answered | 07  Of which 5 to be answered | 95 marks including choice  Of which 50  Marks to be answered |

PR GOVERNMENT COLLEGE (A), KAKINADA

SEMESTER-IV

ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

COURSE: X

MODEL QUESTION PAPER

Time:2 hrs. Max.Marks:50

SECTION-A

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

Draw diagrams wherever necessary 3X10= 30 M

PART– 1

1.write an essay on the process of absorption of food materials.

2.Ellucidate the transport of Oxygen through lungs.

3. Discuss about the urine formation Mechanism.

Part– II

4. Describe the structure and factions of kidney.

5.Discuss the Process of Muscle contraction.

6.Write an essay on cardiac cycle.

SECTION-B

Answer any Four of the following. 4x5=20 M

7.Chemical digestion of food.

8. Gastro intestinal tract associated glands.

9. Pulmonary ventilation

10.Respiratory volumes and capacities.

11.Regulation of acid-base balance.

12.Structure of Neuron

13.Blood pressure and its regulation.

**P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA**

**SEMESTER-IV**

**ANIMAL PHYSIOLOGY**

**COURSE XI**

**QUESTION BANK**

UNIT: I ESSAY QUESTIONS

1. Write an essay on Structural organization and functions of gastro intestinal tract and associated glands. BT1
2. Write an essay on the process of Absorptions. BT3
3. Discuss about Hormonal control of different Types of enzymes in Gastro intestinal tract. BT2
4. Elucidate the Mechanical and chemical digestion of food. BT2

**Short Answer questions**

1. Vitamins & Mineral composition of food.
2. Absorptions.
3. Gastro intestinal tract associated glands.
4. Mechanical digestion of food.

UNIT: II ESSAY QUESTIONS

1. Elucidate the transport of O2 in blood; dissociation curves and the factors influencing it?
2. Ellucidate the Transport of Carbon dioxide in blood; dissociation curves and the factors influencing it, BT2
3. Write an essay on Mechanism of respiration and control of respiration .BT1

UNIT: III ESSAY QUESTIONS

1. Discuss about the urine formation Mechanism.
2. Describe the structural and fictional unit of kidney.
3. Describe the structure and functions of Kidney.
4. Discuss about the Regulation of water and acid-base balance.

Shorts:

1. Kidney structure
2. Counter current Mechanism.
3. Regulation of water balance
4. 4. Regulation of acid-base balance

UNIT: IV ESSAY QUESTIONS

1. Discuss about the Process of Muscle contractions.BT2
2. Write an essay on Neuron structure and its types .BT1
3. Describe the Ultrastructure of muscle.BT1

**Shorts**

1. Nerve impulse transmission.
2. Neuron structure.
3. Myelinated and non-myelinated sheeth.
4. Neuro transmitters.

**UNIT: V ESSAY QUESTIONS**

1. Write an essay on cardiac cycle.BT2
2. Elucidate the Structure of mammalian heart.BT2
3. Describe the Structure and working of heart.BT2

**Shorts**

1. 1structure of heart.
2. Myogenic heart.
3. Neuro genic heart.
4. Blood pressure and its regulation.

SEMESTER-IV

COURSE X: ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

PRACTICAL CREDITS:1 2HRS./WEEK

LEARNINGOBJECTIVES

To acquire knowledge of anatomy of certain important organs.

To develop the ability to test the biological sample like saliva and urine.

To Effectively estimate the blood hemoglobin.

To Acquire skill to use the sphygmomanometer in recording blood pressure.

To observe the ECG

SYLLABUS:

Examination of sections of mammalian esophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney

1. Study of activity of Salivary amylase under optimum condition
2. Qualitative tests for identification of Carbohydrates
3. Qualitative tests for identification of Proteins
4. Qualitative tests for identification of Fats
5. Urine test for sugar, albumin
6. Estimation of hemoglobin using Sahli’s haemoglobinometer
7. Recording of blood pressure using a sphygmomanometer
8. Recording of frog’s heart beat under insituand perfused conditions
9. ECG observation-Spotting/identification of curves from the given ECG

RFERENCE WEB LINKS:

https://[www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham](http://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham)

https://library.csi.cuny.edu/oer/virtuallabs-simulations#anatomy

https://[www.labster.com/simulations?course-packages=animal-physiology](http://www.labster.com/simulations?course-packages=animal-physiology)

<http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e46>1b45.pdf

https://physiology.elte.hu/gyakorlat/jegyzet/Physiology\_Pactical\_(2013).pdf

PRACTICA LMODEL PAPER

ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

|  |  |
| --- | --- |
| 1. Estimation of the salivary Amylase Activity. | 12M |
| 2. Identification of Proteins (Any Four). | 8M |
| Identification of slides | 5X4=20M |
| 1.kidney  2. lung. |  |
| 3.liver. |  |
| 4.stomach  Record | 05M |
| Viva | 05M |
| Total | 50M |

P.R Government College (A), Kakinada

SEMESTER IV

COURSE 11: IMMUNOLOGY

Theory Credits:3 3 hrs/week

LEARNING OBJECTIVES

To promote critical thinking among students.

To provide students with a foundation in immunological processes

To provide students with knowledge on how the immune system works building on their previous knowledge

To clearly state the role of the immune system.

To compare and contrast the innate versus adaptive immune systems.

To provide an overview of the interaction between the immune system and pathogens.

LEARNING OUTCOMES:

The overall course outcome is that the student shall develop deeper understanding of concepts of immunology. This course will provide students with a deep knowledge in immunology by the completion of the course the graduate shall able to –

CO 1: Articulate the roles of innate recognition receptors in immune responses

CO 2: Compare and contrast humoral versus cell-mediated immune responses

CO 3: Distinguish various cell types involved in immune responses and associated functions;

CO 4: Distinguish and characterize antibody isotypes, development, and functions

CO 5: Understand the role of cytokines in immunity and immune cell activation;

CO 6: Understand the significance the Major Histocompatibility Complex in terms of immune

response and transplantation

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-'/0: No Correlation)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 2 | 1 | 1 | 3 | 2 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 2 | 1 | 0 | 2 | 1 | 3 | 3 |
| CO4 | 3 | 3 | 2 | 2 | 2 | 0 | 3 | 1 | 3 | 3 |
| CO5 | 3 | 3 | 1 | 2 | 2 | 0 | 3 | 1 | 3 | 3 |
| Average | 3.0 | 2.8 | 1.8 | 1.8 | 1.4 | 0.2 | 2.4 | 1.0 | 3.0 | 3.0 |

SYLLABUS:

**UNIT – I: Overview of Immune system**

1.1Introduction to basic concepts in Immunology

1.2Innate and adaptive immunity

1.3Cells of immune system

1.4Organs of immune system

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above/Model chart preparation of cells/organs of immune system*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

**UNIT – II : Antigens**

2.1Basic properties of antigens

2.2B and T cell epitopes, paratopes

2.3Haptens and adjuvants

2.4Factors influencing immunogenicity

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of organogenesis*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

**UNIT – III: Antibodies**

3.1Structure of antibody

3.2Classes of antibodies

3.3Functions of antibodies

3.4Monoclonal antibodies

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of antibodies*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

**UNIT – IV: Working of Immune system**

4.1Structure and functions of major histocompatibility complexes

4.2 Exogenous pathway of antigen presentation and processing

4.3Endogenous pathway of antigen presentation and processing

4.4. Basic properties and functions of cytokines

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of MHC*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

UNIT – V: Immune system in health and disease

5.1Gell and Coombs’ classification and brief description of various types of hypersensitivities

5.2Introduction to concepts of autoimmunity and immunodeficiency

5.3General introduction to vaccines Types of vaccines, Immunization programme

5.4Organ transplantation- Graft rejection, immune suppressors

*Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/ Model chart preparation of classification of Hypersensitivity*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

**Additional inputs:**

Autoimmune disorders

Immunodeficiency disorders

Anti-venom

Co-curricular activities (suggested)

Organizing awareness on immunization importance in local village in association with NCC and NSS teams

Charts on types of cells and organs of immune system

Student study projects on aspects such as – identification of allergies among students (hypersensitivity), blood groups in the class (antigens and antibodies duly reported) etc., as per the creativity and vision of the lecturer and students

REFERENCES BOOKS:

Judy Owen, Jenni Punt, Sharon Stranford 2013 Kuby Immunology: International Edition W. H. Freeman

Abbas AK, 2011, Cellular and Molecular Immunology 7th Ed. Elsevier Health Sciences – India.

Delves P, Martin S, Burton D, Roitt IM 2011 Roitt’s Essential Immunology. 12th Ed. Wiley- Blackwell Scientific Publication, Oxford.

Murphy K, 2011 Janeway’s Immunobiology. 8th Ed. Garland Science Publishers, New York.

Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.

Richard Coico, Geoffrey Sunshine 2008 Immunology: A Short Course, 6th Edition Wiley- Blackwell

Sudha Gangal 2013 Textbook of Basic and Clinical Immunology Orient Blackswan Private Limited

- New Delhi

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**SEMESTER IV**

**Course XI IMMUNOLOGY**

**BLUE PRINT**

Time: 2 hrs   Max. Marks: 50

| Unit | Essay 10M | Short 5 M | Marks allotted to the Unit |
| --- | --- | --- | --- |
| I | 1 | 1 | 15 |
| II | 1 | 1 | 15 |
| III | 1 | 2 | 20 |
| IV | 2 | 2 | 30 |
| V | 1 | 1 | 15 |
| Total | 6 | 7 | 95 |

Out of 6 essays, 3 questions should be answered 3 × 10 = 30M  
 Out of 7 SAQ, 4 questions should be answered 4 × 5 = 20M

**PITHAPUR RAJAH’S GOVT. DEGREE COLLEGE (A), KAKINADA  
B.SC. HONOURS ZOOLOGY**

**SEMESTER IV  
COURSE XI: IMMUNOLOGY**

**MODEL QUESTION PAPER**

Time: 2hrs   Max. Marks: 50

SECTION – A

Answer any THREE of the following, choosing at least one from each part 3 × 10 = 30 M

Draw labelled diagrams wherever necessary

PART – I

1. Explain the components of the immune system and differentiate between innate and adaptive immunity.
2. Describe the properties and types of antigens.
3. Explain the structure and functions of different classes of antibodies.

PART – II

4.Explain the structure and functions of MHC molecules.

5.Describe the hypersensitivity reactions as per Gell and Coombs classification.

6.Write an essay on vaccines and immunization programmes in India.

SECTION – B

Answer any FOUR of the following *4 × 5 = 20M*

1. Secondary Lymphoid organs
2. Epitopes and haptens
3. Monoclonal antibodies
4. Exogenous pathway
5. Autoimmunity — causes and examples
6. Immunodeficiency disorders
7. Graft rejection mechanisms

**QUESTION BANK**

**IMMUNOLOGY**

**SEMESTER IV — COURSE XI**

**Essay Questions (10M each)**

1. Explain the components of the immune system and differentiate between innate and adaptive immunity.
2. Describe the properties and types of antigens with examples.
3. Explain the structure and functions of different classes of antibodies.
4. Describe the structure and functions of lymphoid organs.
5. Explain the structure, classes, and role of MHC molecules.
6. Describe antigen processing and presentation through exogenous and endogenous pathways.
7. Classify hypersensitivity reactions and explain any two types.
8. Discuss autoimmunity and immunodeficiency disorders with examples.
9. Write an essay on vaccines and immunization programmes in India.
10. Explain the types, causes, and mechanisms of graft rejection.

**Short Answer Questions (5M each)**

1. Innate immunity
2. Adaptive immunity
3. Epitopes and haptens
4. Factors affecting immunogenicity
5. Hybridoma technology
6. Monoclonal antibodies – production and uses
7. Structure of IgG
8. Complement system – classical pathway
9. Functions of macrophages
10. Cytokines – types and roles
11. Immunological memory
12. Examples of autoimmune diseases
13. SCID and AIDS (brief note)
14. Live attenuated vaccines
15. Types of grafts in transplantation

**COURSE11: IMMUNOLOGY**

**Practicals lab Credits:1 2 hrs/week**

**SYLLABUS:**

1.Demonstration of lymphoid organs (asperUGC guidelines)

2.Histological study of spleen, thymusandlymphnodes (throughpreparedslides)

3.Bloodgroup determination

4.Demonstration of ELISA

5.Demonstration of Immuno electrophoresis

6.TestingforTyphoid antigens byWidaltest.

7.Differential Leukocyte Count

8.Isolationof monocytes from blood.

9.Rapid Plasma Reagin (RPR)Test

RFERENCEWEBLINKS:

<https://vlab.amrita.edu/?sub=3&brch=69>

<https://ivl1-au.vlabs.ac.in/List%20of%20experiments.html>

<https://ivl2-au.vlabs.ac.in/List%20of%20experiments.html>

<https://www.medicine.mcgill.ca/physio/vlab/immun/vlabmenuimmun.htm>

<http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>

[http://www.lucp.net/books-pdf/Lab%20Manual%20Dr.%20Idris%20Adewale%20Ahmed/15.%20BASIC%20IMMUNOLOGY](http://www.lucp.net/books-pdf/Lab%20Manual%20Dr.%20Idris%20Adewale%20Ahmed/15.%20BASIC%20IMMUNOLOGY.pdf)

[.pdf](http://www.lucp.net/books-pdf/Lab%20Manual%20Dr.%20Idris%20Adewale%20Ahmed/15.%20BASIC%20IMMUNOLOGY.pdf)

<https://www.avit.ac.in/lab/immunology_bioprocess_engineering_lab/download/17BTCC89/lab_manual.pdf>

[https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger](https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger-lab/documents/Immunology-Lab-Manual.pdf)

[-lab/documents/Immunology-Lab-Manual.pdf](https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/labs/frelinger-lab/documents/Immunology-Lab-Manual.pdf)

<https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC106J-lab-manual.pdf>

**PITHAPUR RAJAH’S GOVT. DEGREE COLLEGE (A), KAKINADA  
 B.SC. HONOURS IN ZOOLOGY**

**SEMESTER IV  
 COURSE XI: IMMUNOLOGY**

**PRACTICAL**

**MODEL QUESTION PAPER  
  Time: 2 Hrs Max. Marks: 50**

I a) ABO and Rh blood grouping in humans 12 M

b) Demonstration of ELISA technique 8M

II. Answer the following experiment  
 Preparation of smear for identification of lymphocytes and neutrophils 5M   
III) Identification of prepared slides with labelled diagram 3X5=15

A

B

C

4. Viva voce — 5M

5. Record — 5M

Total: 50 Marks

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PITHAPUR RAJAH’S GOVT. DEGREE COLLEGE (A) KAKINADA.** | **PROGRAM & SEMESTER B.SC. HONOURS IN ZOOLOGY (MAJOR) SEMESTER-V** | | | |
| **COURSECODE: 12** | **POUNTRY MANAGEMENT-I (POULTRY FARMING** |  | | | |
| **THEORY** | **CREDITS:3** | **3 HRS/WEEK** | | | |
| **TEACHING** | **HOURS ALLOCATED:60 (THEORY)** | **L** | **T** | **P** | **C** |
| **PRE-REQUISITES:** | **POULTRY FARMING** | **4** | **0** | **2** | **4** |

HOURS:60 Max.Marks: 50

COURSE OUTCOMES

1. **CO1:** Explain the importance of poultry farming and its essentiality in India
2. **CO2:** To acquire knowledge on the importance of poultry products.
3. **CO3:** Have knowledge on the various types of birds which can be farmed under poultry.
4. **CO4:** To get information on the production of egg & meat in India and their necessity in nutrition.
5. **CO5:** To have a basic idea on the various types of indigenous breeds and their economic importance
6. **CO6:** To recommend the improved varieties to be farmed in Indian poultry systems.
7. **CO7:** To improve knowledge on the systems & research institutes working on the poultry and its development.

Bottom of Form

Learning outcomes

Some of the learning outcomes for a course in **Poultry Farming-I**

Students at the successful completion of this course will be able to

• Evaluate the status of Indian Poultry Industry

• Explain the Scientific Poultry keeping

• Compare the diversified Poultry practices

• Inspect the different breeds of chickenTop of Form

Bottom of Form

**Unit 1** Indian poultry Industry

1.1 Importance of poultry farming and poultry development in India.

1.2 Present status and future prospectus of poultry Industry

1.3 Classification of poultry based on genetics Utility

**Unit -2** Scientific Poultry Keeping

2.1 Modern breeds of Chicken

2.2 Present day egg production lines- meat production lines

2.3 Mini breeds- dwarfism in mini-Leghorns

**Unit-3** Diversified Poultry

3.1 Ducks and Geese-classification- rearing system-classification-advantages

3.2 Guinea fouls - guinea fowl farming in India-Production-varieties

3.3 Emu-rearing- Economical aspects-commercial products

**Unit-4** Desi Chickens:

4.1 Indigenous breeds and economical aspects of desi chicken

4.2 Indigenous breeds-Aseel-Chittagong-Kadaknath-Bursa

4.3 Improved varieties in India – Giriraja-Vanaraja-Girirani-Kalinga brown, Gramapriya,Swarnandhra

**Unit -5** Breeds from Central Avian Research Institute – Izatnagar

5.1 CARI Nirbheek - CARI- Shyama-HITCARI (Naked Neck Cross)

5.2 CARI- Priya Layer, CARI- Sonali Layer,

5.3 CARIBRO-VISHAL, CARI-RAINBRO,

5.4 Nandanam chicken-I, Nandanam Chicken-II, Nandanm-Quail

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

**REFERENCES**:

1. Text Book of Poultry Science, P V Sreenivasaiah, Write and Print Publications, ISBN No. 9788192970592, 8192970590

2. Poultry Science Practices, Nilothpal Ghosh, CBS Publication & Distributions, 2015

3. Principles of Poultry Science, 1996, CAB Publishers, ISBN 9780851991221

4. A Text Book of Animal Husbandry, C. C. Banerjee, Oxford and IBH, Publish Co, ISBN: 9788120412606 Web sources:

5. <https://www.drvet.in/p/e-books.html>

6. <https://byjus.com/biology/animal-husbandry-poultry-farming/>

7. <https://www.helpforag.app/2018/02/livestock-production-and-management-lpm_14.html?m=1>

**Co-Curricular Activities**

Mandatory:

1**. For Teacher**: Training of students by the teacher in laboratory/field in various steps of poultry techniques, on the advanced farming procedures in poultry – Training of students on other employability skills in the poultry sector.

2. **For Student**: Students shall (individually) visit – various types of poultry systems. Observe the different types of indegenious breeds being farmed and make observations on procedures practiced there and submit a brief handwritten Fieldwork/Project work Report with pictures and data /survey in 10 pages.

3. Max marks for Fieldwork/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work: Title page, student details, index page, details of place visited, observations made, findings and acknowledgements

CO PO Mapping

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |
| CO2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 2 | 2 |
| CO3 | 1 | 1 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| CO4 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO5 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |

**P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA**

**TITLE: COURSE 12: POULTRY MANAGEMENT - I**

**BLUE PRINT FOR QUESTION PAPER SETTER**

|  |  |  |  |
| --- | --- | --- | --- |
| **MODULENO.** | **. ESSAY QUESTIONS 10** | **SHORT ANSWERQUESTIONS 5** | **MARKS ALLOTEDT O THE UNIT** |
| MODULE-1 | 1 | 1 | 15 |
| MODULE-2 | 1 | 1 | 20 |
| MODULE-3 | 1 | 2 | 15 |
| MODULE-4 | 2 | 1 | 25 |
| MODULE-5 | 1 | 1 | 15 |
| TOTAL | Out of 06 questions 3 should be answered 3X10=30 | Out of 07 questions 4 should be answered  4X5=20 | 90 |

**PITHAPUR RAJA’S GOVT. COLLEGE (AUTONOMOUS),**

**KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTURE**

**MAJOR ZOOLOGY SEMESTER-V- POULTRY MANAGEMENT - I**

**MODEL QUESTION PAPER**

**Time: 2 hrs. Max Marks: 50**

**SECTION - A**

**Answer Any THREE of the following questions by choosing at least one question in each Part (Draw labelled diagrams wherever necessary)**

**PART- I 3X10=30M**

| **S.No** | | **Questions** | **BT**  **Level** | **CO** | **PO** | **Marks** |
| --- | --- | --- | --- | --- | --- | --- |
| **1** | Discuss the present and future prospectus of poultry industry in India | | **BT1** | **1** | **2** | **10** |
| **2** | Describe the various types of mini breeds and add a note on dwarfism in leghorns. | | **BT2** | **2** | **0** | **10** |
| **3.** | Write an essay on Emu-farming its economic aspects and the various commercial products of it. | | **BT2** | **2** | **0** | **10** |

| **S.No** | **Questions** | **BT**  **Level** | **CO** | **PO** | **Marks** |
| --- | --- | --- | --- | --- | --- |
| **4** | Give a detailed note on the indigenous breeds and the economic aspects of desi chicken | **BT1** | **1** | **2** | **05** |
| **5** | Improved varieties in India – Explain. Add a note on any three varieties | **BT2** | **2** | **2** | **05** |
| **6** | Discuss the functions and activities of CARI in brief. | **BT2** | **1** | **2** | **05** |

**PART- II**

**SECTION B**

**Answer any FOUR of the following: Draw labeled diagrams wherever necessary**

**4x5=20 M**

| **S.No** | **QUESTION** | **BT**  **LEVEL** | **CO** | **PO** | **MARKS** |
| --- | --- | --- | --- | --- | --- |
| **7** | **Write a short note on poultry development in India** | **BT1** | **2** | **1** | **01** |
| **8** | **Modern chick breeds** | **BT1** | **0** | **1** | **01** |
| **9** | Egg production in AP | **BT2** | **1** | **2** | **01** |
| **10** | Write a short note on Duck rearing system. | **BT3** | **2** | **2** | **01** |
| **11** | Guinea fowl | **BT1** | **2** | **1** | **01** |
| **12** | Kadaknath | **BT1** | **0** | **1** | **01** |
| **13** | HITCARI | **BT2** | **1** | **2** | **01** |

**P.R. Govt. College (Autonomous),**

**Kakinada**

**Semester-IV**

**TITLE: POULTRY MANAGEMENT - I**

**PAPER: 12 - Question Bank**

**UNIT: I**

**ESSAY QUESTIONS**

**1.** Discuss the development of poultry farming in India. BT1

2 Explain the importance of poultry and its farming- BT2

3 Give a detailed note on the present status and future prospectus of poultry industry. BT1

4 Classify the poultry breeds basing on the their genetic utility. –BT1

**SHORT ANSWER QUESTIONS:**

**1 . Poultry farming - BT1**

2 . Future prospects of poultry - BT2

3 , Genetic utility - BT1

**UNIT-II**

**Essay questions**

1.Write an essay on modern chick breeds. -BT1

2. Discuss the present day egg production lines in AP. - BT2

3. Describe the various mini breeds and add a note on dwarfism in Leghorns.-BT3

**SHORT ANSWER QUESTIONS**

1. Rhode Island Reds – BT1
2. Cornish – BT2
3. Leghorn – BT2
4. Meat production – BT2
5. Dwarfism - BT1

**UNIT – III**

**Essay questions**

1. **Classify the various types of rearing systems and their advantages.-BT1**
2. **Write an essay on the various breeds of Ducks.BT2**
3. **Describe the farming of Guinea fowl in India and its varieties.-BT1**
4. **Write an essay on emu farming and its economic importance – BT2**
5. **Give a detailed note on the commercial products of Emu. – BT2**

**SHORT ANSWER QUESTIONS:**

1. Embden Gees.-BT1

2.Malard Duck – BT2

3. Pearl grey Guinea fowl.- BT2

4. Gunia foul farming? –BT2

5 Emu economic importance-BT3

6. Emu Oil - BT2

**UNIT – IV**

**Essay questions**

1. Write an essay on the indigenous chick breeds and their economics aspects. BT1

2. Describe the importance of Bursa.BT2

3. list out the various improved indigenous varieties and add a note on Giriraja ?BT1

4. List out the various types of desi chicken and their economic importance. – BT 2

**SHORT ANSWER QUESTIONS:**

1. **Kadaknath - BT1**
2. **Aseel. BT2**
3. **Economic aspects of Indegenious breeds.BT2**
4. **Vanaraja. BT1**
5. **Girirani. BT1**
6. **Kalinga brown BT2**
7. **Swarnandra BT 1**

**UNIT – V**

**Essay questions**

1. Define CARI and list out the various types of research activities carried out by CARI. BT1.

2. Differentiate Priya layer and Sonali layer. –BT1

3. Write a detailed note on RAINBRO and its importance-BT1

4. Discuss the farming & economic importance of Nandanam Quail.-BT2

**SHORT ANSWER QUESTIONS:**

1**. CARI Shyam. BT 2**

**2. Naked Neck Cross. BT1**

**3. Sonali Layer. BT3**

**4. CARIBRO VISHAL BT2**

**5. Nandanam Chicken. BT 1**

**SEMESTER-V**

**MAJOR ZOOLOGY PAPER – 12 – POULRTY MANAGEMENT - I**

**PRACTICALS 2 HRS/WEEK**

**CREDITS-1**

LEARNING OUTCOMES:

On successful completion of this practical course, student shall beable to:

• Identify different types of Poultry rearing practices

• Evaluate the efficacy of different types of poultry practices in maximizing yield

• Understand the importance of different hybrid breeds in poultry

**SYLLABUS:**

1. Different types of Poultry rearing (Students has to observe and draw the different types of poultry rearing systems)

2. Different types of poultry Housing - Models / Images/charts

3. Different layer breeds images/charts/ Models (Observation of characters)

4. Types of broilers images/charts/ Models (Identification of important Characters)

5. CARI breeds characters –images/charts 6. Nandanam breeds- images/charts (Identification of characters)

\*\*\* (This practical is 70 % (Web based /virtual) 30% physical: student and teachers must browse the web for the specimens models – write down the important characters based on theweb resources)

**REFERENCES:**

1. A Text Book of Animal Husbandry, C. C. Banerjee, Oxford and IBH, Publish Co, ISBN: 9788120412606

2.http://www.agritech.tnau.ac.in/expert\_system/poultry/Poultry%20House%20Construction.html

3.https://petkeen.com/best-chicken-breeds-for-eggs/

4.https://garden.decorexpro.com/en/hozyajstvo/ptitsevodstvo/porody-brojlernyh-kur-s-foto-iopisaniem.html

**Co-Curricular Activities:**

a) Mandatory:

1. For Teacher: Training of students by the teacher in laboratory and field on the techniques of identification of layers, broilers and management practices in poultry.

2. For Student: Students shall Individually visit a Poultry farm, make observations and report on the Rearing, Housing, Brooding, Feeding and water management activities. The student shall submit a handwritten Fieldwork/Project work Report on the observations along with pictures in the given format not exceeding 10 pages to teacher.

3. Max marks for Fieldwork/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work: Title page, student details, index page, detailsof place visited, observations made, findings and acknowledgements.

5. Unit tests. (IE)

b) Suggested Co-Curricular Activities

1. Web resources – visiting the web sites of CARI-IZATNAGA https://cari.icar.gov.in procuring additional information on the poultry breeds

2. Web resources- visiting the web site of NANADANAM <http://www.tanuvas.ac.in/ippmmadhavaram_tech.html>

3. Collection of additional data on different types of Poultry breeds

4. Seminar, Assignment, Group discussion. Quiz, Collection of Material, Invited Lecture, Video preparation etc.

PR GOVT COLLEGE AUTONOMOUS

KAKINADA

MAJOR ZOOLOGY

PAPER -12

POULTRY MANAGEMENT - I

PRACTICAL MODEL QUESTION PAPER - MAX MARKS-50

**Part A — Major Exercise 20 Marks**

1. Different types of poultry housing systems.

**Part B — Identification (4X4= 16 Marks)**

**Identify the given chart/model/specimen. Draw a neat labelled diagram**

**a) White leghorn**

**b) Emu**

**c) Chittagong**

**d) Nandanam Quail**

**Part C — Field visit report (4 Marks)**

**Part D — Viva Voce (5 Marks)**

**Part E — Record and Observation Book (5 Marks)**

**TOTAL- 50 MARKS**

V SEMESTER

**PITHAPUR RAJAH’S GOVT. DEGREE COLLEGE (A) KAKINADA.**

**DEPARTMENT OF ZOOLOGY & AQUACULTURE**

**SEMESTER-V**

**COURSE 13: POULTRY MANAGEMENT-II**

**(POULTRY PRODUCTION AND MANAGEMENT)**

**Theory Credits: 3 3 hrs/week**

**COURSE OUTCOMES:**

Students at the successful completion of the course will be able to

 Suggest measure for Health care in Poultry

 Evaluate the economics of poultry production

 Elaborate the poultry Breeder flock management

 Differentiate the poultry hatchery practices

SYLLABUS:

Unit-1 HEALTH CARE

1.1 Common poultry diseases: bacterial, viral, fungal, parasitic and nutritional deficiencies.

1.2 Vaccination schedule for commercial layers and broilers: factors that govern vaccination schedule; vaccination principles type, methods, pre and post vaccination care.

1.3 Disinfection: Types of disinfectants; mode of action; recommended procedure; precaution and handling.

Unit-2 ECONOMICS

2.1 Economics of layer and broiler production

2.2 Projects reports in different systems of rearing for layer & broilers.

2.3 Feasibility studies on poultry rearing- in context of small units and their profitability.

2.4 Export/import of poultry and poultry products.

Unit-3 BREEDER FLOCK MANAGEMENT

3.1 Layer and broiler breeder flock management housing & space requirements

3.2 Different stage of management during life cycle; Light management during growing and laying period, Artificial insemination.

3.3 Feeding: Feed restriction, separate male feeding. Nutrient requirement of layer and broiler breeders of different age groups.

Unit-4 BREEDER HEALTHCARE

4.1 Vaccination of breeder flock; difference between vaccination schedule of broilers and commercial birds.

4.2 Common diseases of breeders (Infectious and metabolic disorders)-prevention.

4.3 Fertility disorder- etiology, diagnosis and corrective measures. Selection and culling of breeder flocks

Unit-5 HATCHERY PRACTICES

5.1 Management principles of incubation.

5.2 Factors affecting fertility and hatchability. Selection, care and incubation of hatching eggs. Fumigation; sanitation and hatchery hygiene.

5.3 Importance of hatchery records, break even analysis of unhatched eggs.

5.4 Computer applications for hatchery management

REFERENCES:

1. HVS Chauhan, S. Roy, Poultry Diseases, Diagnosis and Treatment, New Age International Publishers-2018

Web resources:

2. https://www.drvet.in/p/e-books.html

3. https://byjus.com/biology/animal-husbandry-poultry-farming/

4. https://www.helpforag.app/2018/02/livestock-production-and-management- lpm\_14.html?m=1

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CO-POMapping:

(1: Slight [Low];2: Moderate [Medium];3: Substantial [High], -': No Correlation)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 3 | 1 | 2 | 2 | 2 |
| CO2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 2 | 2 |
| CO3 | 1 | 1 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 2 | 1 |
| CO4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

**Pithapur Rajah’s Govt. Degree College (A) Kakinada.**

**DEPARTMENT OF ZOOLOGY & AQUACULTURE**

**SEMESTER-V**

**COURSE 13: POULTRY MANAGEMENT-II**

**(POULTRY PRODUCTION AND MANAGEMENT)**

**MODEL QUESTION PAPER**

**Time: 2 hrs Max. Marks :50**

**SECTION- A**

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

**PART – I**

1. Write an essay on the common diseases affecting poultry birds

2. Explain the economics of layer and broiler production

3.Write an essay on the housing and space requirements for the layer breeder flock management

Part – II

4. Write an essay on vaccination in breeder flock

5. Explain the factors affecting fertility and hatchability in poultry birds

6. What are the various hatchery records to be maintained in a poultry farm. Explain their importance

**SECTION-B**

Answer any Four of the following. 4x5=20

7. Types of disinfectants in poultry

8. Feasibility studies in poultry rearing

9. Artificial insemination in poultry

10. Nutrient requirement in layer birds

11. Fertility disorder in poultry

12. Any two infectious diseases in breeders

13.Management principles of incubation

**Pithapur Rajah’s Govt. Degree College (A) Kakinada.**

**DEPARTMENT OF ZOOLOGY & AQUACULTURE**

**SEMESTER-V**

**COURSE 13: POULTRY MANAGEMENT-II**

**(POULTRY PRODUCTION AND MANAGEMENT)**

Time: 2 hrs Max. Marks :50

BLUE PRINT FOR QUESTION PAPER

|  |  |  |
| --- | --- | --- |
| Unit | Essay | Short |
| I | 1 | 1 |
| II | 1 | 1 |
| III | 1 | 2 |
| IV | 1 | 2 |
| V | 2 | 1 |
|  | Out of 6, 3 questions should be answered  3X10=30M | Out of 7, 4questions should be answered  4X5=20M |

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**Pithapur Rajah’s Govt. Degree College (A) Kakinada.**

**DEPARTMENT OF ZOOLOGY & AQUACULTURE**

**SEMESTER-V**

**COURSE 13: POULTRY MANAGEMENT-II**

**(POULTRY PRODUCTION AND MANAGEMENT)**

**QUESTION BANK**

**ESSAY TYPE QUESTIONS**

1. Write an essay on the common diseases affecting poultry birds

2. Write about the vaccination schedule for commercial layers. Add a note on the factors which govern vaccination schedule in poultry

3. Explain the economics of layer and broiler production

4. Explain the preparation of project report in different systems of rearing of layer birds

5. Write an essay on the export and import of poultry and poultry products

6. What is a feasibility study? Explain feasibility studies on poultry rearing in the context of small units

7.Write an essay on the housing and space requirements for the layer breeder flock management.

8. Write an essay on the housing and space requirements for the broiler breeder flock management.

9. Explain different stages of management during life cycle in poultry

10.Write an essay on vaccination in breeder flock

11. Explain the common diseases affecting breeder birds

12. Explain the etiology, diagnosis and corrective measures for fertility disorder in poultry birds

13. Explain the factors affecting fertility and hatchability in poultry birds

14. What are the various hatchery records to be maintained in a poultry farm. Explain their importance.

15. Write an essay on selection, care and incubation of hatching eggs

SHORT ANSWER TYPE QUESTIONS

1. Types of disinfectants in poultry

2. pre and post vaccination care

3. Coccidiosis

4. Avian influenza

5. Fowl pox

6. Mareks disease

7. New castle disease

8. Aspergillosis

9. Colibacillosis

10. Fowl Typhoid

11.Pullorum disease

12. Feasibility studies in poultry rearing

13. Light management during growing and laying

14. Artificial insemination in poultry

15. Nutrient requirement in layer birds

16. Fertility disorder in poultry

17. Culling of breeder flocks

18. Any two infectious diseases in breeders

19.Management principles of incubation

20. Hatchery records

21. Break even analysis of unhatched eggs

22.Fumigation

23.sanitation and hatchery hygiene

24. Computer applications for hatchery management

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**Pithapur Rajah’s Govt. Degree College (A) Kakinada.**

**DEPARTMENT OF ZOOLOGY & AQUACULTURE**

**SEMESTER-V**

**COURSE 13: POULTRY MANAGEMENT-II**

**(POULTRY PRODUCTION AND MANAGEMENT)**

**Practical Credits: 1 2 hrs/week**

LEARNING OUTCOMES:

On successful completion of this practical course, student shall be able to:

 Identify Poultry diseases by observation

 Analyze Poultry establishment feasibility

 Understand the Poultry Records

SYLLABUS:

1. Poultry Viral diseases – Observation of histopathological slides

2. Poultry Fungal Diseases- Observation of histopathological slides

3. Poultry Bacterial Diseases-Observation of histopathological slides

4. Feasibility study of Poultry establishment: (Preparation of feasibility

study report with given parameters)

5. Rearing of Layers – (Preparation of Flow chart

6. Rearing of broiler- Flow chart

7. Hatchery records- Model study/analysis- Report with modified data

REFERENCES:

1. HVS Chauhan, S. Roy, Poultry Diseases, Diagnosis and Treatment, New Age International Publishers-2018

2. Flow chart hatchery: http://lms.tanuvas.ac.in/mod/resource/view.php?id=45106

3. Feasibility report: https://www.manage.gov.in/stry&fcac/content/19.%20Project%20Report%20on%20Layer%2 0Poultry.pdf

Co-Curriular Activities

a) Mandatory:

1. For Teacher: Training of students by the teacher laboratory and field on skills in different practices employed in poultry with regard to the disease management – analysis of poultry project- preparation of flow chart – Observation of Poultry records – computerization activities

2. For Student: students shall (individually) visit a Layer/ Broiler Poultry farming places (small scale/corporate), make observations on practices- resources – management and marketing - analysis and submit a handwritten Fieldwork/Project work Report of 10 pages with necessary images.

3. Max marks for Fieldwork/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements*.

6. (IE): Unit tests.

b) Suggested Co-Curricular Activities

1. Preparation of Poultry diseases charts

2. Preparation of feasibility report poultry establishment with different variables

3. Seminar, Assignment, Group discussion. Quiz, Collection of Material, Invited Lecture, Video preparation etc.

Pithapur Rajah’s Govt. Degree College (A) Kakinada.

DEPARTMENT OF ZOOLOGY & AQUACULTURE

SEMESTER-V

COURSE 13: POULTRY MANAGEMENT-II

(POULTRY PRODUCTION AND MANAGEMENT)

PRACTICAL MODEL PAPER

MODEL PAPER

Time: 2hrs Max Marks: 50

1. Identification and write notes on the following 3X5=15M

A. Viral disease-histopathological slide

B. Bacterial fungal histopathological slide

C. Fungal histopathological slide

2. Preparation of feasibility study report for poultry establishment -10M

3. Rearing of layers/broilers-flow chart -5M

4.Hatchery records -5M

5. Field work/Project work -5M

5.Record 05M

6. Viva 05M

Total 50M

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| --- | --- | --- | --- | --- | --- |
|  | P.R. Government College (A) Kakinada | Program & Semester  IIIB. B.Sc., (V SEM) | | | |
| Course Code | TITLE OFTHECOURSE  Domain Subject: ZOOLOGY Semester–V  Course 14 A: SUSTAINABLE AQUACULTURE  MANAGEMENT |
| Teaching | Hours Allocated:50(Theory) | L | T | P | C |
| Pre-requisites: |  | 3 | 1 | - | 3 |

Course Outcomes:

|  |  |
| --- | --- |
| On Completion of the course the students will be able to- | |
| CO1 | Evaluate the present status of aquaculture at the Global level and National level |
| CO2 | Classify different types of ponds used in aquaculture |
| CO3 | Demonstrate induced breeding of carps |
| CO4 | Acquire critical knowledge on commercial importance of shrimps |
| CO5 | Identify fin and shell fish diseases |

CO-PO Mapping:

The COs are mapped to POs based on the relevance on a scale of 0-3

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-'/0: No Correlation)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| CO1 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 3 | 3 |
| CO2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 3 |
| CO3 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 3 |
| CO4 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 3 | 3 |
| CO5 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 3 |
| Average | 2.0 | 2.0 | 1.4 | 1.4 | 2.0 | 2.4 | 2.4 | 1.8 | 3.0 | 3.0 |

Syllabus

UNIT I:

1.1. Present status of Aquaculture – Global and National scenario.

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

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

1.4 Design and construction of fish and shrimp farms.

UNIT II:

2.1 Functional classification of ponds – head pond, hatchery, nursery ponds

2.2 Functional classification of ponds -rearing, production, stocking and quarantine ponds

2.3 Need of fertilizer and manure application in culture ponds

2.4 Physico-chemical conditions of soil and water optimum for culture (Temperature, depth, turbidity, light, water, PH, BOD, CO2 and nutrients)

UNIT III:

3.1 Induced breeding in fishes

3.2 Culture of Indian major carps: Pre-stocking management (Dewatering, drying, ploughing /desilting, predators, weeds and algal blooms and their control, Liming and fertilization)

3.3 Culture of Indian major carps - Stocking management

3.4 Culture of Indian major carps - post-stocking management

UNIT IV:

4.1 Commercial importance of shrimp & prawn.

4.2 Macrobrachium rosenbergii- biology, seed production.

4.3 Culture of L. vannamei – hatchery technology and culture practices.

4.4 Mixed culture of fish and prawns.

UNIT V:

5.1 Viral diseases of Fin Fish & shell fish.

5.2 Fungal diseases of Fin & Shell fish.

5.3 Bacterial diseases of Finfish & Shell fish

5.4 Prophylaxis in aquaculture.

Additional Inputs:

1. Future scenario of aquaculture

2. Need of liming of pond

3. Sources of seed for aquaculture practices

4. Recent pathogens affecting the aquaculture farms

REFERENCES:

Pillay TVR & M.A. Dill, 1979. Advances in Aquaculture. Fishing News Books Ltd., London

Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & Sons Inc.1981

Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company.

Bose AN et.al. 1991. Costal Aquaculture Engineering. Oxford & IBH Publishing Company Pvt. Ltd.

Web Links:

[http://www.fao.org/fishery/docs/CDrom/FAO\_Training/FAO\_Training/General/x6708e/x670 8e06.htm](http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6708e06.htm)

<http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf>

[https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control- fishery/871](https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871)

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| --- |
| **P.R. GOVERNMENT COLLEGE (A) KAKINADA** |
| **DOMAIN SUBJECT: ZOOLOGY SEMESTER–V**  **COURSE 14 A: SUSTAINABLE AQUACULTURE MANAGEMENT** |

BLUE PRINT

|  |  |  |  |
| --- | --- | --- | --- |
| Module No | PART I  EssayTypeQuestions10 marks each | PartIIShortAnswer Questions  5markseach | MarksAllottedtothe Chapter |
| UNIT I | 1 | 01 | 15 |
| UNITII | 1 | 02 | 20 |
| UNITIII | 2 | 01 | 25 |
| UNITIV | 1 | 02 | 20 |
| UNITV | 1 | 01 | 15 |
| 5.Total | 06  Of which 3 to be answered | 07  Of which 4 to be answered | 95 Marks including  choice.  Of which 60 Marks to be answered |

NOTE: The question paper setters are requested to kindly adherer to the format given in the table

**P.R. GOVERNMENTCOLLEGE(A), KAKINADA**

**CHOICEBASED CREDIT SYSTEM**

**FOUR– YEAR B.SC. (HONS) DOMAIN SUBJECT: ZOOLOGY**

**SEMESTER V - COURSE 14 A**

**SUSTAINABLEAQUACULTUREMANAGEMENT**

**MODELPAPER**

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

SECTION-A

PART -I

1. Describe the present status of Aquaculture in Global and National Scenario
2. Write an essay on Design and construction of a fish farm
3. What are the Physico -chemical conditions of water required for aquaculture

PART - II

4.Write an essay on Induced breeding

5.Explain the mixed culture of Fish and Prawn

6.Explain viral diseases in Fin Fish

SECTION- B

Answer any Four questions 4x5=20

7.Nursery pond

8.Turbidity

9.Fertilizer in culture pond

10.Algal bloom

11.Quarantine pond

12.Macrobrachium

13.White Spot Disease

P.R. GOVERNMENT COLLEGE (A), KAKINADA

CHOICEBASEDCREDIT SYSTEM

Four– year B.Sc. (Hons) Domain Subject: ZOOLOGY

Course 14 A: SUSTAINABLE AQUACULTURE MANAGEMENT

Question Bank for Sustainable Aquaculture Management

**Module- I**

1. Essay Questions
2. What is the current status of aquaculture at global and national level?
3. Describe Major Cultivable Freshwater fishes
4. Write an essay on Major cultivable species for brackish water
5. Write an essay on Design and Construction of Fish farm
6. Explain the Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish.
7. Explain the Traditional, extensive, modified extensive, semi-intensive and intensive cultures of shrimp.

Short Answer Questions

1. Any2 Brackish water food fishes
2. Any2Marine food fishes
3. Criteria for selection of Fishes for cultivation
4. Extensive fish culture
5. Traditional fish culture

ModuleII

Essay Questions

1. What are the Physico-chemical conditions of soil and water required for aqua culture
2. What is the Functional Classification of Ponds in a fish farm
3. Need of fertilizer and manure application in culture ponds

Short Answer Questions

1. Nursery Pond
2. Turbidity
3. Fertilizer in Culture Pond
4. Quarantine Pond
5. Stocking pond
6. BOD
7. Nutrients

**ModuleI III**

Essay Questions

1. 1.Write an essay on Induced Breeding
2. 2.Culture of Indian Majo rcarps- Pre- stocking
3. Culture of Indian major carps - Stocking management
4. Culture of Indian major carps - post-stocking management

Short Answer Questions

1. Algal Bloom
2. Liming
3. Stocking density
4. Predators
5. Ova prim

Module IV

Essay Questions

1. Explain the mixed culture of Fish and Prawn

2. Commercial Importance of shrimp & prawn

3. Macrobrachium rosenbergii- biology, seed production.

4. Culture of L. vannamei – hatchery technology and culture practices

Short Answer Questions

1. Vannamei

2. Macrobrachium

3. Larval Stages of Prawn

4. Types of Hatcheries

5. Eye stalk oblation

ModuleI V

Essay Questions

1. Explain the viral diseases in Fin Fish & shell fish

2. Explain the Bacterial Diseases in Prawns

3. Describe the Bacterial diseases of Fin fish

4. Explain the Fungal Diseases of Fish

5. Fungal diseases of Fin & Shell fish

6. Prophylaxis in aquaculture

Short answers

1. Any two viral diseases in Prawns

2. Any two bacterial diseases in fish

3. White spot disease

4. Dropsy

5. Prophylaxis

P.R. GOVERNMENT COLLEGE (A), KAKINADA

CHOICE BASED CREDIT SYSTEM

Four– year B.Sc. (Hons) Domain Subject: ZOOLOGY

Course 14 A: SUSTAINABLE AQUACULTURE MANAGEMENT

PRACTICAL SYLLABUS

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

Identify the characters of Freshwater cultivable species

Estimate physico chemical characteristics of water used for aquaculture

Examine the diseases of fin and shellfish

Suggest measures to prevent diseases in aquaculture

Practical (Laboratory) Syllabus: (30hrs) (Max.50Marks)

1.Fresh water Cultivable species any (Fin& Shell Fish Specimens – Observation of morphological characters by observation and drawings)- Any three

2.Brackish water cultivable species (Fin &Shellfish-Specimens-Observation of Morphological Character by observing drawing) -----Any three

3Hands on training on the use of kits for determination of water quality in aquaculture (DO, Salinity, pH, Turbidity- Testing kits to be used for the estimation of various parameters/ Standard procedure can be demonstrated for the same)

4.Demonstration of Hypo physation (Procedure of hypo physation to be demonstrated in the practical lab with any edible fish as model)

5.Viral diseases of Fin &Shell Fish (Observation of pathological slides/Charts/ Models of viral pathogens in fin/ shell fish) ANY THREE

6.Bacterial diseases of Fin &Shell Fish (Observation of histopathological slides/ Charts/Models - ANYTHREE

7.Fungal diseases of Fin & Shell Fish (Observation of histo pathological slides/Charts/ Models of Bacterial pathogens in fin/ shell fish) Any three

Lab References

Boyd CE1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company

<http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6>

<http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf>

https://[www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and](http://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and)control- fishery/871

Webresourcessuggestedbytheteacherconcernedandthecollegelibrarianincludingreading material

Co-CurricularActivities

Mandatory:(Student training by teacher in field skills: Total15hrs., Lab:10+field05)

For Teacher: Trainingofstudentsbytheteacherinlaboratory/fieldfornotlessthan15hours on Breeding- Induced breeding in carps -hatchery technology of L. Vennamai- Farming techniques- disease diagnostic techniques—concepts –Demonstration @ any aqua laboratory

For Student: Students shall (individually) visit a Hatchery/Farm/ Aqua diagnostic center andmakecarefulobservationsoftheprocessmethodandimplements-protocolsandreport on the same in 10 pages hand written Fieldwork/Project work Report.

Max marks for Fieldwork/Project work Report: ------- 05.

Suggested Format for Fieldwork/Project work: Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.

(IE). Unit tests.

SuggestedCo-CurricularActivities

Preparation of Model/Charts of Cultivable species of finfish shellfish

PreparationofModel/ChartofIdealfishPond-withthestandardsprescribed.

Observation of aquaculture activities in the area (Observation of any activity related to aquaculture in the vicinity of the college/village)

Preparation of Model–charts of Fin/Shell fish Diseases with eco-friendly material.

Assignments Group discussion, Seminar, Quiz, Collection of Material, Videopreparation etc., Invited lect

P.R. GOVERNMENT COLLEGE (A), KAKINADA

CHOICE BASED CREDIT SYSTEM

Four– year B.Sc. (Hons) Domain Subject: ZOOLOGY

Course6A: SUSTAINABLE AQUACULTURE MANAGEMENT

PRACTICAL MODEL PAPER

Max.Marks50 Time:2Hours

I.Identify the following spotters/Charts/Photographs (6x5) -- - 30M

A Fresh water fishes

B Brackish water fish

C. Viral disease fish/prawn

D. Bacterial Disease fish/prawn

E. Marine Fish

F. Fungal Disease fish/prawn

Record - --------------------------- 05M

Field note book/project work report ---------------------------- 10M

Viva voce ----------------------------- 05M

Total 50M

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | PITHAPUR RAJAH’S GOVT. DEGREE COLLEGE (A) KAKINADA. | PROGRAM & SEMESTER B.SC. HONOURS IN ZOOLOGY (MAJOR) SEMESTER-V | | | |
| COURSECODE: 15A | POST HARVEST TECHNOLOGY OF FISH AND FISHERIES |  | | | |
| THEORY | CREDITS:3 | 3 HRS/WEEK | | | |
| TEACHING | HOURS ALLOCATED:60(THEORY) | L | T | P | C |
| PRE-REQUISITES: | POST HARVEST TECHNOLOGY | 4 | 0 | 2 | 4 |

HOURS:60 Max.Marks: 50

COURSE OUTCOMES

CO1: Explain the physiological and biochemical changes that occur in agricultural produce after harvest.

CO2: Identify and evaluate factors affecting postharvest losses in fruits, vegetables, grains, and other crops.

CO3: Demonstrate knowledge of postharvest handling, storage, and transportation methods to maintain quality and extend shelf life.

CO4: Apply appropriate preservation techniques such as refrigeration, drying, packaging, and controlled atmosphere storage.

CO5: Assess postharvest technologies and their role in ensuring food safety, quality, and marketability of produce.

CO6: Design and recommend postharvest management systems for different types of crops considering economic and environmental factors.

CO7: Interpret relevant national and international standards and regulations related to postharvest handling and quality assurance.

Learning objectives

Understand the Principles of Postharvest Physiology:

Explain the biological and chemical changes in crops after harvest.

Understand respiration, ripening, senescence, and spoilage processes.

Identify Postharvest Losses and Their Causes:

Analyze factors contributing to quantitative and qualitative postharvest losses.

Evaluate pre-harvest, harvest, and postharvest handling impacts.

Apply Methods for Postharvest Handling and Storage:

Select appropriate handling, packaging, and storage techniques for different crops.

Understand controlled and modified atmosphere storage principles.

Understand Postharvest Treatments and Technologies:

Identify technologies such as refrigeration, drying, curing, irradiation, and chemical treatments.

Evaluate the effectiveness and suitability of these technologies.

Design and Assess Postharvest Systems:

Develop systems to minimize loss and maintain quality from farm to consumer.

Apply HACCP and other quality control systems in postharvest management.

Evaluate Packaging Materials and Techniques:

Understand the role of packaging in extending shelf life and maintaining product quality.

Select suitable packaging based on commodity characteristics.

Promote Food Safety and Quality Standards:

Understand national and international food safety regulations.

Apply best practices to ensure food quality and safety during postharvest handling.

SYLLABUS

Top of Form

Unit – 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 in marine fish and freshwater fish.

1.2 Principles of preservation – cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to low radiation of gamma rays.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Unit – 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).

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Unit – III Processing and preservation of fish and fish by-products

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, Using glass, chitosan, pearl essence, shark fins, fish Leather and fish maws.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Unit – 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 after processing.

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

Unit – V Quality Assurance, Management and Certification

5.1. 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.

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

Activity: Assignment /Students Seminar/Quiz/Project/Peer teaching/Report writing after watching any video on the above

REFERENCES:

1. Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture, Oxford-IBH, NewDelhi

2. Lakshmi Prasad’s, Fish Processing Technology 2012, Arjun Publishing House

3. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications

4. Safety and Quality Issues in Fish Processing (Woodhead Publishing Series in Food Science, Technology and Nutrition) by H.A Bremner K.A Mahanthy, Innovations in Fishing and Fish Processing Technologies, January 2021

Web Resourses

<http://ecoursesonline.iasri.res.in/mod/page/view.php?id=145743>

Co-Curricular Activities

Mandatory:

1. For Teacher: Training of students by the teacher in laboratory/field in various steps of post-harvest techniques of fishes, on the advanced techniques in post-harvest technology – Training of students on other employability skills in the post-harvest sector of Aquaculture Industry- like Processing, Packing, marketing of processed aqua products.

2. For Student: Students shall (individually) visit - Any fish/shrimp Processing Plant/Packing industry and make observations on post harvesting techniques and submit a brief handwritten Fieldwork/Project work Report with pictures and data /survey in 10 pages.

3. Max marks for Fieldwork/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work: Title page, student details, index page, details of place visited, observations made, findings and acknowledgements

CO-PO MAPPING

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |
| CO2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 2 | 2 |
| CO3 | 1 | 1 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| CO4 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO5 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |

P.R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA

SEMESTER V

COURSE 15: POSTHARVEST TECHNOLOGY

BLUE PRINT FOR QUESTION PAPER SETTER

|  |  |  |  |
| --- | --- | --- | --- |
| MODULENO. | . ESSAY QUESTIONS 10 | SHORT ANSWERQUESTIONS 5 | MARKS ALLOTEDT O THE UNIT |
| MODULE-1 | 1 | 2 | 20 |
| MODULE-2 | 1 | 1 | 15 |
| MODULE-3 | 2 | 2 | 30 |
| MODULE-4 | 1 | 1 | 15 |
| MODULE-5 | 1 | 1 | 15 |
| TOTAL | 06 OF WHICH 3TO BE ANSWERED | 07 OF WHICH 5 TO BE ANSWERED | 95 MARKS INCLUDING CHOICE OF WHICH 50 MARKS TO BE |

**PITHAPUR RAJA’S GOVT. COLLEGE (AUTONOMOUS),**

**KAKINADA**

**DEPARTMENT OF ZOOLOGY AND AQUACULTURE**

**COURSE: 15A**

**SEMESTER-V-POST HARVEST TECHNOLOGY OF FISH AND FISHERIES**

**MODEL QUESTION PAPER**

Time: 3 hrs. Max Marks: 50

SECTION –A

Answer Any THREE of the following by choosing at least one question in each section (Draw labelled diagrams wherever necessary) 3X10=30

PART- I

| S.No | Questions | BT  Level | CO | PO | Marks |
| --- | --- | --- | --- | --- | --- |
| 1 | Describe storage and transport of fresh fish, | BT1 | 1 | 2 | 10 |
| 2 | Discuss any four advanced methods of fish preservation | BT2 | 2 | 0 | 10 |
| 3. | Explain various Fish Products and their applications | BT2 | 2 | 0 | 10 |

PART- II

| S. No | Questions | BT  Level | CO | PO | Marks |
| --- | --- | --- | --- | --- | --- |
| 4 | Write the Industrial Importance of Fish By-Products | BT1 | 1 | 2 | 05 |
| 5 | Discuss on Environmental and personal hygiene in fish processing plants | BT2 | 2 | 2 | 05 |
| 6 | Write about Seafood Quality Assurance System Ensuring Safety Standards | BT2 | 1 | 2 | 05 |

SECTION - B

Answer any FOUR of the following: Draw labeled diagrams wherever necessary

4x5=20 M

| S. No | QUESTION | BT  LEVEL | CO | PO | MARKS |
| --- | --- | --- | --- | --- | --- |
| 7 | Comment on rigormortis | BT1 | 2 | 1 | 01 |
| 8 | **Explain Advanced freeze drying** | BT1 | 0 | 1 | 01 |
| 9 | Role of Gamma rays | BT2 | 1 | 2 | 01 |
| 10 | Fish oils | BT3 | 2 | 2 | 01 |
| 11 | HACCP | BT1 | 2 | 1 | 01 |
| 12 | GMP & GLP | BT1 | 0 | 1 | 01 |
| 13 | **ISO certification** | BT2 | 1 | 2 | 01 |

P.R. GOVT. COLLEGE (AUTONOMOUS),

KAKINADA

SEMESTER-IV

POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

PAPER: 15A - QUESTION BANK

UNIT: I

ESSAY QUESTIONS

1. Describe storage and transport of fresh fish BT1
2. Write an essay on traditional methods of fish preservation? - BT2
3. Discuss on spoilage in marine and freshwater fish.? BT1
4. Describe the principles of fish preservation. –BT1
5. Write About Traditional Methods of Fish Preservation. -BT1
6. Discuss the role of modern methods fish preservation. - BT2
7. **Discuss the various types of fish products derived from fish and their importance in the food industry. - BT1**
8. **Explain any our fish by-products and their significance industry- .BT2**
9. **Describe the nutritional and economic value of fish protein concentrate, fish meal, and fish oil.**
10. Discuss the importance of environmental hygiene in fish processing plants. BT1
11. Explain the role of personal hygiene in ensuring the safety and quality of fish and fishery products. Include examples of personal hygiene practices.BT2
12. Explain the importance of Good Manufacturing Practices (GMPs), Good Laboratory Practices (GLPs), BT1.
13. Discuss the concept of Hazard Analysis and Critical Control Points (HACCP) in the seafood industry. –BT1
14. Evaluate the challenges and advantages in adopting international standards such as ISO 9000 and Codex Alimentarius in sea food industry-BT4

SHORT ANSWER QUESTIONS:

1. **Salting,**
2. **Drying,**
3. **Chilling- BT1**
4. 4 Rigor Mortis - BT2
5. Smoking
6. Canning
7. AFD
8. RSW
9. Fish minced meat
10. Chitosan
11. Fish meal
12. Isin glass
13. Fish leather
14. Fish manure
15. Fish ensilage
16. Environmental Hygiene
17. Personal Hygiene
18. GMP
19. GLP
20. Codex Alimentarius

**\*\*\*\*\*\***

**SEMESTER-V**

**COURSE – 15 - POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES**

**PRACTICALS 2 HRS/WEEK**

LEARNING OUTCOMES:

On successful completion of this practical course, student shall be able to:

• Identify the quality of aqua processed products.

• Determine the quality of fishery by products by observation

• Analyze the protocols of aqua processing methods

SYLLABUS:

1. Evaluation of fish/ fishery products for organo leptic, chemical and microbial quality.

2. Preparation of dried, cured and fermented fish products

3. Examination of salt, protein, moisture in dried / cured products

4. Examination of spoilage of dried / cured fish products, marinades, pickles, sauce.

5. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.

6. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet

7. Corrective action procedures in processing of fish- flow chart- work sheet preparation (\*Refer the following web sites for complete procedure method and estimations of above listed practical’s) REFERENCES: 1. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications

https://ecourses.icar.gov.in/e-Leaarningdownload3\_new.aspx?Degree\_Id=03.

<https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf>

PR GOVT COLLEGE AUTONOMOUS

KAKINADA

MAJOR ZOOLOGY

PAPER -15

POSTHARVEST TECHNOLOGY

PRACTICAL MODEL QUESTION PAPER - MAX MARKS-50

**Part A — Major Experiments (30 Marks)**

Answer the following

I. Evaluate the given fish/fishery product for (2 × 15 = 30 marks)  
a) Organoleptic quality of Fish (OR)  
b) Chemical Evaluation for Freshness of fish

II.Prepare a dried, cured, or fermented fish product and  
a) Record the process in a flow chart (OR)  
b) Examine salt, protein, and moisture content in the final product

**Part B**

II.Answer the following: (2 × 5 = 10 marks)

a.Examine the spoilage in a given dried/cured fish product, marinade, or fish pickle. Record signs of spoilage and probable causes

b.Prepare a hazard analysis worksheet for a fish processing operation (drying, curing, or fermentation

Viva Voce (5 Marks)

Record

TOTAL- 50 MARKS

Skill Enhancement Courses for Semester–VII

|  |  |  |  |
| --- | --- | --- | --- |
| (To choose one pair from the four  Alternate pairs of SECs) Course no | Course Title (Theory Lab) | Marks | Credits |
| 9A | HATCHERY TECHNOLOGYIN  AQUATIC ORGANISMS | 100+50 | 4+1 |
| 9B | FISHNUTRITION AND FEED  TECHNOLOGY | 100+50 | 4+1 |
| (OR) | | | |
| 10A | MILK AND MILK PRODUCTS  TECHNOLOGY | 100+50 | 4+1 |
| 10B | MILK AND MEAT HYGIENE, FOOD SAFETY AND  PUBLIC HEALTH | 100+50 | 4+1 |
| (OR) | | | |
| 11A | POULTRYPRODUCTSAND  MANAGEMENT | 100+50 | 4+1 |
| 11 B | POULTRYWASTE  MANAGEMENT | 100+50 | 4+1 |
| (OR) | | | |
| 12 A | MULBERRY PHYSIOLOGY ANDMULBERRY  BREEDING &GENETICS | 100+50 | 4+1 |
| 12 B | SILKWORM PHYSIOLOGY ANDSILKWORM  BREEDING &GENETICS | 100+50 | 4+1 |
| 13 | ONEONLINE  COURSEFROMANY DISCIPLINE | 100+50 | 5 |

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Ofthe6courses inSemestersVII,5courses (3+2) areSubjectrelatedand1 courseshallmandatorilybe OPEN Online course in anydiscipline, encouraging trans disciplinary

Higher Order Courses for semester-VIII

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (Tochooseany three of the following combination) Choose any THREE  Courses | Courseno | | Course Title (Theory+Lab) | | | Marks | | Credits |
| 14 A | TOOLS AND TECHNIQUESIN  BIOLOGY | | | | 100+50 | | 4+1 | |
| 14 B | TOXICOLOGY  AND BIOSTATISTICS | | | | 100+50 | | 4+1 | |
| 14 C | ENVIRONMENTBIOLOGY AND  ENVIRONMENT PHYSIOLOGY | | | | 100+50 | | 4+1 | |
| 14 D | ANIMALBEHAVIOURANDCHRONOBIOLOG  Y | | | | 100+50 | | 4+1 | |
| 14 E | MOLECULAR  ANDHUMAN GENETICS | | | | 100+50 | | 4+1 | |
| 14 F |  | BIOSYSTEMATIC S & TAXONOMY | |  | 100+50 | | 4+1 | |
|  |  | | | |  | |  | |

SkillEnhancementCoursesforSemester–VIII

|  |  |  |  |
| --- | --- | --- | --- |
| (To choose one pair from the  fouralternatepairs ofSECs) Courseno. | Course Title (Theory+Lab) | Marks | Credits |
| 15 A | MARICUTLURE | 100+50 | 4+1 |
| 15 B | ORNAMENTAL  FISHERY | 100+50 | 4+1 |
| (OR) | | | |
| 16 A | LIVESTOCK ECONOMICS, MARKETING  ANDBUSINESS MANAGEMENT | 100+50 | 4+1 |
| 16 B | LIVESTOCK ENTREPRENEURS HIP | 100+50 | 4+1 |
| (OR) | | | |
| 17 A | POULTRY  ECONOMICS, MARKETING | 100+50 | 4+1 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | AND  INTEGRATION |  |  |
| 17 B | POULTRY  ENTERPRENUERS HIP | 100+50 | 4+1 |
| (OR) | | | |
| 18 A | SERICULTURE  MARKETING | 100+50 | 4+1 |
| 18 B | SERICULTURE ENTREPRENUERS HIP HUMAN RESOURCE  DEVELOPMENT | 100+50 | 4+1 |
|  | ONEONLINE  COURSEFROMANY DISCIPLINE |  |  |

|  |  |  |
| --- | --- | --- |
| 19 |  | 5 |

Ofthe6courses inSemestersVIII,5courses (3+2) are Subject related and 1 course shall mandatorily be OPEN Online course in any discipline, encouraging trans disciplinary learning.

DEPARTMENTOFZOOLOGY

LIST OF EXAMINERS



|  |  |  |  |
| --- | --- | --- | --- |
| S. No | Name of the Examiners | Subject | Name of the College |
| 1. | Dr.N. Sreenivas | Zoology | GDCRamachandrapuram |
| 2. | B. AhmadAliBaba | Zoology | GDC Pithapuram |
| 3. | Dr. PJohnKiran | Zoology | GDCPerumallapuram |
| 4. | Dr.M. Vijaya Kumar | Zoology | SRRGDCVijayawada |
| 5. | Dr.P. JayaBharathi | Zoology | VSK College, Vizag |
| 6. | N. Suneetha | Zoology | SRR GDC, Vijayawada |
| 7. | V.Sandhya | Zoology | GDC, Kaikaluru |
| 8. | Dr. R. P Dattu | Zoology | GDC, Tiruvuru. |
| 9. | Dr. K. RamaRao | Zoology | VSK College, Vizag |
| 10. | Dr.T. Samuel DavidRaj | Zoology | VSK College, Vizag |
| 11. | Dr. P.R Vani | Zoology | VSK College, Vizag |
| 12. | DrY.PoliNaidu | Zoology | GDC, Srikakulam |
| 13. | A. Arjuna Apparao | Zoology | GDC, Yellamanchili |
| 14. | DrG.Mani | Zoology | GDC(M), Srikakulam |
| 15. | P.S.C.H.P Deepika Rani | Zoology | SKR College(W), Rajahmundry |
| 16. | DrG.VijayPrathap | Zoology | VSK College, Vizag |
| 17. | Dr.Y. Shantiprabha | Zoology | VSK College, Vizag |
| 18. | M. Vasantha Lakshmi | Zoology | ASD GDC (W), A, Kakinada |

Lecturer in charge

Dept of Zoology & Aquaculture

DEPARTMENTOFZOOLOGY

LISTOF QUESTION PAPER SETTERS

|  |  |  |  |
| --- | --- | --- | --- |
| S. No | Name of the QP setter | Subject | Name of the College |
| 1. | Dr.N. Sreenivas | Zoology | GDCRamachandrapuram |
| 2. | B. Ahmad Ali Baba | Zoology | GDC Pithapuram |
| 3. | Dr. PJohn Kiran | Zoology | GDCPerumallapuram |
| 4. | Dr.M. VijayaKumar | Zoology | SRRGDCVijayawada |
| 5. | Dr.P. Jaya Bharathi | Zoology | VSK College, Vizag |
| 6. | N. Suneetha | Zoology | SRR GDC, Vijayawada |
| 7. | V.Sandhya | Zoology | GDC, Kaikaluru |
| 8. | Dr. R.P Dattu | Zoology | GDC, Tiruvuru. |
| 9. | Dr. K. Rama Rao | Zoology | VSK College, Vizag |
| 10. | Dr.T. Samuel David Raj | Zoology | GDC, Porumamilla |
| 11. | Dr. P.R Vani | Zoology | VSK College, Vizag |
| 12. | DrY.PoliNaidu | Zoology | GDC, Srikakulam |
| 13. | A. Arjuna Apparao | Zoology | GDC, Yellamanchili |
| 14. | DrG.Mani | Zoology | GDC(M), Srikakulam |
| 15. | P.S.C.H.P Deepika Rani | Zoology | SKRCollege(W), Rajahmundry |
| 16. | DrG.VijayPrathap | Zoology | VSK College, Vizag |
| 17. | Dr.Y. Shantiprabha | Zoology | VSK College, Vizag |
| 18. | Sri.D. Durgarao | Zoology | GDC (A), Rajahmundry |

 Lecturer in charge Dept of Zoology & Aquaculture