

PITHAPUR RAJAH'S GOVT COLLEGE (A),
KAKINADA

(Re- Accredited by NAAC with A Grade)

DEPARTMENT OF ZOOLOGY
&
AQUACULTURE

BOARD OF STUDIES

B.Sc. AQUACULTURE (Single Major System)
&
B.Voc. Commercial Aquaculture

2024-2025



CHOICE BASED CREDIT SYSTEM
(Convened on 01-05-2024)

B.Sc. Honours - ZOOLOGY (SingleMajor)

2024-2025

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**DEPARTMENT OF COLLEGIATE EDUCATION
GOVERNMENT OF ANDHRA PRADESH
PROCEEDINGS OF THE PRINCIPAL, PITHAPUR RAJAH's GOVT. COLLEGE [A]:
KAKINADA Present: Dr. B.V. TIRUPANYAM, Ph.D.
Rc.No.1/ A.C/BOS/2024-25 Dt.29 Aug2023**

Sub: P.R.G.C[A] – Academic Cell - Conduct of BOS Meetings
for the Academic Year2024-25– Guidelines issued -
Regarding.

Ref: Resolutions adopted in 25th Staff Council Meeting held on 29 Aug
2023

The Autonomous colleges are, as per its vision, mission, stated objectives and core values, mandated to design and develop their own outcome -based curricula keeping in view the societal, local and global industry requirements, employability and industry – ready and transferable skills duly prescribing Course Outcomes (COs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and suitable learning outcome assessment management system through robust and transparent evaluation system to measure their attainment levels by the students.

The Sustained Developmental Goals (SDG-4) of UNEP recommended assurance of quality to students in HEIs promoting creativity, critical thinking, and collaborative skills, while building curiosity, courage, resilience and gender equality among students.

Further, the NEP-2020 recommended that the HEIs shall equip students with such skills that translate them into leaders and potential entrepreneurs too besides credit transfer mechanism through ABC (Academic Bank of Credits).

The HEIs are also, as per the Revised Accreditation Framework [RAF] of NAAC, endowed with the responsibility of rolling out quality and holistic human resources to the modern Indian Economy by ingraining quality in teaching- learning process by facilitating the students experience a wide range of participative and experiential learning strategies including field trips, conferences, integration of technology, community service programmes, career guidance, certificate and value added courses, research and inquiry based teaching, exchange programmes, gender equity programmes, etc.

Besides, the students shall have social consciousness, regard for constitutional provisions, right perspective on environmental protection, awareness on gender equity, health and hygiene, Yoga and wellness, college social responsibility, culture, and values, etc., to mention a few.

Further, the Ministry of India, GoI, through NIRF, prescribes quality research, infrastructure augmentation, enhanced placement and progression to higher education,

equipment of employability skills leading to enhanced public perception about the college among the public.

Our institution has, from AY 2022-23, devised its new vision and mission along with objectives

and core values necessitating design and re-orientation of its academic administration in tune with them.

ORDER:

In the light of the above mandate and responsibilities prescribed by institutions vision and mission, SDG-4, NEP – 2020, NAAC, NIRF to the autonomous HEIs, need to customize, design and re-orient their academic and research administration in tune with the policies of above bodies, our institution is no exception

Hence, the Chairmen of U.G and P.G Boards of Studies of various Departments are requested to make necessary arrangements for the conduct of the meetings on **01 May 2024 2023**. They are further requested to prepare curricula and extracurricular activities and devise suitable evaluation system keeping in mind above recommendations to make students a wholesome personality and a 21st century student capable of facing challenges, adaptive to changes, creative and innovative.

Further, the Chairman of the each BOS, in association with the IQAC coordinator, preceding the BOS meeting, is requested to prescribe benchmarking, quality initiatives in pedagogy and learning; in design of curriculum (with 20% change) and optimum utilization of existing human, physical and ICT resources and adopt resolutions to the extent of benchmarks (As per SOP given in **Annexure – I**). Further, as the regular attendance of students to the classes is a deciding factor in enhancement of quality in learning, a minimum attendance of 60% for I mid-term examination, 75% for II mid-term examination under CIA component shall be the benchmark for attendance and it shall be approved in the BOS. The Chairmen are also requested to approve the new programmes to be introduced for 2024-25, if any, number of certificate courses, their frequency, Bloom's- Taxonomy based evaluation system for effective learning outcomes as per the Annexure – I

The Chairmen are, therefore, requested to

- Design curricula of Odd and even semesters for the A.Y 2024-25 both for U.G and P.G courses in tune with the stated vision, mission of the institution, RAF of NAAC, NEP-2020

and NIRF.

- Conduct meeting with employers, parents, alumni, shall take feedback on the existing curricula and invite suggestions and changes to be made.
- Invite the University nominee, subject experts, industrial nominees, student nominees, parents well in advance along with the date, venue, agenda, etc. A soft copy shall be communicated well in advance to the members to have an idea on the matters.
- Facilitate much room for intense deliberation on the design of the curricula, evaluation system, research component, enhancing learning experiences, resource utilization by staff and students, etc.,
- Each Department shall approve and recommend additional credits for additional modules, training programmes, N.S.S, N.C.C, participation in cultural programs, sports and games, environmental programs, blood donations camps, etc.
- All meetings shall be offline. Online attendance of members faculty will be permitted only in exceptional cases.
- The Chairmen shall submit minutes of the meeting in the prescribed format only (Annexure – II) in triplicate (hard copies) to the Academic cell for onward submission to the IQAC, Examination cell and library within three days from the completion of BOS meeting and besides hosting the soft copy in the college website within the period stipulated.
- Each Chairman of BOS, shall get the rough draft of the curricula verified and approved by the Principal, Academic Cell and IQAC before the actual BOS meetings to ensure uniformity and commensurate with the stated vision and mission of the college among the departments.
- The Academic Cell coordinator shall be the Chief Coordinator for the BOS meeting activity and IQAC coordinator will be the additional coordinator.
- The Academic Coordinator and IQAC coordinator conducted a meeting with the Chairmen, BOS on 28 August 2024 and explain the structure of curricula, uniformity other modalities.
- The Controller of Examinations of the institution shall fund the BOS meetings from the available funds on the condition of reimbursement after receiving autonomous funds from UGC. Initially, he shall pay Rs. 5,000/- uniformly as an advance to each Chairman towards each course (If BOS meetings for multiple courses are held under one Chairmanship, he/she shall be given advance amount equivalent to the number of courses x Rs.500/-)
- The Chairman of each BOS shall apply to the principal for advance amount for meeting the BOS meetings with head-wise expenditure in the prescribed format (Annexure-III)

Following contents shall be presented in the BOS document in order

1. Proceedings of the Principal pertaining to BOS
2. Composition of BOS
3. vision and Mission of the college
4. Agenda: It shall include ATR on the previous BOS meeting first, resolutions, etc., later.
5. Table showing the Allocation of Credits in the following table for both theory and Lab incase of science subjects

S. No	Semester	Title of the Course (Paper)	Hrs./week	Max. Marks (SEE)	Marks in CIA	Credits
1	III	Optics	4	50	50	4

6. Resolutions adopted in the meeting with detailed discussion that took place during the meeting (Activities and Bench marking as per Annexure –I)
7. At the end of each theory paper, each topic shall be mapped as per the Blooms taxonomy

and scope of that topic for skill/ employability/ entrepreneurship opportunities in the following table incorporated

S. No	Subject	Semester	Title of the Course (Paper)	Topic	Parameter as per Blooms taxonomy (Knowledge/ Application/ Creativity/ Innovation	Experiential learning component	Scope (Skill/ employability/ entrepreneurship)
1	III	Botany	Plant Physiology	Plant Cell	Knowledge	Shall beshown Microscope	
2	III	History	Tourism	Tourism management	Application	Apprenticeship	Employability

8. Each BOS Chairman shall, immediately after syllabus, tabulate the changes made in the syllabus/paper along with justification, in the Proforma given in Annexure – I.
9. Attendance of Members present with signatures in the tabular form.
10. List of Examiners & Paper setters
11. Syllabus for each course (both theory & Practical in case of Science subjects) followed by model question papers (theory & practical) and allocation of CIA (50marks) for each course with structure.
12. Each student (2024-25) AB must complete one MOOCS course from SWAYAM in any subject per year which is mandatory.

CIA structure for Single Major system

- Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.
- I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions to be given for each paper.
- Question paper is to be given as per the following structure for the courses with **4 units**

S.No	Unit No	Long Answer Question(10M)	Short Answer Question (5 M)	Objective Questions(1M)
1	I	1	0	1
2	II	1	0	1
3	III	0	2	1
4	IV	0	2	1+ one question from any unit with more syllabus Weightage

- For I mid examination to be conducted in offline mode, Question paper is to be given as per the following structure for the courses with **5 units**

Ø

S.No	Unit No	Long Answer Question(10M)	Short Answer Question(5M)	Objective Questions(1M)
1	I	1	0	1
2	II	1	0	1
3	III	0	1	1
4	IV	0	1	1
5	V	0	1+ one question from any unit(III or IV or V) with more syllabus weightage	1

- The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M
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CIA structure for 3 Major system

- Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.
- I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions with one mark each.
- The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M
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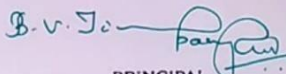
CIA structure for 3 Major system for Honors programmes (2020-21AB)

- Out of 40 marks for CIA, 20 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.
- I mid examination to be conducted in offline mode in which the student should attempt **Two essay** questions for ten marks each out of three questions, **four short** answer questions with five marks each out of six questions.
- The remaining 20 marks for CIA are allocated as per the following structure

Assignment- 10M	Seminar- 5	Quiz -5M
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1. Percentage of syllabus changes in each paper
2. Measure outcome attainment learning levels of students through direct and indirect methodology and mapping COs and POs
3. Text & Reference Books
4. e-content links.

PRINCIPAL
Pithapur Rajah's **Government Autonomous**


PRINCIPAL
P.R. Govt. College (A)
KAKINADA

College

Kakinada

**PROCEEDINGS OF THE PRINCIPAL, P.R. GOVERNMENT COLLEGE(A),
KAKINADA-A. P**

Present: Dr. B. V. Tirupanyam, M. Sc; Ph.D.

R.C.No.1/A.C./BOS/2024-25, Dated: 29.08.2024

SUB: P.R. Government College(A), Kakinada-UG Board of Studies (BOS)- Program/Course- Nomination of Members-Orders issued.

REF: 1. UGC Guidelines of for Autonomous Colleges-2018.

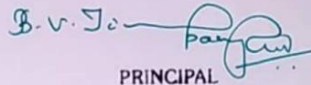
ORDERS:

The Principal, P.R. Government College(A), Kakinada is pleased to constitute UG Boards of Studies in Aquaculture & B.Voc CA- for framing the syllabi in respective Subject for all Semesters duly following the norms of the UGC Autonomous guidelines.

S. No	Name of the Person	Designation
1	Sri. B. Chakravarthi	Chairman & Head, Department of Zoology & Aquaculture
2	Dr. K. Ramesh Babu	Dept of Marine Living Resources, Andhra University, Vishakhapatnam.
3	Dr. K. Ramaneswari	Subject Expert -I, Department of Zoology, Dean Research Cell, Adikavi Nannaya University, Rajamahendravaram
4	Dr N Sreenivas	Subject Expert – II, Lecturer in Zoology, Govt. Degree College, Ramachandrapuram.
5	Sri M Phaneendra	Representative from Industry, Aqua Industry consultant
6	Dr. Kiran Kumar Pappu	Member
7	Dr. B. Elia	Member
8	Sk. Madina Saheb	Member
9	Y. Gowthami	Member
10	P.V. Chandrika	Member
11	B. Devi	Member
12	T. Sushma	Member
13	MD. Shamreen	Member
14	M. Sowmya	Member
15	A.Manju Lakshmi	Student Alumni Member
16	K Ayyappa Swamy	Student Member
17	K Jagadeesh	Student Member
18	V Ramya	Student Member

The above members are requested to attend the BoS meeting on 31 - 08 -2024 and share their valuable reviews, and suggestions on the following functionaries.

- Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and National requirement for consideration and approval of the IQAC and Academic Council.
- Suggested 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.


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BOS Meetings 2023-2024

Guidelines for Departments

Please ensure that the following parameters are reflected while adopting resolutions in the BOS minutes.

- The resolutions shall be in tune with the vision & mission of the college.

VISION, MISSION & OBJECTIVES FROM 2024-25

VISION:

To contribute its might for holistic and quality human capital formation for modern economy with focus on developing employment opportunity – enhancing skilling ecosystem, through integration of research, value system and technology into teaching – learning process.

MISSION:

To provide conducive and outcome-based skill development environment in the institution to brighten prospects for progression to higher education, employment opportunities in Government and Private agencies, for personal growth and enhanced productivity and economic growth.

To collaborate with coaching centers or skill development institutions for skill development. To develop systems for quality enhancement in learning by student through promotion of ICT integration into learning, deployment of learning resources at the door steps of students for optimum utilization.

Designing and implementing student-centric, inquisitive, practical-rich, and research-based curricula, including project works, problem-solving & applications oriented TLPs, field trips, etc., that facilitate experiential and participative learning.

To strengthen research and development and create new research knowledge through intense research, collaborations, knowledge and technology transfer

To foster innovation among students through trainings and forging collaborations with outside organizations

To turn each student into a wholesome personality through initiatives in Community Service, Gender equity initiatives, Environment protection, personality development, transferable skills, understanding constitution and its spirit and their role in nation building.

To mould the character of each constitutional provisions-abiding and inquisition-arousing.

The activities and plans of actions for AY 2024-25 and BOS resolutions shall be in tune with vision & Mission of the college.

OBJECTIVES:

1. To prepare and introduce students to the world of work through development of cognitive skills, discipline-specific skills, technical and professional skills, information processing skills, problem-solving skills, social engagement and emotional skills.
 2. To forge collaborations with industry, Government and third sector organizations
 3. To promote intuition among students
 4. To devise plans for rolling out socially conscious, culturally synchronizing and environmental friendly students.
 5. To make students access to ICT infrastructure for enhanced quality higher education
 6. To make students find innovative solutions to societal problems and adapt themselves to
- The changes in the syllabus made shall be atleast 20% and tabulate the changes
(No.of topics added)/ (Total No.of topics)x 100 = 20%

Name of the Department	Semester, Program, Paper Number & Title of the Paper,	Titles of Topics deleted	Topics added during BOS meeting 01 May 2024	Percentage of changes made in syllabus	Justification per each topic deleted/ added

- The changes in theory for sciences shall be in tune with the local & global level industry required skill development and employment opportunities.
- The Practicals shall be according to theoretical concepts. If required, new & innovative practicals shall be proposed and approved keeping the futuristic and advanced technologies in future.
- Each Department shall approve at least two expert/guest lectures per semester per faculty member with tentative months and dates
- Each Department shall plan and approve at least one student-centric National level conference/ seminar/ conclave/workshop, etc., either offline/ webinar-based per year.
- Each Department shall plan & approve one faculty-centric National level conference/ seminar/ conclave/workshop, etc., either offline/ webinar-based per year.

- Each Department shall plan & approve at least one industrial / Educational tour per year with specific month and tentative dates.
- Each Department shall plan & approve at least two – community extension/ outreach programmes per semester.
- Each Department shall plan & approve at least one certificate course per semester, one MOOCs by each faculty per year
- Each department shall resolve to publish the number of research papers equivalent to the no. of faculty in the department per year.
- Mandatory publication of at least one book by each faculty member.
- Each department shall discuss, plan & approve at least two best practices for 2024-25.
- Each department shall conduct at least two career guidance programmes for AY 2023-24 in tune with the vision & mission.
- Each department shall resolve the attendance requirements for students to allow them appear for midterm examinations and SEE. 1. 60% attendance for I mid-term examination 2. 75% attendance for II mid and SEE theory & 90% attendance for practical examinations
- Minimum of 60% integration of ICT into transaction of curriculum
- Remedial coaching for slow learners and project works, research, Conferences, etc., for advanced learners.

S.No	Parameter	Unit of Time	Benchmarking (Number/quantity)	Remarks
1	Certificate courses	Semester	1	
2	Value added courses	Semester	1	
3	MOOCs for student	Year	1	
4	MOOCs for faculty	Semester	1	
5	LMS by faculty	Semester	1	Each faculty shall prepare topic wise/ chapter wise LMS (4 - quadrant approach)
6	Field/ industrial/ Educational trips	Year	1	Department level – Each dept shall conduct
7	Research papers	Year	1	Minimum one research publication per year per lecturer
8	Conferences/ Workshops/ – National level	Year	1	Offline (Preferably one month after commencement of odd/ even semester)

9	Conferences/ Workshops/ – State level	Year	1	Webinar (Preferably two months after commencement of odd/ even semester)
10	Book publications	Year	2	Each faculty shall publish atleast one book per year
11	Career Guidance Programmes	Semester	2	1 Department level & 1 by faculty
2	Parent-teacher meetings	Semester	1	
13	Meeting with employers on curriculum design & feedback	Semester	1	At least one week before the beginning of BOS meetings
14	Meeting with Alumni for feed back on curriculum design	Semester	1	At least one week before the beginning of BOS meetings
15	Review meetings on syllabus completion by each			
16	Mentoring (Faculty)	Semester	3 times per candidate	In first week after commencement of semester In sixth week after commencement of semester In Tenth week after commencement of semester 4.
7	Frequency of tests	At the end of every chapter		Its besides CIA
18	Group Discussions, Quiz programs, etc	Monthly/faculty	1 GD 0C1 Quiz 1 Extracurricular activity 1 Career Guidance activity (sports/ c ultural)	

19	Participation of students in seminars/ workshops	Semester	At least 50%of advanced learners shall participate & present papers in conferences/ workshops	
20	Feedback by Department on the Departmental performance and that of faculty performance (Self Assessment of the Department)	Semester	2	15 days after commencement of instruction 10 days before the closure of the instruction for the semester
21	Department wise Slow and advanced learner identification (Class-wise	Semester	1	One week immediately after commencement of instruction basing on previous SEE examination (from II semester onwards) or through test result (for I semester students)
22	Participation of faculty in Conferences/ workshops and paper presentation	Semester	1	Every faculty shall invariably take part and present at least in 2conferences, etc., in other colleges@ at least 1/ each semester onlineor offline.
23	Participation in short term/ FDP/ Orientation/ Refresher course by faculty	Year	1	Each faculty shall invariably take training through mentionedprograms annually
24	Departmental trainings/ FDPs	Semester	1	Each department shall invariably conduct training in pedagogy/ departmental initiatives such as OTLM/ FRS/ research paperwriting, preparation and maintenance of academic documents such as CSP, DS, daily etc.,
25	Research Board meetings	Monthly	1	Each Department shall constitute Research Board (RB) for it with HoD as Chairman and one of the faculty members as Director. It shall prepare Plan of Action per year with No.of publications,

				research activity to be done. Review of progress of research by scholars and guides of the department.
6	Collaborations	Yearly	5-10	
27	Consultancy services	Yearly	Minimum Rs.25000/- generation	Its mandatory on the part of each department to offer consultancy in its areas of study/ research affiliated areas and generate funding through Govt/ Non- Govt organizations.
28	Library usage by faculty members	Monthly	15 Hours	Each faculty member shall optimally utilize library resources, update knowledge through physical and N-LIST resources. Daily Utilization of e-content of N-LIST is recommended.
29	Merit scholarships by Departments	Yearly	Atleast for 10 students of the dept.	Each dept shall mobilize merit scholarships for its students through donors/ philanthropists.
30	Student Grievance redressal	Weekly/ whenever required	1	Each department shall evolve a mechanism for redressing grievances of students. It shall constitute a committee with atleast one woman faculty and two male and two female students each. It shall arrange a grievance box in the HoD room for dropping grievance related letters The committee shall meet at 3:00 P.M on every Monday in the department and open the box in the presence of committee and students. The grievances shall be tabulated and addressed within 3 days. The grievances pertaining to college level shall be sent to the principal.

31	Departmental initiative for progression to Higher Education	Semester	15 classes	Each faculty member shall engage one class per week for coaching for P.G entrance examinations
32	Coaching for Employment. / Skill Development	Semester	1 course	In collaboration with JKC/ Centre for 21 st century skills/ on its own, each department shall offer value addition courses like Indian polity/ Technical skills/ Analytical skills/ Communications skills, etc., for an edge in competitive examinations
33	Environmental sustainability	Weekly	1	Each faculty member shall in at least one day in a week attend the college without personal vehicle (Car/ Bike) and rather use public transportation/ bicycle, the environment friendly modes

**PROCEEDINGS OF THE PRINCIPAL,
P.R. GOVERNMENT COLLEGE(A), KAKINADA – A.P**

Present: Dr. B.V.Tirupanyam,M.Sc;Ph.D.

R.C.No.12A/A.C./BOS/2024-2025,Dated:29.05.2024.

SUB: P.R. Government College (A), Kakinada- UG Boards of studies (BOS)-Program/Course-B.Sc../ Zoology,
Nomination of numbers—Orders issued

REF: 1.UGC Guidelines for Autonomous colleges-2018.

ORDER: The Principal, P.R. Government College(A), Kakinada is pleased to constitute UG 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.

DEPARTMENT OF ZOOLOGY

**Consolidated Report of Board of Studies For The Year 2024-
2025**

AQUACULTURE TECHNOLOGY & B.Voc CA

The Board of studies Meeting in the Department of Zoology was convened on 01-05-2024 at under the Chairmanship of Sri. B. Chakravarthi, Lecturer in Charge, Department of Zoology and Aquaculture Technology. The following members are present:

S.No	Name of the Nominee	Designation	Signature
1	Sri. B. Chakravarthi	Chairman & Lecturer In charge, Department of zoology & Aquaculture	<i>[Signature]</i> 1/5/2024
2	Dr. K. Ramesh Babu	Dept of Marine Living Resources, Andhra University,Vishakapatnam.	Attended online
3	Dr. P. Rameswari	Subject Expert: I, Department of zoology, Dean Research Cell, Adikavi nannaya University, Rajamahendravaram	Attended online
4	Dr. N. Srinivas	Subject Expert: II, Lecturer In zoology, Govt Degree college,Ramachandrapuram.	Attended online
5	Sri. M. Phaneendra	Representative from Industry, Aqua Industry Consultant	<i>[Signature]</i>
8	Dr. P. Kiran Kumar	Member	<i>[Signature]</i>
9	Dr. B. Elia	Member	<i>[Signature]</i>
10	Sri.T.Venkateswara Rao	Member	<i>[Signature]</i>
11	Y. Gowthami	Member	<i>[Signature]</i>
12	P.Vijaya Chandrika	Member	<i>[Signature]</i>
13	B. Devi	Member	<i>[Signature]</i>
15	T. Sushma	Member	<i>[Signature]</i>
16	M. Sowmya	Member	<i>[Signature]</i>
17	R.Sunitha	Member	<i>[Signature]</i>
18	D.R. Manjula	Member	<i>[Signature]</i>
19	O.V. Yellari	Alumni Student Member B.Sc B.Z.C	<i>[Signature]</i>
20	N.Rikitha Sai Lakshmi	Student Member II B.Sc B.Z.C	<i>[Signature]</i>
21	N. Dharani	Student Member II B.Sc B.Z.C	<i>[Signature]</i>
22	P. Ephraem	Student Member II B.Sc B.Z.C	<i>[Signature]</i>

[Signature] 1/5/2024
Signature of the Chairperson

Date : 1-05-2024

The above members are requested to attend the BoS meeting on - 05 -2024 and share their valuable reviews,andsuggestions on the following functionaries.

- Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holdersandNational requirement for consideration and approval of the IQAC and Academic Council.
- Suggested 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.


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P.R. Govt. College (A)
KAKINADA

AGENDA FOR BOARD OF STUDIES MEETING -2024-2024

1. Approval of Single major system for UG B.Sc. Hounours (Zoology) SEM I &SEM II From the adamic year 2024-24
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 newly introduced 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. Action plan 2024-2024
7. Conduct of guest lectures, field visits, assigning of project works etc.
8. Additional inputs and changes in the curriculum.
9. Introducing Certificate course entitled **Certificate Course on Water quality assessment for fresh water Aquaculture**
10. Implementation of Community Service Project and Internship and apprenticeship Programmes introduced from 2020-2021 admitted batch.
11. Continuous Internal Assessment pattern (CIA) introduced by APCCE
12. Designing and conduct of workshops and seminars
13. Arrangement of skill development, training programs and MOUs.
15. Conduct of Bridge Course and Remedial Coaching.
16. 75% attendance compulsory for Mid and Sem End Exams.
17. Course outcome Assessment manual as per UGC norms and Blooms taxonomy
18. Approval of new courses introduced in the academic year 2024-25
19. Any other proposal with the permission of the Chair.

Discussion:

The members of BOS have discussed all the points of Agenda extensively and made the following resolutions

PITHAPUR RAJAH'S GOVT COLLEGE (A), KAKINADA

DEPARTMENT OF ZOOLOGY & AQUACULTURE

BOARD OF STUDIES MEETING (2024-25) CONVENED ON 31ST August 2024-2024

Resolutions

The members, Board of Studies, Zoology met through online and offline on 31-08-2024 at 3.00 PM 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 Course offered by the Department, Internship programmes, Continuous Internal Assessment pattern (CIA) and Semester End examination Pattern.

The following resolutions are made.

Resolution-1

1. It is resolved to adapt Single major system for UG B.Sc **Aquaculture** from the academic year 2024-25 as per the Guidelines of APSHE.
2. It is resolved to follow the syllabus as well as Choice Based Credit System introduced by UGC/APSHE through Adikavi Nannaya University, Rajamahendravaram for I, II-III- & IV-Year students from the academic year 2024-25.

Resolution-2

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

Resolution-3

Resolved to implement 50 % external and 50% internal marks for theory from the academic year 2021-22, 2024-2024 admitted batches, and 60% - 40 % for 2020-2021 admitted batch as mentioned below.

	Internal Assessment 50 M						Ext'l Assessment
I Mid	II Mid	Project	Viva	Seminar	Assignment	Clean & Green	50M (2024 admitted Batch)
25M	25M	10	03	05	05	02	
I Mid	II Mid	Project	Seminar		Assignment etc,	Total	50 M (2021 admitted batch)
25M	25 M	10M	5M		10M	50M	
25M	25M		5M		10M	40M	60 M (2020 admitted batch)

Resolution-4

Resolved to split 50 marks of theory internal as 25 marks for mid exams and 10 marks for project 3 marks for viva, 5 marks for assignment, 2 marks for clean and green activity.

Resolution-5

It is resolved to adopt newly introduced Skill Enhancement Courses (SEC's) in Zoology for the academic year 2022-2024 by APSCHE through affiliating University. It is also resolved to choose first pair consisting of 6A & 7A from Skill Enhancement Courses (SEC's) for V Semester for the academic year 2022-2024 as detailed below.

6A	Sustainable Aquaculture Management
	Sustainable Aquaculture Management Lab
7A	Post-Harvest Technology of Fish and Fisheries
	Postharvest Technology of Fish and Fisheries Lab

Resolution-6

Resolved to implement the Action plan proposed for the Academic year 2024-2024

Resolution VI: Resolved to introduce SDC as prescribed by the APSCHE. Department of Zoology anchoring the Environmental Science, Health and Hygiene in the III semester

Resolution-7

Resolved to offer choice-based Skill Development Courses by Department of Zoology entitled '**Poultry Farming**' and **in III semester and Environmental Studies** as Life skill course in III Semester as prescribed by APSCHE / AKNU and CCE

Resolution-8

It is resolved to follow the existing Syllabus prescribed by APSCHE & Adikavi Nannaya University for the 2021-2022, and 2022-23 admitted batches for III, IV & V semesters with the following additional inputs and changes in the curriculum within the frame work of Autonomy.

Resolution-9

It is resolved to offer a Certificate Course entitled **Water Quality Assessment** for I & II Year students. Also resolved to conduct a certificate course in Biodiversity of Mangrove fauna in the academic year 2024-25.

Resolution-10

Resolved to implement the SOP given by APSCHE through Adikavi Nannaya University regarding I Phase of Internship (Community Service Project) between 1st and 2nd year, II Phase of Internship between 2nd and 3rd year and III phase of internship during entire 6th Semester from 2020-2021 admitted batch onwards.

Resolved to approve assessment process for I, II and III Internships in 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%
Project report	25%,
Presentation	25%

Second Internship shall be undertaken by the students in the intervening summer vacation between the 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.

The weightage shall be:

Project Log	20%
Project Implementation	30%
Project report	25%
Presentation	25%

Third internship shall be for the entire 5th/6th Semester, the student shall undergo **Apprenticeship / Internship / On the Job Training**. The assessment for the V / VI Semester long apprenticeship is for **200 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 weightage 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-11

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 (Annexure II)

Resolution-12

Resolved to arrange Bridge Course for the newly admitted students and remedial classes for slow learners/ Extracurricular/Co-Curricular activities has to be conducted in the 7th hour as instructed by CCE

Resolution-13

It is resolved to make 75% of attendance compulsory for all the students to appear for MID and Sem End exams

Resolution-14

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-15

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.

Resolution-15

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

Resolution-16

Resolved to calculate outcome attainment as per the manual of UGC (Annexure I) and Blooms taxonomy and also resolved to approve action plan for 2024-25 AY.

Resolution-17

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.

Resolution-18

It is resolved to introduce the following new courses in—B.Sc. (Honours) Zoology, from the AY 2024-25

S.No	Course Code	Title of the new course	Programmes inwhich it is introduced
1	AICB23	Introduction to Classical Biology	B.Sc. (Honours) Aquaculture/SEMI
2	AIAB23	Introduction to Applied Biology	B.Sc. (Honours) Aquaculture / SEMI
3	APBS23	Principles Of Biological Sciences (MDC)	B. A/B. Com/(Honours) SEMI
4	ABNC23	Taxonomy and Functional Anatomy of Fin Fish and Shellfish	B.Sc. (Honours) Aquaculture / SEMII
5	ACMB23	Biology of fin fish & shell fish	B.Sc. (Honours) Aquaculture /SEMII
6	ACBPA24	Basic principles of Aquaculture	B.Sc. (Honours) Aquaculture / SEMI
7	ACCF24	CAPTURE FISHERIES	B.Sc. (Honours) Aquaculture / SEMI

8	ACFWA24	FRESH WATER AQUACULTURE	B.Sc. (Honours) Aquaculture / SEMI
9	ACBWA24	BRACKISH WATER AQUACULTURE	B.Sc. (Honours) Aquaculture / SEMI
10	ACFHM24	FISH HEALTH MANAGEMENT	B.Sc. (Honours) Aquaculture / SEMI
11	ACSHM24	SHRIMP MANAGEMENT	B.Sc. (Honours) Aquaculture / SEMI
12	ACFN&FT24	FISH NUTRITION & FEED TECHNOLOGY	B.Sc. (Honours) Aquaculture / SEMI

DEPARTMENT OF ZOOLOGY & AQUACULTURE
PITHAPUR RAJAH'S GOVERNMENT COLLEGE [A]:: KAKINADA
PLAN OF ACTION FOR AY 2024-25

S.No	Activity planned	Dates/ Period	Outcomes/ Objectives	Expenditure to be incurred (Budget) Rs.	Remarks
3	Bos Meetings for the academic year 2024-2025	05-01-2024	To design , develop and enrich curriculum	24000	
4	organization of free Medical Camp for all staff of the Institution	24-06-2024	Faculty welfare, Outreach Activity in collaboration with top class medical organizations	5000	A detailed Budget estimate including Academic and non Academic activities is prepared and submitted
5	Apprenticeship Evaluation	20-06-2024	Assessment and Evaluation		
6	MOOCS enrolment for students	4th week of June 2024	To procure additional credits and to gain knowledge		
7	Bridge course to I Sem students	3rd week of July	To fill the gaps in the curriculum and to enable the students to enter into HE smoothly		
8	Field Trip to B. Voc , Aqua & Zoology students	4th week of July	Experiential learning	100000	
9	National Webinar	Aug-24	Faculty as well as student development	10000	
10	Student seminars Guest lectures to be organized by all Regular faculty	Aug-24	Mandatory for every student Curriculum enrichment and exchange of faculty to share knowledge	10000	
11	Certificate course on Water quality Assessment for Fresh water Aquaculture	Sep-24	To Provide Additional employable skills to students	10000	
12	Training programme to III B. VOC students	Sep-24	To Provide Additional employable skills to students	20000	
13	Field trip to ZOOLOGY and Aqua major students	October 1st week	Experiential learning		
14	Extension Activity on Health and Hygiene in Rural Areas and High schools	November 1st week	Connecting class rooms to community service	10000	
15	Observation of World Aids Day	12-01-2024	Awareness programme on HIV-AIDS	2000	
16	Industrial visits or study tours	Dec-24	Curriculum enrichment and employability		

17	MoU s - 3 (Target)	Academic year 2024-2025	To share and exchange Academic and infrastructural facilities		
18	One day workshop for students in laboratory specimen examination and preservation tech	January 2-3, 2025	To provide practical skill to students		
19	Work shop on Haematological Techniques	Jan-25	Skill development Programme		
20	National Science Day Training to Biology Teachers	Feb 28th	Extending Knowledge and skill to enhance teaching capabilities of Biology teachers	40000	
21	Research guides recognition - 2 target				
22	Practical exams	Mar-25	Learning Assessment of students		
23	Student study Projects for Final year students.	Mar-25	Compulsory assessment programme		
26	Securing Research projects : Target 2 from Govt/ college seed money	2024-2025 Academic year	To encourage research culture among faculty	400000	
27	Research publications - Target at least 1 per Regular faculty	JULY - OCT 2024	To improve research culture	15000	
29	Constitution of Departmental Discussion forum with students and staff	on every 20th day of month	To deliberate on various issues like environment protection, Biodiversity, Health and hygiene		
34	Multidisciplinary activities	Once in a month	To exchange knowledge from other disciplines		
	1. Establishment of Biodiversity park in collaboration with Botany Department. 2. Teaching of Aquaculture economics , Conservation Biology , Bio informatics, Molecular Genetics	Throughout the academic year starting from August 2024 to March 2025	Collaboration with Departments of Economics, Botany, Statistics and Biotechnology etc	100000	
	3. Plantation of saplings in Adopted village				
36	Best Practices				
	1. Out reach activities on Blood Grouping, Mosquito borne diseases, awareness programs on Health & Hygiene and Organ donation etc	August 2024 to March 2025			
	2. Field trips, Internship programmes				
	3. Student act as teacher programme				
			Total	746000	



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

ACADEMIC CELL

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

Department Name: | Zoology & Agriculture.

Name of the BOS Member : Dr. N. Sreenivas.
(University Nomine/Subject Expert/Industrialist/ Member)

I certify that the syllabus submitted by the Zoology & Agriculture Department is verified by me and I recommend the following suggestions..

1. All the syllabus is in tune with affiliating university
2. Followed guidelines of the autonomous college
- 3.
- 4.
- 5.

The syllabus is approved with the above suggested modification

Signature with Date | 15-11-2024
(Dr. N. Sreenivas)

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



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

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

Department Name: Prof K Ramesh Basu

Name of the BOS Member :
(University Nominee/Subject Expert/Industriallist/ Member)

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

- 1.
- 2.
- 3.
- 4.
- 5.

The syllabus is approved with the above suggested modification

K. Ramesh Basu
Signature with Date 01/05/24

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



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

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

Department Name: Zoology & Aquaculture

Name of the BOS Member : Dr. K. Rameshwar Reddy,
(University Nomine/Subject Expert/Industrialist/ Member) -AKNU.

I certify that the syllabus submitted by the Zoology & Department
verified by me and I recommend the following suggestions: Aquaculture

1. Arrange Subject related training programmes
- 2.
- 3.
- 4.
- 5.

The syllabus is approved with the above suggested modification


Signature with Date

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



KAKINADA 533 001-ANDHRA PRADESH
An AUTONOMOUS and NAAC Accredited Institution (A Grade- 3.17 CGPA)
(Affiliated to ADI KAVI NANNAYA UNIVERSITY, Rajamahendravaram.)

ACADEMIC CELL

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

Department Name: Zoology/Aquaculture/ B. Voc Commercial Aquaculture

Name of the BOS Member : M. Phaneendra, Aqua industrialist
(University Nomine/Subject Expert/Industrialist/ Member)

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

1. Include Pearl culture in the syllabus
- 2.
- 3.
- 4.
- 5.

The syllabus is approved with the above suggested modification


Signature with Date 01/05/2024

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

OLD PATTERN V SEMESTER
PITHAPURRAJAH'S GOVERNMENT COLLEGE(A) KAKINADA
DEPARTMENT OF ZOOLOGY
BOARD OF STUDIES MEETING 2024-25
CHOICE BASED CREDIT SYSTEM

(2022-23 admitted batch onwards)

YEAR	SEM	PAPER	TITLE	MARKS (100)		CREDITS
				MID	END	
I	I		Animal Diversity-I	50	50	04
			Biology of Non- Chordates			
			Practical-I		50	01
	II		Animal Diversity- II	50	50	04
			Biology of Chordates			
			Practical-II		50	01
	III	III	Cell biology, Genetics, Molecular Biology& Evolution	50	50	04
			Practical-III		50	01
			Physiology, Cellular Metabolism& Embryology	50	50	04
II			Practical-IV			
	IV	6A	Immunology & Animal Biotechnology	50	50	04
			Practical-V		50	01
			Sustainable Aquaculture Management	60	40	04
III	V		Practical		50	01
			Post- Harvest Technology of Fish and Fisheries	60	40	04
			Practical		50	01
	VI		Apprenticeship			

2023-2024 Admitted Batch onwards Single major System

B.Sc (Honours) with Single Major																								
Semester	Major* (4 Cr)			Minor (4 Cr)			AECC (3 Cr) <i>Lat</i>			Multi Disney' (2 Cr)			Skill Enhanceme nt Courses (2Cr)			OOTC			Env. Edn (2 Cr)			Total		
	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr	C	H	Cr
Sem 1	2*	10	8				2	8	6	1	2	2	2	6	4							7	26	20
Sem 2	2	10	8	1	3+2	4	2	8	6				2	6	4							7	29	22
Community Service Project of 180 hours with 4 Credits.																								
Student is eligible for Exit Option-1 with the award of Certificate in respective discipline																								
Sem 3	4	12+8	16	1	3+2	4				1	2	2	1	2	2							7	29	24
Sem 4	3	9+6	12	2	6+4	8				1	2	2	1	2	2							7	29	24
Short-Term Internship/Apprenticeship/OJT of 180 hours with 4 Credits.																								
Student is eligible for Exit Option-2 with the award of Diploma in respective major with minor																								
Sem 5	4	12+8	16	2	6+4	8													1	2	2	7	32	26
Sem 6	Semester Internship/Apprenticeship/OJT with 12 Credits.																							
Student is eligible for Exit Option-3 with the award of Degree in respetive major																								
																			IKS#					
Sem 7	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22
Sem 8	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22
	21		84	6		24	4		12	3	6	6	10	32	28	2	4	4	2	4	0	47		160
20 Additional Credits for 10 month mandatory Internship/OJT/Apprenticeship																								
C Courses						H Hours						Cr Credits						OOTC Open Online Transdisciplinary						
IKS# Indian Knowledge Systems - Audit Course																								



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

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

w.e.f. AY 2024-25

COURSE STRUCTURE

SEMESTER	Code	Title of the paper	Hr /week	Credits
I	1	Introduction to Classical Biology	5	4
	2	Introduction to Applied Biology	5	4
II	3	Taxonomy and Functional Anatomy of Fin Fish and Shellfish- (T)	3	3
	3	Taxonomy and Functional Anatomy of Fin Fish and Shellfish- (P)	2	1
	4	Biology of fin fish & shell fish - (T)	3	3
	4	Biology of fin fish & shell fish- (P)	2	1
III	5	Basic Principles of Aquaculture- (T)	3	3
	5	Basic Principles of Aquaculture - (P)	2	1
	6	Capture Fisheries- (T)	3	3
	6	Capture Fisheries- (P)	2	1
	7	Fresh water Aquaculture- (T)	3	3
	7	Fresh water Aquaculture- (P)	2	1
	8	Brackish water Aquaculture- (T)	3	3
	8	Brackish water Aquaculture- (P)	2	1
IV	9	Fish Health management- (T)	3	3
	9	Fish Health management- (P)	2	1
	10	Shrimp Health Management- (T)	3	3
	10	Shrimp Health Management- (P)	2	1
	11	Fish nutrition & Feed technology - (T)	3	3
	11	Fish nutrition & Feed technology - (P)	2	1
V	12	Extension, Economics & Marketing- (T)	3	3
	12	Extension, Economics & Marketing- (P)	2	1
	13	Ornamental Fishery- (T)	3	3
	13	Ornamental Fishery - (P)	2	1
	14	Fishery Engineering- (T)	3	3
	14	Fishery Engineering - (P)	2	1
	15	Fish Processing Technology- (T)	3	3
	15	Fish Processing Technology- (P)	2	1
VI		Internship		
VII	16	Post Harvest Technology & Transportation- (T)	3	3
	16	Post Harvest Technology & Transportation - (P)	2	1
	17	Fishery Microbiology- (T)	3	3
	17	Fishery Microbiology - (P)	2	1
	18	Quality Control in Processing Plants. - (T)	3	3
	18	Quality Control in Processing Plants. - (P)	2	1
	19	Crustacean culture- (T)	3	3

VIII	19	Crustacean culture - (P)	2	1
	20 A	Molluscan and Seaweed culture- (T)	3	3
	20 A	Molluscan and Sea weed culture - (P)	2	1
		OR		
	20 B	Genetics in Aquaculture- (T)	3	3
	20 B	Genetics in Aquaculture - (P)	2	1
	21 A	Marine Fin Fish culture- (T)	3	3
	21 A	Marine Fin Fish culture - (P)	2	1
		OR		
	21 B	Fish Immunology- (T)	3	3
	21 B	Fish Immunology - (P)	2	1

B. Sc Major –Aquaculture
First Semester Structure

S.No	Course/paper	Title	Total hrs/week	No.of Credits	Remarks
1.	Major Paper– I	<u>Introduction to Classical Biology</u>	05	4	No Lab
2.	Major Paper– II	<u>Introduction to AppliedBiology</u>	05	4	No Lab
3.	Multidisciplinary courses	<u>Introduction toSocial Work</u>	02	2	A student must choose ONE course from among the six courses listedagainst the semester.
<u>Principles of Psychology</u>					
<u>Indian History</u>					
4.	Skill courses (2 papers)	<u>EntrepreneurshipDevelopment</u>	2+2 =4	2+2	A student mustchoose any TWO of fourcourses
<u>Leadership Skills</u>		(Each course /Paper -2 hrs/ week)			
<u>Analytical Skills</u>					
<u>CommunicationSkills</u>					
5.	English	<u>A Course in Communication and Soft Skills</u>	04	3	
6.	Telugu/ Hindi/ Sanskrit	<u>Relevant paper</u>	04	3	
24 hrs/week				20	

B.Sc. Honours Zoology with Minor

Second Semester Structure

S.No	Subject/ paper	Title	Total hrs /week	No. of Credits	Remarks
1.	Major III	Cell Biology, Genetics, Molecular Biology & Evolution	3+2= 5 Hrs	3+2	
2.	Major IV	Physiology, Cellular Metabolism & Embryology	3+2= 5 Hrs	3+2	
3	Minor I	Cell Biology, Genetics, Molecular Biology & Evolution	3+2= 5 Hrs	3+2	
4	First Language	English	4 Hrs	4	
	Second Language	Tel/San/Hindi	4 Hrs	4	
	Skill Courses (2 Papers)	Business Writing	2+2= 4 Hrs	2+2	A student must choose any TWO of four courses
		Marketing Skills			
		Investment Planning			
		Stock Market Operations			
		Digital Literacy			
Total :27 Hrs.				27	

B.Sc. Aquaculture

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: Aquaculture

Courses for Semesters VII

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

Higher Order Courses for semester-VII

VII	16	Post Harvest Technology & Transportation- (T)	3	3
	16	Post Harvest Technology & Transportation - (P)	2	1
	17	Fishery Microbiology- (T)	3	3
	17	Fishery Microbiology - (P)	2	1
	18	Quality Control in Processing Plants. - (T)	3	3
	18	Quality Control in Processing Plants. - (P)	2	1
VIII	19	Crustacean culture- (T)	3	3
	19	Crustacean culture - (P)	2	1
	20 A	Molluscan and Seaweed culture- (T)	3	3
	20 A	Molluscan and Sea weed culture - (P)	2	1
		OR		
	20 B	Genetics in Aquaculture- (T)	3	3
	20 B	Genetics in Aquaculture - (P)	2	1

	21 A	Marine Fin Fish culture- (T)	3	3
	21 A	Marine Fin Fish culture - (P)	2	1
		OR		
	21 B	Fish Immunology- (T)	3	3
	21 B	Fish Immunology - (P)	2	1

Skill Enhanced Courses Syllabus will be available in due course of time.

**ONE ONLINE COURSE FROM ANY
DISCIPLINE**

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

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE
(AUTONOMOUS) KAKINADA**

	P.R. Government College (Autonomous) Kakinada Department of Zoology & Aquaculture		
UNDER GRADUATE PROGRAM OUTCOMES			
PO 1	Domain Expertise	Acquire comprehensive domain knowledge and skills. Make use of the knowledge in an innovative manner	
PO 2	Hands on learning	Learn “how to learn”- Self-motivated and self-learning. Acquire hands on practical skills Able to use scientific equipment as part of curriculum enrichment	
PO 3	Research and analytical skills	Gain abilities to carryout research activity relevant to the discipline Able to analyze the research findings Learn how to analyze and apply domine knowledge to real life situations	
PO 4	Values and ethics	Develop rational and scientific thinking Ensure the human values & ethics and to follow them throughout the life.	
PO 5	Team works and Experiential learning	Work efficiently as part of team Understand responsibilities as part of a team Enhance conceptual learning by field trips/ workshops and training programs	
PO 6	Efficient Communication & Life Skills	To face challenges and self-sustainability in overcoming the psychological problems. Listen, understand and express views in a convincingmanner. Develop skills to present information clearly and concisely to interested groups.	
PO 7	Environmental Sustainability	Following the green energy measures. Understand sensibly the environmental challenges. Think critically on preventing of	

		environmental pollution. Propagate and follow environment friendly practices.
PO 8	Societal contribution	Involve voluntarily in social development activities at Regional, National levels. Voluntary participation in serving the society from tree plantation, clean & green, outreach activities etc.,. Be a patriotic citizen to uphold the constitutional values of the Nation.
PO9	Effective Project Management	Identify the goals, objectives and components of a project for its completion. Plan, organize and direct the endeavors of teams to achieve the targets in time. Be competent in identifying opportunities and develop strategies and decision making for contingencies.
PO 10	Academic and Professional pursuits	Acquire Academic competencies to reach next level of Higher education Equipped with academic and life skills to pursue their goals of career in their chosen fields

ZOOLOGY BOS 24-25

PROGRAMME OUTCOMES

- Aquaculture is a fascinating programme that provides a platform to the students to learn about various types of culture, cultivable species, Aquatic ecosystems and sustainable Aquaculture practices
- This program enables them to understand Pathology and microbiology in fish and shrimp culture ponds .
- Students can easily understand the concepts of Induced breeding, Bundh breeding, composite culture, Monoculture and Intensive culture practices to pursue either employability or entrepreneurship.
- This program creates deep sense of understanding about food security, nutrition and employment generation in rural areas.
- Aquaculture is an avenue of opportunities as well as challenges where one can explore the potential of huge water resources.

AQUACULTURE COURSE OUTCOMES

Principles of Aquaculture

CO1: Historical Development: Describe the history and development of aquaculture globally and locally.

CO2: Understand the basic principles and practices of aquaculture.

CO3: Identify different types of aquaculture systems and their applications.

CO4: Nurturing the skills on culture methods in practice in world.

Taxonomy of Finfish and Shellfish

CO1: Gain the ability to identify and classify various species of finfish and shellfish.

CO2: Students will be able to use taxonomic keys and other classification tools to accurately identify different species based on their morphological and genetic characteristics.

CO3: Explore the evolutionary relationships and phylogenetic trees of finfish and shellfish.

Functional Anatomy of Finfish and Shellfish

CO1: Learn the fundamental anatomical structures and physiological functions of finfish and shellfish.

CO2: Students will be able to identify and describe the key anatomical features and their functions, such as respiratory systems, digestive systems, and reproductive organs.

Biology of finfish and shell fish

CO1: Describe the anatomical structure of fish and other aquatic organisms.

CO2: Gain Knowledge of feeding habits, gut content analysis and growth factors in fishes. Understand the commercial importance of crustaceans and Fish

CO3: Understand and learn breeding in fishes, breeding habits, method of induced breeding in fishes.

CO4: Acquire knowledge about Endocrine system in fishes

Capture fisheries

CO1: Students will be able to describe the basic principles of capture fisheries,

including various fishing techniques, gear types, and the historical development of fisheries practices.

CO2: identify key species in capture fisheries, explain their ecological importance, and discuss their distribution and abundance.

Fresh water Aquaculture

CO1: Learn the Status, Scope and Prospects of freshwater aquaculture in the world, India and AP.

CO2: Learn about Major Cultivable Indian Carps and Exotic fish Species introduced in India

CO3: Know about recent developments in the culture of clarius, anabas and murrels and special systems of aquaculture.

CO3: Gain knowledge of commercially valuable Fresh water prawns of India and their culturing methods.

Brackish water Aquaculture

CO1: Learn about the types of culture systems

CO2: Gain knowledge on commercial value of prawns in India

CO3: Know about the biology of important shrimps

CO4: Know about the species of crabs and edible oysters cultured

Fish and shrimp Health Management

CO1: Disease Identification: Identify common diseases and health issues in aquaculture species.

Co2: Preventive Measures: Implement preventive measures and biosecurity protocols to minimize disease outbreaks.

CO3: Treatment Methods: Understand various treatment methods for managing diseases in aquaculture.

Fish Nutrition and Feed technology

CO1: Nutritional Requirements: Understand the nutritional requirements of different aquaculture species.

CO2: Feed Formulation: Learn principles of feed formulation and preparation.

CO3: Feeding Strategies: Develop effective feeding strategies to optimize growth and minimize waste.

Extension Economics and Marketing

CO1: Economic Principles: Understand the economic principles related to aquaculture production.

CO2: Cost-Benefit Analysis: Conduct cost-benefit analyses to evaluate the profitability of aquaculture ventures.

CO3: Market Strategies: Develop strategies for marketing aquaculture products effectively.

Marine Biology

CO1: Understand the Divisions, life of Marine Ecosystem

CO2: Assess the Productivity of Marine Ecosystem

CO3: Know the ecological importance of critical ecosystems associated with marine ecosystem

CO4: Judge the adaptations of animals in the marine ecosystem

Marine fisheries

CO1: Understand Marine fishery resources

CO2: Assess the Pelagic fishery resources

CO3: Know the ecological importance of India's EEZ

CO4: Judge the applications of remote sensing & GIS in capture fishery

Water Quality Management

CO1: Water Parameters: Understand the key water quality parameters essential for aquaculture, such as pH, dissolved oxygen, ammonia, and temperature.

CO2: Monitoring Techniques: Learn techniques for monitoring and managing water quality in aquaculture systems.

CO3: Impact of Water Quality: Assess the impact of water quality on the health and growth of aquaculture species.

7.

Breeding and Hatchery Management

CO1: Breeding Techniques: Learn breeding techniques for different aquaculture species.

CO2: Hatchery Operations: Understand the principles and practices of hatchery management.

CO3: Larval Rearing: Gain knowledge in larval rearing techniques and early life stage management.

9. Sustainable Aquaculture Practices

CO1: Environmental Impact: Assess the environmental impact of aquaculture operations.

CO2: Sustainability Principles: Apply principles of sustainability to aquaculture practices.

CO3: Regulatory Compliance: Understand the regulatory frameworks governing aquaculture and ensure compliance.

Aquaculture provides ample opportunities and collectively prepare students for careers in various sectors from farm management to research and policy development.

CO1: Project Planning: Learn project planning and management techniques specific to aquaculture operations.

CO2: Resource Management: Understand the principles of resource management, including labour, capital, and materials.

CO3: Risk Assessment: Conduct risk assessments to identify and mitigate potential challenges in aquaculture projects.

These course outcomes aim to provide students with a comprehensive understanding of aquaculture, equipping them with the knowledge and skills needed for successful careers in the aquaculture industry or further studies in related fields.

B.Sc. Aquaculture

SEMESTER-I

Introduction to Classical biology

Introduction to Applied biology

	Pithapur Rajah's Govt. Degree College (A)Kakinada.	Pro gram & Seme ster B.Sc. Honours in Zoology(Major) Semester-I							
Course Code	TITLE OF THE COURSE COURSE 1: INTRODUCTION TO CLASSICALBIOLOGY								
Teaching	Hours Allocated: 60 (THEORY)								
Pre-requisites:	Basics of Zoology								

Course Objectives:

The student will be able to learn the diversity and classification of living organisms and understand their chemical, cytological, evolutionary and genetic principles.

Course Outcomes:

On Completion of the course, the students will be able to-	
C O1	1. Learn the principles of classification and preservation of biodiversity
C O2	2. Understand the plant anatomical, physiological and reproductive processes.
C O3	3. Knowledge on animal classification, physiology, embryonic development and their economic importance.
C O4	4. Outline the cell components, cell processes like cell division, heredity and molecular processes.
C O5	5. Comprehend the chemical principles in shaping and driving the macromolecules and lifeprocesses.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Develo pment		Employability		Entrepreneurship	
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Syllabus

Unit 1: Introduction to systematics, taxonomy and ecology.

- 1.1. Systematics – Definition and concept, Taxonomy – Definition and hierarchy.
- 1.2. Nomenclature – ICBN and ICZN, Binomial and trinomial nomenclature.
- 1.3. Ecology – Concept of ecosystem, Biodiversity and conservation.
- 1.4. Pollution and climate change.

Unit 2: Essentials of Botany.

- 2.1. The classification of plant kingdom.
- 2.2. Plant physiological processes (Photosynthesis, Respiration, Transpiration, phytohormones).
- 2.3. Structure of flower – Micro and macro sporogenesis, pollination, fertilization and structure of mono and dicot embryos.
- 2.4. Mushroom cultivation, floriculture and landscaping.

Unit 3: Essentials of Zoology

- 3.1. The classification of Kingdom Animalia and Chordata.
- 3.2. Animal Physiology – Basics of Organ Systems & their functions, Hormones and Disorders
- 3.3. Developmental Biology – Basic process of development (Gametogenesis, Fertilization, Cleavage and Organogenesis)
- 3.4. Economic Zoology – Sericulture, Apiculture, Aquaculture

Activities :

- Visit to Zoology Lab and observe different types of preservation of specimens
- List out different hormonal, genetic and physiological disorders from the society

Unit 4: Cell biology, Genetics and Evolution

- 4.1. Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle.
- 4.2. Chromosomes and heredity – Structure of chromosomes, concept of gene.
- 4.3. Central Dogma of Molecular Biology.
- 4.4. Origin of life

Activities:

- Draw the Ultrastructure of Prokaryotic and Eukaryotic Cell.
- Hands-on experience of various equipment – Microscopes
- Visit to Zoo / Sericulture / Apiculture / Aquaculture unit

Unit 5: Essentials of chemistry

- 5.1. Definition and scope of chemistry, applications of chemistry in daily life.
- 5.2. Branches of chemistry
- 5.3. Chemical bonds – ionic, covalent, noncovalent – Vander Waals, hydrophobic, hydrogen bond
- 5.4. Green chemistry

ADDITIONAL INPUTS:

Scope of Biology - For better understanding of importance of Biology in other sciences. Branches of Biology - For systematic study of living things.

Microscopy Slide

preparation

Specimen Collection

Reference books:

Sharma O.P., 1993. Plant taxonomy. 2nd Edition. McGraw Hill publishers.

Pandey B.P., 2001. The textbook of botany Angiosperms. 4th edition. S. Chand publishers, New Delhi, India.

Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International

	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

Publishers.

1. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.
2. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
3. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
4. Karen Timberlake, William Timberlake, 2019. Basic chemistry. 5th Edition. Pearson publishers.
5. Subrata Sen Gupta, 2014. Organic chemistry. 1st Edition. Oxford publishers.

Web Links:

1. <https://www.ignfa.gov.in/document/biodiversity-cell-ntfp-related-issues4.pdf>.
2. <https://www.fao.org/3/cb5353en/cb5353en.pdf>
3. [https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Introductory_Biology_\(CK-12\)/04%3A_Molecular_Biology/4.01%3A_Central_Dogma_of_Molecular_Biology](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Introductory_Biology_(CK-12)/04%3A_Molecular_Biology/4.01%3A_Central_Dogma_of_Molecular_Biology)

CO-PO Mapping:

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

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

DEPARTMENT OF ZOOLOGY

I SEMESTER ZOOLOGY - PAPER - I

COURSE I: **Introduction to Classical Biology**

BLUE PRINT

Time: 2 1/2 hrs

Max. Marks: 50

Unit	Essay	Short
I	1	1
II	1	1
III	1	2
IV	1	1
31V	2 Out of 6, 3 questions should be answered3X10=30M	2 Out of 7, 4questions should be answered 4X5=20M

**COMMON QUESTION PAPER PATTERN TO BE FOLLOWED (From 2021-22AB, 2022-23AB
AND 2024-25AB FOR CORE SUBJECTS)**

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA

DEPARTMENT OF ZOOLOGY

SEMESTER - I

INTRODUCTION TO CLASSICAL BIOLOGY

Time: 2 1/2 Hours

Max Marks: 50M

Section -I

Answer any three of the following questions. Must attempt at least one question from each

part. Each question carries 10 Marks.

3 X 10 = 30M

Part – A

1. Define Biodiversity. Write methods of conservation of biodiversity.
2. Give an account of Classification of Plant Kingdom
3. Describe any 5 animal Hormones and their functions

Part - B

1. Explain ultrastructure of Eukaryotic cell
2. Write an essay on the scope and applications of Chemistry in daily life
3. Write an essay on apiculture

Section II

Answer any four of the following questions

Each question carries 5 marks. 4 X 5 = 20M

1. Systematics
 1. Pollination
 2. Fertilization
 3. Sericulture
 4. DNA
 5. Chemical bonding
 6. Green Chemistry

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honours in Zoology(Major) Semester-I			
Course Code	TITLE OF THE COURSE COURSE 2:INTRODUCTION TO APPLIED BIOLOGY				
Teaching	Hours Allocated: 60 (THEORY)				
Pre-requisites:	Basics of Zoology				

Course Objectives:

The student will be able to learn the foundations and principles of microbiology, immunology, biochemistry, biotechnology, analytical tools, quantitative methods, and bioinformatics.

On Completion of the course, the students will be able to-	
C O1	Learn the history, ultrastructure, diversity and importance of microorganisms.
C O2	Understand the structure and functions of macromolecules.
C O3	Knowledge on biotechnology principles and its applications in food and medicine.
C O4	Outline the techniques, tools and their uses in diagnosis and therapy.
C O5	Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data.

Skill Development		Employability		Entrepreneurship	
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Syllabus Unit 1: Essentials of Microbiology and Immunology

6.1. History and Major Milestones of Microbiology; Contributions of Edward Jenner, Louis Pasteur, Robert Koch and Joseph Lister.

- 6.2. Groups of Microorganisms – Structure and characteristics of Bacteria, Fungi, Archaea and Virus.
- 6.3. Applications of microorganisms in – Food, Agriculture, Environment, and Industry.
- 6.4. Immune system – Immunity, types of immunity, cells, and organs of immune system.

Unit 2: Essentials of Biochemistry

- 2.1. Biomolecules I – Carbohydrates, Lipids.
- 2.2. Biomolecules II – Amino acids & Proteins.
- 2.3. Biomolecules III – Nucleic acids -DNA and RNA.
- 2.4. Basics of Metabolism – Anabolism and catabolism.

Unit 3: Essentials of Biotechnology

- 3.1. History, scope, and significance of biotechnology. Applications of biotechnology in Plant, Animal, Industrial and Pharmaceutical sciences.
- 3.2. Environmental Biotechnology – Bioremediation and Biofuels, Biofertilizers and Biopesticides.
- 3.3. Genetic engineering – Gene manipulation using restriction enzymes and cloning vectors; Physical, chemical, and biological methods of gene transfer.
- 3.4. Transgenic plants – Stress tolerant plants (biotic stress – BT cotton, abiotic stress – salt tolerance). Transgenic animals – Animal and disease models.

Unit 4: Analytical Tools and techniques in biology – Applications

- 4.1. Applications in forensics – PCR and DNA fingerprinting
- 4.2. Immunological techniques – Immunoblotting and ELISA.
- 4.3. Monoclonal antibodies – Applications in diagnosis and therapy.
- 4.4. Eugenics and Gene therapy

Unit 5: Biostatistics and Bioinformatics

- 1.1. Data collection and sampling. Measures of central tendency – Mean, Median, Mode.
- 1.2. Measures of dispersion – range, standard deviation and variance. Probability and tests of significance.
- 1.3. Introduction, Genomics, Proteomics, types of Biological data, biological databases- NCBI, EBI, Gen Bank; Protein 3D structures, Sequence alignment
- 1.4. **Accessing** Nucleic Acid and Protein databases, NCBI Genome Workbench

ADDITIONAL INPUTS

1. Contribution of Yerrapragada Subba Rao to Microbiology
2. Vaccines
3. Life cell bank - stem cell therapy

ACTIVITIES

1. Identification of given organism as harmful or beneficial.
2. Observation of microorganisms from house dust under microscope.
3. Finding microorganism from pond water.
4. Visit to a waste water treatment plant.
5. Retrieving a DNA or protein sequence of a gene'
6. Performing a BLAST analysis for DNA and protein.
7. Field trip and awareness programs on environmental pollution by different types of wastes and hazardous materials.

Reference books:

1. Gerard J., Tortora, Berdell R. Funke, Christine L. Case., 2016. Microbiology: An Introduction. 11th Edition. Pearson publications, London, England.
2. Micale, J. Pelczar Jr., E.C.S. Chan., Noel R. Kraig., 2002. Pelczar Microbiology. 5th Edition. McGraw Education, New York, USA.
3. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
4. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
5. R.C. Dubey, 2014. Advanced Biotechnology. S. Chand Publishers, New Delhi, India.
6. Colin Ratledge, Bjorn, Kristiansen, 2008. Basic Biotechnology. 3rd Edition. Cambridge Publishers.
7. U. Sathyanarayana, 2005. Biotechnology. 1st Edition. Books and Allied Publishers pvt. ltd., Kolkata.
8. Upadhyay, Upadhyay and Nath. 2016. Biophysical Chemistry, Principles and Techniques. Himalaya Publishing House.
9. Arthur M. Lesk. Introduction to Bioinformatics. 5th Edition. Oxford publishers.
10. AP Kulkarni, 2020. Basics of Biostatistics. 2nd Edition. CBS publishers

Web Links:

1. <https://microbiologynote.com/dna-fingerprinting-definition-steps-methods-applications/>
<https://egyankosh.ac.in/bitstream/123456789/41406/1/Unit-4.pdf>

CO-PO Mapping:

(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

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

DEPARTMENT OF ZOOLOGY

I SEMESTER ZOOLOGY - PAPER - II

COURSE II: Introduction to Applied Biology

BLUE PRINT

Time: 2 1/2 hrs

Max. Marks: 50

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

COMMON QUESTION PAPER PATTERN TO BE FOLLOWED (from 2021-22AB, 2022-23AB AND 2023-24AB FOR CORE SUBJECTS)

**PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA DEPARTMENT
OF ZOOLOGY
SEMESTER – I**

Introduction to Applied Biology

Time: 2 1/2 Hours

Max Marks: 50M

Section -I

Answer any three of the following questions. Must attempt at least one question from each part. Each question carries 10 Marks. 3 X 10 = 30M

Part – A

1. Write an essay on applications of microorganisms in food and industry.
2. Describe the classification of carbohydrates.
3. Explain the scope and benefits of environmental biotechnology

Part - B

4. Write an essay on the application of DNA finger printing in forensics
5. Describe the Measures of dispersion
6. Write an essay on transgenic organisms.

Section II

Answer any four of the following questions. Each question carries 5 marks. 4 X 5 = 20M

7. Edward Jenner
8. Proteins
9. Restriction enzymes
10. PBR 322
11. PCR
12. Genomics
13. Sequence alignment

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	P r o g r a m & S e m e s t e r B.Sc. Honours in Zoology (Major) Semester-I		
Course Code	TITLE OF THE COURSE Multidisciplinary Courses PRINCIPLES OF BIOLOGICAL SCIENCES			
Teaching	Hours Allocated: 30 (THEORY)			
Pre-requisites:	Basics of Zoology			

Learning Objectives: By the end of this course the learner can:

1. Acquire logic to evaluate fundamental biological concepts at various levels of biological organisation including the molecular, cellular, organismal and systems levels.
2. Communicate fundamental biological knowledge between tiers of biological organisation.
3. Apply common biological principles across all levels of biological organization.

Learning Outcomes: On completion of this course students will be able to:

1. Understand the relationship between structure and function at all levels.
2. Recognise the mechanisms underlying biological evolution, its patterns, and its significance as biology's overarching unifying principle.
3. Understand the contributions of biology to the resolution of medical, ethical, social, and environmental concerns in human affairs.

UNIT-I Diversity of Life

- 1.1 Introduction to Biology, Branches of Biology, Basic Principles of Biology
- 1.2 Biological Classification-Two kingdom and Five kingdom classification, Viruses, Viroid's and Lichens
- 1.3 Diversity in the living world, Taxonomic categories, Taxonomic aids
- 1.4 Plant organization-The form, structure and function of plant vegetative and reproductive

organs, Classification of Plant Kingdom,

1.5 Basis of Animal Classification, Classification of Animal Kingdom

UNIT-II Biomolecules and metabolism

2.1 Ultra structure of cell and Cell organelles (Structure and Functions), Plant cell vs Animal cell

2.2 Plant Physiology: Photosynthesis, Respiration, Transportation, Mechanisms of Nitrogen fixation.

2.3 Plant growth and development, physiology of flowering.

2.4 Human Physiology: Digestion, Respiration, Circulation

2.5 Male and female reproductive organs, gametogenesis, fertilization.

UNIT-III Principles of Biology

3.1 Genetics: Mendel's laws of inheritance, Genetic disorders- Colour blindness, Sickle cell anaemia.

3.2 Evolution: Geological time scale for evolution of plants and vertebrates, Origin and evolution of plants and man

3.3 Common Human Diseases: causing organism, prevention and treatment- malaria, dengue, AIDS, cancer, corona.

3.4 Common Plant Diseases: causing organism, prevention and treatment- Black spot, Leaf spots, Powdery mildew, Blight, Canker.

3.5 Biotechnology: Tools and process of recombinant DNA technology, Applications of biotechnology in agriculture, food industry, medicine and transgenic animals.

Text Books

1. Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi.
2. Kotpal, R.L. 2022. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut).
3. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.

Reference Books

1. Sreekrishna V. 2005. Biotechnology –I, Cell Biology and Genetics. New Age International Publ. New Delhi, India.
2. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.

BLUE PRINT

MODULE	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTTED TO THE UNIT
MODULE – I	01	02	20
MODULE – II	02	02	30
MODULE – III	02	03	35
Total no.of Questions	05 Of which 3 to be answered	07 Of which 4 to be answered	85 marks including choice Of which 50 marks to be answered

PITAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA
MULTI DISCIPLINARY COURSE SEM I PRINCIPLES OF
BIOLOGICAL SCIENCES MODEL PAPER
SECTION- A

Time: 2hrs.

Max. Marks: 50

Answer any THREE of the following questions

3X10=30

1. Write an overview on five kingdom classification?
2. Discuss the ultrastructure of a cell and the functions of cell organelles. Compare the structure of plant cells and animal cells?
3. Explain the physiology of photosynthesis, respiration, and transportation in plants.
4. Discuss Mendel's laws of inheritance and their significance in understanding genetic traits.
5. Examine common plant diseases. Describe the causal preventive measures, and treatment methods.

SECTION- B

Answer any FOUR of the following questions

4X5=20

6. Viroid
7. Plant Reproductive organs
8. Plant cell structure
9. Fertilization
10. Geological time scale
11. Applications of Biotechnology
12. Photosynthesis

SEMESTER-II

Course 3: Taxonomy and Functional Anatomy of Fin Fish and Shellfish Course

4: Biology of fin fish & shell fish

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honours in Aquaculture(Major) Semester-II			
Course Code	TITLE OF THE COURSE COURSE 3: Taxonomy and Functional Anatomy of Fin Fish and Shellfish				
Teaching	Hours Allocated: 45 (THEORY)				
Pre-requisites:	Basics of Aquaculture				

Course Objectives:

- To understand the taxonomy and functional anatomy position of Fin fish and Shell fish
- To understand the general characteristics of animals belonging to Fin fish and Shell fish
- To understand the structural organization of fin and shell fish
- Understand the digestive and respiratory systems of fin and shell fish
- Understand the reproductive biology of fin and shell

fish fishCourse Outcomes:

On Completion of the course, the students will be able to-	
CO1	Acquire knowledge on the Classification of major groups of Finfish and Shell fish
CO2	Students will be familiar with the Digestive & Respiratory systems of Finfish and Shell fish
CO3	Gain knowledge on the structure and functions of circulatory system
CO4	Understand the difference between the brain of fish and prawn
CO5	Acquire knowledge on the Reproductive system of fish and prawn

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

DEPARTMENT OF ZOOLOGY

Syllabus:

Unit I: General characters & Classification of Cultivable fin fish and shell fish

- 1.1 General Characters of Crustacea
- 1.2 Classification of Crustacean: Major groups up to orders and their important characters
- 1.3 General Characters of fishes
- 1.4 Classification of Fishes: Major groups up to subclass and their important characters.

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

Unit 2: Digestive and Respiratory systems of Fish and shell fish

- 2.1 : Digestive system of fish
- 2.2 Respiratory system of fish
- 2.3 Digestive system of Prawn
- 2.4 Respiratory system of prawn

Activity : comparative study on different systems is emphasized .Seminars/Quiz/Projects are given .

Evaluation : students are evaluated on their knowledge and skills.

Unit 3: Circulatory systems of Fish and shell fish

- 3.1 Cardiovascular system: Structure of heart in fishes
- 3.2 Blood vascular system in prawn

Activity : Detailed study on structure and functions of heart is emphasized.

Unit 4: Nervous system of Fish and shell fish

4.1 Nervous system in fish: Structure and functions of Brain

4.2 Central Nervous system in prawn.

Unit 5: Reproductive system of Fish and shell fish

5.1 Urino-genital system in fishes

5.2 Reproductive system in prawn

Activity: Assignment /Seminar /Quiz/Project/ is conducted

Co-Curricular activities:

- Prepare an album depicting various fin and shell fishes
- Should be able to identify and classify various fin and shell fishes
- Differentiate between different systems and prepare working models of fin and shell fishes
- Thermocol and clay models of fin and shell fishes

REFERENCE BOOKS

Bond E. Carl. 1979. *Biology of Fishes*, Saunders.

Halver JE. 1972. *Fish Nutrition*. Academic Press.

Hoar WS and Randall DJ. 1970. *Fish Physiology*, Vol. I-IX, Academic Press, New York.

Lagler KF, Bardach, JE, Miller, RR, Passino DRM. 1977. *Ichthyology*, 2nd Ed. John Wiley & Sons, New York.

Lovell J. 1989. *Nutrition and Feeding of Fish*. Van Nostrand Reinhold, New York.

Moyle PB and Joseph J. Cech Jr. 2004. *Fishes: An Introduction to Ichthyology*. 5th Ed. Prentice Hall.

Nikolsky GV. 1963. *Ecology of Fishes*, Academic Press.

Web links

[https://med.libretexts.org/Courses/Kansas State University/FNDH 413%3A Science of Food/02%3A A Proteins/2.03%3A Fish Shellfish/2.3.01%3A Fish Classifications and Composition](https://med.libretexts.org/Courses/Kansas_State_University/FNDH_413%3A_Science_of_Food/02%3A_A_Proteins/2.03%3A_Fish_Shellfish/2.3.01%3A_Fish_Classifications_and_Composition)

<https://courseware.cutm.ac.in/courses/anatomy-and-biology-of-finish/>

CO-PO Mapping:

(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	3	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	3	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

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

DEPARTMENT OF ZOOLOGY

II SEMESTER ZOOLOGY - PAPER - I

COURSE 3: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES

BLUE PRINT

Time: 21/2 hrs

Max. Marks: 50

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

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

DEPARTMENT OF ZOOLOGY MODEL PAPER FOR II SEMESTER
ZOOLOGY

PAPER - I

COURSE 3: Taxonomy and Functional Anatomy of Fin Fish and Shellfish

Time: 21/2 hrs

Max. Marks: 50

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

Draw labeled diagrams wherever necessary

3x10=30

SECTION - A PART- I

1. What is the Whittaker's Five Kingdom concept and how does it classify the animal kingdom?
2. Describe the Canal system in sponges
3. Explain Parasitic Adaptations in helminthes

PART- II

4. Explain Vermicompost, economic importance of vermicompost
5. Describe the Pearl formation in Pelecypoda
6. Describe the Water vascular system in star fish

SECTION - B

II. Answer any FOUR of the following:

Draw labeled diagrams wherever necessary

4x5=20

7. Amoeboid Movement
8. Ascon type canal System
9. Trematoda
10. Pathogenisity of Ascaris
11. Nephredia
12. Gastropoda
13. Affinities of Balanoglossus

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY
SEMESTER-II

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester r B.Sc. Honours in Aquaculture(Major) Semester-II			
Course Code	TITLE OF THE COURSE COURSE 3: Taxonomy and Functional Anatomy of Fin Fish and Shellfish				
Teaching	Hours Allocated: 30 (LAB)				
Pre-requisites:	Basics of Aquaculture				

SYLLABUS

List of Practicals:

1. Study of mouth parts in herbivorous and carnivorous fishes
2. Comparative study of digestive system of herbivorous and carnivorous fishes
3. Demonstration of brain of fish
4. Demonstration of cranial nerves of fish
5. Demonstration of Nervous system of prawn
- 6). Exposure of gills of prawn
- 7). Exposure of gills of fish

REFERENCE BOOKS

Bond E. Carl. 1979. *Biology of Fishes*, Saunders. Halver JE. 1972.

Fish Nutrition. Academic Press.

Hoar WS and Randall DJ. 1970. *Fish Physiology*, Vol. I-IX, Academic Press, New York.

Lagler KF, Bardach, JE, Miller, RR, Passino DRM. 1977. *Ichthyology*, 2nd Ed. John Wiley & Sons, New York. Lovell J. 1989. *Nutrition and Feeding of Fish*. Van Nostrand Reinhold, New York.

Moyle PB and Joseph J. Cech Jr. 2004. *Fishes: An Introduction to Ichthyology*. 5th Ed. Prentice Hall.

Nikolsky GV. 1963. *Ecology of Fishes*, Academic Press.

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY
Taxonomy and Functional Anatomy of Fin Fish and Shellfish

PRACTICAL MODEL PAPER

Time: 3hrs

Max. Marks: 50

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

–write notes on

4x5=20M

A. Nauplius

B. Glochidium

C. Alima

D. Oyster eggs

II Write notes on the following

20x1=20M

E. Study of nest building and brooding of fishes

III.

Practical Record
5x1=5 M

Viva voce

5M

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honours in Zoology(Major) Semester-II			
Course Code	TITLE OF THE COURSE COURSE 4: BIOLOGY OF FIN FISH AND SHELL FISH				
Teaching	Hours Allocated: 60 (THEORY)				
Pre-requisites:	Basics of Aquaculture				

Course Objectives :

- Gain Knowledge of feeding habits, gut content analysis and growth factors in fishes. 2. Understand the commercial importance of crustaceans and Fish
- Understand and learn breeding in fishes, breeding habits, method of induced breeding in fishes.
- To create awareness on parental care of Fishes and embryonic and larval development and environmental factors affecting development of major aquaculture organisms.
- Acquire knowledge about Endocrine system in fishes

On Completion of the course, the students will be able to-	
CO1	Gain knowledge on classification of fishes
CO2	Nuturing the skills on food, feed and growth parameters
CO3	Understand the reproductive biology of fish
CO4	Understand the parental care in fishes
CO5	Understand the endocrine system in fishes

Skill Development		Employability		Entrepreneurship	
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Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY II SEMESTER

Course No.: 4 -Biology of Fin Fish & Shellfish

SYLLABUS

UNIT- I: Specialized organs in fish

- 1.1 Sense organs of fishes and crustaceans.
- 1.2 Specialized organs in fishes – electric organ, venom and toxins
- 1.3 Buoyancy in fishes- swim bladder and mechanism of gas secretion
- 1.4 Fish and Crustaceans of commercial importance

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

UNIT- II: Food, Feeding and Growth

- 2.1 Natural fish food, feeding habits, feeding intensity, stimuli for feeding, utilization of food, gut content analysis, forage ratio
- 2.2 Principles of Age and growth determination; growth regulation, Growth rate measurement – scale method, otolith method, skeletal parts as age indicators
- 2.3 Length-frequency method, age composition, age-length keys, absolute and specific growth, back calculation of length and growth, annual survival rate,
- 2.4 Length-weight relationship.

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

UNIT- III: Reproductive Biology

- 3.1 Breeding in fishes, breeding places, breeding habits & places, breeding in natural environment and in artificial ponds, courtship and reproductive cycles
- 3.2 Induced breeding in fishes

3.3 Breeding in shrimp, oysters, mussels, clams, pearl oyster, pila, and cephalopods.

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

UNIT- IV: Development

4.1. Parental care in fishes, ovo-viviparity, oviparity, viviparity, nest building and brooding

4.2. Embryonic and larval development of fishes

4.3. Embryonic and larval development of shrimp, crabs and molluscs of commercial importance

4.4. Environmental factors affecting reproduction and development of cultivable aquatic fin & shell fish

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

UNIT- V: Hormones & Growth.

5.1 Endocrine system in fishes.

5.2 Neuro-secretory cells, androgenic gland, ovary, chromatophores,

5.3 Molting, molting stages, metamorphosis in crustacean shell fish

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

Co- Curricular Activities

- Identify different sense organs of fishes
- To make chart on feed formulation
- To identify age determination of fishes –scales, otolith and skeletal methods
- Collect different larval forms of fish ,shrimps, crabs and molluscs
- To know about hypophyseal techniques from the Fisheries Department.

Text books:

Bone Q et al., 1995. Biology of fishes, Blackie academic & professional, LONDON

Saxena AB 1996. Life of Crustaceans. Anmol Publications Pvt.Ltd., New Delhi

Reference books:

1. Tandon KK & Johal MS 1996. Age and Growth in Indian Fresh Water Fishes. Narendra Publishing House, New Delhi.

2. Raymond T et al., 1990. Crustacean Sexual Biology, Columbia University Press, New York

3. Guiland J.A (ed) 1984. Penaeid shrimps- Their Biology and Management.

4. Barrington FJW 1971. Invertebrates: Structure and Function.ELBS

5. Parker F & Haswell 1992. The text book of Zoology, VolI. Invertebrates (eds. Marshal AJ & Williams). ELBS & Mc Millan & Co

Web Links:

1. <https://www.slideshare.net/sbmptdr/biology-of-finish-2nd-semester-full-sylabus-106322965>

2. <http://ecoursesonline.iasri.res.in/course/view.php?id=427>

CO-PO Mapping:

(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

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

DEPARTMENT OF ZOOLOGY II SEMESTER - AQUACULTURE

COURSE 4: BIOLOGY OF FIN FISH AND SHELL FISH

BLUE PRINT

Time: 2 1/2 hrs

Max. Marks: 50

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

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY MODEL APER FOR II SEMESTER
COURSE 4: BIOLOGY OF FIN FISH AND SHELL FISH

Time: 2 1/2 hrs

Max. Marks: 50

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

Draw labeled diagrams wherever necessary

3x10=30

SECTION - A

PART- I

1. Explain sensory organs of Fish
2. How do you analyze gut contents to estimate quality of fish
3. Write an essay on Induced breeding in fish

PART- II

4. Discuss larval stages in the development of shrimp
5. Discuss the commercial importance of Crabs and Molluscs
6. Write an essay on metamorphosis in crustaceans

SECTION - B

Answer any FOUR of the following:

Draw labeled diagrams wherever necessary

4x5=20

7. Swim bladder
8. Natural fish food
9. Otolith method
10. Artificial ponds
11. Parental care in fish
12. Neurosecretory cells
13. Growth rate measurement

Pithapur Rajah's Govt. Degree College (A) Kakinada.
SEMESTER-II
Course -4: BIOLOGY OF FINFISH AND SHELLFISH

Practical Syllabus

Credits :1

List of Practicals:

1. Length-weight relationship of fishes
2. Gut content analysis in fishes and shrimp
3. Mouth parts and appendages of cultivable prawns, shrimps and other crustaceans
4. Study of eggs of fishes, shrimps, prawns and other crustaceans
5. Study of oyster eggs
6. Embryonic and larval development of fish
7. Study of gonadal maturity and fecundity in fishes and shellfish 8..Observation of crustacean larvae
8. Study of nest building and brooding of fishes

PRESCRIBED BOOK(S)

Bone Q et al., 1995. Biology of fishes, Blackie academic & professional, LONDON

Saxena AB1996. Life of Crustaceans. Anmol Publications Pvt.Ltd., New Delh

REFERENCES:

Tandon KK & Johal MS 1996. Age and Growth in Indian Fresh Water Fishes. Narendra Publishing House, NewDelhi.

Raymond T et al., 1990. Crustacean Sexual Biology, Columbia University Press, New York

GuilandJ.A (ed) 1984. Penaeid shrimps- Their Biology and Management.

1.18 Barrington FJW 1971. Invertebrates: Structure and Function.ELBS

1.19 Parker F & Haswell 1992. The text book of Zoology, VolII. Invertebrates (eds. Marshal AJ & Williams). ELBS & Mc Millan & Co.

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY
ZOOLOGY PRACTICAL SYLLABUS FOR II SEMESTER
BIOLOGY OF FINFISH AND SHELLFISH
PRACTICAL MODEL PAPER

Time: 3hrs

Max. Marks: 50

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

–write notes on

4x5=20M

A. Nauplius

B. Glochidium

C. Alima

D. Oyster eggs

II Write notes on the following

10x2=20M

A. Study of nest building and brooding of fishes

B. Appendages of Prawn

III. Practical Record

5x1=5M

IV. Viva voce

5M

MINOR SYLLABUS FOR AQUACULTURE II SEMESTER

SEMESTER-II COURSE 1: BIOMOLECULES AND ANALYTICAL TECHNIQUES

Theory Credits: 3

3 hrs/week

I. LEARNING OUTCOMES

On successful completion of the course, the students will be able to

1. Learn about classification, structure and properties of Carbohydrates, Proteins and Lipids.
2. Learn about structure and function of DNA, RNA, Vitamins and Bioenergetics.
3. Learn about basic principles of Centrifugation, Chromatography and Electrophoresis.
4. Learn about principles of Spectroscopy, Microscopy and Techniques.
5. Learn about basics of Biostatistics.

II. Syllabus

Unit-I-Carbohydrates, Protein and Lipids

1. Classification, structure, properties of carbohydrates, amino acids, peptide bond and peptides.
2. Classification, structure (primary, secondary, tertiary, quaternary) and functions of proteins.

Denaturation and renaturation of proteins.

3. Classification structure and properties of saturated and unsaturated fatty acids.

Unit-II- Nucleic acid, Vitamins, and Bioenergetics

1. Structure and functions of DNA and RNA.
2. Source, structure, biological role, and deficiency manifestation of vitamin A, B, C, D, E, and K.

Free energy, entropy, enthalpy, and redox potential.

3. High energy compounds, Electron-Transport System and Oxidative Phosphorylation.

Unit-III-Centrifugation, Chromatography, and Electrophoresis

1. Basic principles of sedimentation and types of centrifugations.
2. Principle, instrumentation, and application of partition, absorption, paper, TLC, ion exchange, gel permeation, and affinity chromatography.

3. Basic principles and types of electrophoresis, factors affecting electrophoretic migration. PAGE (Native, SDS-PAGE). Introduction to 2D & Isoelectric Focusing.

Unit - IV-Spectroscopy, Microscopy and Laser Techniques

1. Beer-Lambert law, light absorption and transmission. Extinction coefficient, Design and application of photoelectric calorimeter and UV-visible spectrophotometer. Introduction to crystallography and application.

2. Types and design of microscopes - compound, phase contrast, fluorescent electron microscopy (TEM, SEM).

3. Introduction to radioisotopes, measurement of radioactivity (scintillation counter and autoradiography)

Unit –V- Biostatistics

1. Mean, median, mode, standard deviation,

2. One-way ANOVA, Two-way Anova

3. t-test, F-test and chi-square.

III. Skills Outcome

On Successful Completion of this Course, Student shall be able to

1. learn about basic instruments and their operation

2. learn about Qualitative and Quantitative analysis of carbohydrates

3. Learn about estimations nucleic acids and protein by various methods

4. learn about the separation of molecules by chromatography and electrophoresis

5. Learn about problems on mean median mode

SEMESTER-II

COURSE 1: BIOMOLECULES AND ANALYTICAL TECHNIQUES

Practical Syllabus

Practical Credits: 1

2 hrs/week

1. Introduction to basic instruments (Principle standard operation procedure) demonstration and record

2. Calculation of molarity, normality, and molecular weight of compounds.

3. Qualitative analysis of carbohydrates (sugars)

4. Quantitative analysis of carbohydrates

5. Quantitative estimation of protein - Lowery method

6. Estimation of DNA by diphenylamine reagent

7. Estimation of RNA by orcinol reagent

8. Assay of protease activity

9. Preparation of starch from potato and its hydrolyze by salivary amylase

10. Preparation of standard buffer and pH determination

11. Separation of amino acids by paper chromatography

12. Separation of lipids of TLC

13. Agarose gel electrophoresis

14. Calculation of mean, median and mode

V. REFERENCES

1. Outlines of Biochemistry, 5th Edition, (2009), Erice Conn & Paul Stumpf; John Wiley and Sons, USA

2. Principles of Biochemistry, 4th edition, (1997), Jeffery Zubey; McGraw-Hill College, USA

3. Principles of Biochemistry, 5th Edition (2008), Lehninger, David Nelson & Michael Cox; W.H. Freeman and Company, NY

4. Fundamentals of Biochemistry, 3rd Edition (2008), Donald Voet & Judith Voet; John Wiley and Sons, Inc. USA

5. Biochemistry, 7th Edition, (2012), Jeremy Berg & Lubert Stryer; W.H.Freeman and Company,
6. An Introduction to Practical Biochemistry, 3rd Edition, (2001), David Plummer; Tata McGraw Hill Edu. Pvt.Ltd. New Delhi, India
7. Biochemical Methods,1st Edition, (1995), S.Sadashivam, A.Manickam;New Age International Publishers, India
8. Textbook of Biochemistry with Clinical Correlations, 7th Edition, (2010),Thomas M. Devlin; John Wiley and Sons, USA
9. Proteins: biotechnology and biochemistry, 1st edition, (2001), Gary Walsch; Wiley, USA
10. Biochemical Calculations, 2nd Ed., (1997), Segel Irvin H; John Wiley and Sons, NY
11. Biophysical Chemistry Principles & Techniques Handbook,(2003),
A. Upadhyay, K. Upadhyay, and N. Nath
12. Enzymes: Biochemistry, Biotechnology & Clinical chemistry, (2001), PalmerTrevor,
Publisher: Horwood Pub. Co., England.
13. Analytical Biochemistry, 3rdedition, (1998), David Holmes, H.Peck, Prentice-Hall, UK
14. Introductory Biostatistics, 1st edition, (2003), Chap T. Le; John Wiley, USA.
15. Methods in Biostatistics, (2002), B. K. Mahajan –Jaypee Brothers.
16. Statistical methods in biology, (1995), Bailey, N. T.; Cambridge university press

VI. CO-Curricular Activities

a) Suggested CO-Curricular Activities

1. Assignments
2. Seminars, Group Discussions on related topics
3. Charts preparation on vitamins

SEMESTER-III

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honors in Aquaculture (Major) Semester-III			
Course Code	TITLE OF THE COURSE COURSE 5: BASIC PRINCIPLES OF AQUACULTURE				
Teaching	Hours Allocated: 45 (THEORY)				
Pre- requisites:	Basics of Aquaculture				

Credits :3

COURSE OBJECTIVES

To understand the techniques involved in aquaculture practices

To get a detailed information about aquaculture

To provide a basic idea about the importance of live feed in culture system

On Completion of the course, the students will be able to-	
CO1	Gain knowledge on different types of aquacultures.
CO2	Nurturing the skills on culture methods in practice in world
CO3	Understand the various culture ponds
CO4	Understand the establishment of fish farm
CO5	Understand the various parameters of water and soil of a culture pond

Skill Develop ment		Employabilit y		Entrepreneurship	
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UNIT-I (Introduction)

Course – 5: Basic Principles of Aquaculture SYLLABUS

Definition and History of Aquaculture

Concept of Blue Revolution and Pradhan Mantri Matsya Sampada Yojana (PMMSY)

Present status of Aquaculture at global level, India and Andhra Pradesh

Aquaculture versus Agriculture; Present day needs with special reference to Andhra Pradesh.

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

UNIT-II (Types of Fish Ponds)

Lotic and lentic systems, streams and springs

Classification of ponds based on water resources – spring, rain water, flood water, well water and water course ponds

Functional classification of ponds – head pond, hatchery, nursery, rearing, production and stocking ponds; quarantine ponds, isolation ponds and wintering ponds

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

UNIT- III (Design and Construction of Aqua Farms)

Important factors in the construction of an ideal fishpond – site selection, topography, nature of the soil, water resources

Lay out and arrangement of ponds in a fish farm construction of an ideal fishpond – space allocation, structure and components of barrage Pond.

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

UNIT-IV (Aquaculture Systems and Practices)

Types of aquaculture Fresh water aquaculture - Brackish water aquaculture - Mari culture

Aquaculture Systems – Pond, Raceways, Cage, Pen, Rafts, Running water, Water Recirculating Systems, Bio floc Technology and 3-C System

Pond culture practices- Traditional, Extensive, Modified Extensive, Semi-Intensive, Intensive & Super- intensive systems of fish and shrimp and their significance.

Fin fish culture methods - Monoculture, Poly culture and Monosex culture and Integrated fish farming.

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

UNIT- V (Management Factors of Culture Ponds, Pre-stocking Management

Dewatering, drying, ploughing/desilting.

Predators, weeds and weed fish in culture ponds - Advantages and disadvantages of weed plants; Toxins used for weeding control and control of predators. Liming and fertilization.

Algal blooms and their control

Stocking Management – Stocking density and stocking

Post-stocking Management Feeding: Role of nutrients

Water quality: Physico-chemical conditions of soil and water optimum for culture – temperature, depth, turbidity, light, water and shore currents, PH, DOD, CO₂, NH₃, NO₂

Activity: Assignment /Seminar /Quiz/Project/Peer teaching on the above

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

Text books:

Text Book of Fishery science And Indian Fisheries : C.B. L. Shrivastava.

Reference books:

Handbook on diagnosis and control of bacterial **diseases** in **finfish** and **shellfish** culture.
@inproceedings{Pillai1984HandbookOD .

Web Links:

https://www.adfg.alaska.gov/index.cfm?adfg=fishingpathologylab.pathology_management

<https://www.gov.scot/collections/diseases-of-fish-molluscs-and-crustaceans/>

<https://www.routledge.com/Introduction-to-the-General-Principles-of-Aquaculture/Ackefors-Huner-Konikoff/p/book/9780367401979>

http://pbsiddhartha.ac.in/pbs_admin/UG-Syllabus/BZC/2019/SEM%20VI/ZOOTCL61.pdf **FAO**
<http://www.fao.org/fishery/topic/4340/en>

CO-PO MAPPING

CO-(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

BLUE PRINT

Unit	Essay	Short
I	2	1
II	2	1
III	2	1
IV	2	1
V	2	1

QUESTION BANK

UNIT-I ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Explain the five kingdom classification concept proposed by whittaker.	BT1	CO1	PO2
2	Describe the Classification of Protozoa up to classes with suitable examples	BT2	CO1	PO2
3	Discuss in detail about the reproduction in protozoa	BT1	CO1	PO2
4	Explain the process of locomotion in Protozoa	BT2	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Holozoic nutrition	BT1	CO1	PO2
2	Conjugation	BT2	CO2	PO2
3	Ciliary movement	BT2	CO1	PO1
4	Binary fission	BT1	CO2	PO2
5	Proloculum	BT1	CO1	PO2

UNIT-II ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Describe the Classification of Porifera up to classes with suitable examples	BT1	CO1	PO2
2	Explain the canal system in sponges	BT2	CO1	PO2
3	Describe the process of polymorphism in colenterata	BT1	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Calcaria	BT1	CO1	PO2
2	Obelia	BT2	CO1	PO2
3	Corral reefs	BT1	CO1	PO2
4	Polymorphism	BT1	CO1	PO2

**UNIT-III
ESSAY QUESTIONS**

S.No.	QUESTION	BT-LEVEL	CO	PO
1	Explain the parasitic adaptations in helmenths	BT1	CO1	PO2
2	Illustrate the Life cycle of Ascaris lumbricoides	BT2	CO1	PO2
3	Describe the general characters of platyhelminthes with classification	BT1	CO1	PO2
4	Describe the general characters of Nemathehelminthes with classification with suitable examples	BT1	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	<i>Fasciola hepatica</i>	BT1	CO1	PO2
2	Parasitic adaptations	BT2	CO1	PO2
3	Turbellaria	BT1	CO1	PO2
4	Trematoda	BT2	CO1	PO2

UNIT-IV
ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Illustrate vermiculture and explain the economic importance of vermicompost	BT1	CO1	PO2
2	Describe the Structure of peripatus and its affinities	BT2	CO1	PO2
3	Describe the general characters of Annelida with classification	BT1	CO1	PO2
4	Explain the general characters of Arthropoda with classification			

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Coelom	BT1	CO1	PO2
2	Polychaeta	BT2	CO1	PO2
3	Vermicompost	BT1	CO1	PO2
4	Insecta	BT1	CO1	PO2
5	Crustaceae	BT2	CO1	PO2

UNIT-V
ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Describe the process of pearl formation in pelecypoda	BT1	CO1	PO2
2	Illustrate the water vascular system in star fish	BT2	CO1	PO2
3	Describe the general characters of Mollusca with classification	BT1	CO2	PO1
4	Explain the general characters of Echinodermata with classification	BT2	CO1	PO2

5	Discuss in detail the structure and affinities of Balanoglossus	BT2	CO2	PO1
6	Explain the various larval forms of echinodermata	BT1	CO2	PO1

SHORT QUESTIONS

S.No.	QUESTION	BT LEVE L	CO	PO
1	Gastropoda	BT1	CO1	PO2
2	Affinities of Balanoglossus	BT2	CO1	PO2
3	Hemichordata	BT1	CO1	PO2
4	Peral formation	BT1	CO1	PO2
5	Bipinnaria	BT2	CO1	PO2
6	Auricularia	BT1	CO1	PO2
7	Madriporite	BT1	CO1	PO2

BLUE PRINT

Time: 2 1/2 hrs

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, 4questions should be answered 4X5=20M

Pithapur Rajah's Government College (Autonomous), Kakinada
I year B.Sc., Degree Examinations - II Semester (w.e.f 2024-25)

For 2024-25 batch

SEMESTER-II: COURSE 3: ANIMAL DIVERSITY.1 BIOLOGY OF NON-CHORDATES (MAJOR 1)

Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any FIVE of the following:

3x10=30M

Draw labeled diagrams wherever necessary

SECTION – A

PART- I

1	What is the Whittaker's Five Kingdom concept and how does it classify the animal kingdom?	BT1	CO1	PO2
2	Describe the Canal system in sponges	BT1	CO1	PO2
3	Explain the parasitic adaptations in helmenths	BT1	CO1	PO2

PART- II

44	Explain Vermicompost, economic importance of vermicompost	BT2	CO1	PO2
5	Describe the process of pearl formation in pelecypoda	BT1	CO1	PO2
6	Describe the Water vascular system in star fish	BT2	CO1	PO2

SECTION - B

Answer any FOUR of the following:

Draw labeled diagrams wherever necessary

4x5=20 M

7	Rules of nomenclature.	BT1	CO1	PO2
8	Obelia	BT1	CO1	PO2
9	Trematoda	BT1	CO1	PO2
10	Pathogenicity of Ascaris	BT1	CO1	PO2
11	Nephridia	BT1	CO1	PO2
12	Gastropoda	BT1	CO1	PO2
13	Affinities of Balanoglossus	BT1	CO1	PO2

BASIC PRINCIPLES OF AQUACULTURE MODEL PAPER

Time : 2.30 Hrs.

Max. Marks: 50

SECTION - I

Answer ALL the following. Draw labelled diagrams wherever necessary. 5 x 8 = 40 M

Write an essay on the scope of Aquaculture at global level.

(OR)

Describe the different types of Aquaculture systems.

Explain the lentic and lotic systems.

(OR)

Describe the importance of Plankton and Benthos in culture ponds.

Write an essay on the stocking and production ponds.

(OR)

Describe the Hatchery design and management.

7). Give an account of the important factors in the construction of ideal pond.

(OR)

8). Describe in detail Lay out and arrangements of ponds in a fish farm

Write an essay on the need of fertilizers in culture pond

(OR)

Write an essay on Eradication of predators and weed control

SECTION - II

Answer any TWO of the following. Draw labelled diagrams wherever necessary. 2 x 5 = 10 M

Concept of Blue Revolution

Quarantine ponds

Topography

Monosex culture

Algal blooms

	Pithapur Rajah's Govt. Degree College (A) Kakinada.	Program & Semester B.Sc. Honors in Aquaculture (Major) Semester-III			
Course Code	TITLE OF THE COURSE COURSE 5: BASIC PRINCIPLES OF AQUACULTURE				
Teaching	Hours Allocated: 30 (LAB)				
Pre-requisites:	Basics of Aquaculture				

List of Practicals :

Estimation of Carbonates, Bicarbonates in water samples

Estimation of Dissolved Oxygen

Estimation of Ammonia in water.

Estimation of Total Hardness of water sample.

Study of beneficial and harmful algal species

Collection, identification and isolation of zooplankton and phytoplankton

Collection and study of aquatic weeds, aquatic insects, weed fish and larvivorous fish

Field visit to hatchery, nursery, rearing and stocking ponds of aqua farms.

PRESCRIBED BOOKS:

Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation, New Delhi Pillay TVR, 1996. Aquaculture Principles and Practices, Fishing News Books Ltd., London

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

Boyd CE. 1979. *Water Quality in Warm Water FishPonds*. Auburn University Boyd, CE. 1982. *Water Quality Management for Pond Fish Culture*. Elsevier Sci.

Publ. Co.

FAO. 2007. *Manual on Freshwater Prawn Farming*.

Supplementary Reading

Shepherd, J and Bromage, N. Intensive Fish Farming
Pillay, T.V.R. Advances in Aquaculture
Beveridge. Cage Culture

Advanced Reading

Stickney, R.R. Principles of Warmwater Aquaculture

Web resources

FAO <http://www.fao.org/fishery/topic/4340/en> NACA <http://www.enaca.org/>
VUAT <http://www.vuatkerala.org/static/eng/advisory/fisheries/index.htm> Aquaculture/Pond Dynamics
<http://pdacrsp.oregonstate.edu/pubs/> Wikipedia <http://en.wikipedia.org/wiki/Aquaculture>
Fish farming <http://www.fishfarming.com/>
ICAR <http://www.icar.org.in/indiafishvoice/intro.html> CIFA <http://www.cifa.in/tech.htm> Aquaculture
articles: <http://aquafind.com/articles/aquaculture.php> Aquaculture Articles <http://www.aquarticles.com/>

Other Reference Books:

Friedrich, H.: Marine Biology
Raymont, J.E.C.: Plankton and productivity in the Oceans, Volume 1.
Balakrishna Nair. N. and D.M. Thampy: A textbook of Marine ecology
Broecker, W.S.: Chemical Oceanography
Sverdrup, H.V., M.W., Johnson and R.H. Fleming.: The Oceans -

Pithapur Rajah's Govt. Degree College (A)
Kakinada.
PRACTICAL SYLLABUS MODEL PAPER
BASIC PRINCIPLES OF AQUACULTURE

Time: 3Hrs. Max. Marks: 50

Estimation of Carbonates and Bicarbonates in given water samples. 1x10=10M

Identify the following and draw the labelled diagrams and write notes on Zoo-phytoplankton. 5x4=20M

- (A).
- (B).
- (C).
- (D).
- (E).

Identify the following and draw the labelled diagrams and write notes on Zoo- phytoplanktons. 2 x 2½ = 5M

- (A).
- (B).

Field Book. 1x5=5M

Practical Record. 1x10=10M

III SEMESTER

Course No.: 6 - Capture Fisheries
credits :3

Course Outcomes

CO1: Understand the EEZ concept & its implementation in fisheries

CO2: Knowledge on Fish Distribution

CO3: Acquire Knowledge on the Riverine systems of India

CO4: Gain Knowledge on Reservoir Fishery

Unit I : Fish Catch Statistics :-

1.1 Fish production of the world both inland and marine, contribution of different countries, position of India in the Fish Catches.

1.2 The EEZ concept & its implementation in fisheries. The Indian EEZ, Fishery survey in India

Unit II : Fish Distribution .

2.1 General account of the distribution

2.2 Biology and fishery of important fishes and other aquatic animals of India,

2.3. Economically Important Fresh Water Fishes of Andhra Pradesh.

Unit-III Riverine Fishery I :-

3.1 Important characters of Streams.

3.2 Different riverine systems in India, and their fishery: The Ganga River System, the Brahmaputra river system,

Unit-IV Riverine Fishery II :-

4.1 The East Coast River System.

4.2 The West Coast River System, River Jhelum of the Indus River System, Fisheries of trout and Mahseer, Problems and management.

Unit-V Reservoir Fishery (Lacustrine Fishery) :-

5.1 Definition of a Lake, Origin and classification of lakes.

5.2 Kolleru Lake and its fishery.

5.3 Different reservoirs of River systems in India with special reference to Nagarjuna Sagar

III SEMESTER
Course No.: 6 - Capture Fisheries
credits :1

PRACTICALS SEMESTER – III

1. Identification of Freshwater fishes based on colour, Pigmentation, morphometric and meristic characters and other characters relevant to the group.
 2. Identification of fry and fingerlings of Indian Major Carps.
 3. Examination of Commercially Important Freshwater fishes and prawns, from the point of view of ecology and fishery.
 4. Knowledge of common types of Freshwater craft and gear on models provided in the department.
- Field Work : Visit to fish landing centers of rivers, lakes and reservoirs

Reference Books :-

1. Jhingram, V.G. Fish and Fisheries of India. Second edition 1983, Hindustan Pub.Co. Picker,
2. W.E. Methods for assessment of Fish Production in Fresh Waters. Blackwell Scient. Publ. 1970
3. Bal, D.V. and Veerabhadra Rao, K. Marine Fisheries, Tata MC Grawhill Publications, New Delhi.
4. Srivastava, U.K. et.al. Freshwater aquaculture in India, Oxford and IBH Publ. Co. New Delhi 1980
5. C.B.L. Srivastava – A text book of Fishery Science and Indian Fisheries. Kitab Mahal Agencies, Patna.

III SEMESTER
Course No.: 6 - Capture Fisheries
BLUE PRINT
Time: 2 1/2 hrs Max. Marks: 50
Pithapur Rajah's Govt. Degree College
(A) Kakinada.

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

DEPARTMENT OF ZOOLOGY
MODEL question PAPER FOR
III SEMESTER - ZOOLOGY - PAPER - 6
COURSE 6: CAPTURE FISHERIES

Time: 2 1/2 hrs

Max. Marks: 50

I. Answer any THREE of the following. Choosing at least one from each part.
Draw labeled diagrams wherever necessary

3x10=30

SECTION - A

PART- I

1. Write an essay on EEZ concept and its implementation in fisheries?
2. Write the notes on Biology and fishery of important fishes in India

3. Write an essay on Major river systems in India?

PART- II

4. Write an essay on East Coast river systems in India?

5. Write an essay on Kolleru lake and its fishery resources

6. Define Reservoir? Explain Major reservoirs in India?

SECTION - B

II. Answer any FOUR of the following: Draw labeled diagrams wherever necessary 4x5=20

7. EEZ

8. Coastal Fishery

9. Pelagic resources

10. Characters of streams

11. Trout fisheries

12. Reservoir fisheries

13. Lacustrine fisheries

III SEMESTER

Course No.: 6 - Capture Fisheries

credits :1

PRACTICALS SEMESTER – III

MODEL QUESTION PAPER

Max Marks: 50M

Time: 3Hrs

1. Fish Morphometric and meristic characters- 10M

2. Identify the following commercially important fishes & prawns 4X5=20 M

A)

B)

C)

D)

3. Identification of fishing Craft & Gear 2X5=10M

A)

B)

3) RECORD- 5M

4) VIVA- 5M

Total: 50M

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY
III SEMESTER CODE : 7
B.Sc HONOURS IN AQUACULTURE : MAJOR

	P .R.GOVERNMENT COLLEGE (A) KAKINADA	Program & Semester SEMESTER - IV code 7			
CourseCode	TITLE OF THE COURSE <u>FRESH WATER AQUACULTURE</u>				
Teaching	Hours Allocated: 60 (Theory)				
Pre-requisites:		4	1	2	5

Course outcomes:

Learn the Status, Scope and Prospects of freshwater aquaculture in the world, India and AP.

Learn about Major Cultivable Indian Carps and Exotic fish Species introduced in India

Know about recent developments in the culture of clarius, anabas and murrels and special systems of aquaculture.

Gain knowledge of commercially valuable Fresh water prawns of India and their culturing methods.

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	3	2	2	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

BLUE PRINT

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

Pithapur Rajah's Govt. Degree College (A) Kakinada.
DEPARTMENT OF ZOOLOGY
III SEMESTER
B.Sc HONOURS IN AQUACULTURE : MAJOR
SYLLUBUS

UNIT-1: Introduction to Fresh water Aquaculture

- 1.1 Status, scope and prospects of fresh water aquaculture in the world, India and AP
- 1.2 Different fresh water aquaculture systems

UNIT-II: Carp Culture

- 2-1 Major cultivable Indian carps – Labeo, Catla and Cirrhinus & Minor carps
- 2-2 Exotic fish species introduced to India – Tilapia, Pangassius and Clarius species.

Unit-III Fish culture

- 3.1 Composite fish culture system of Indian and exotic carps
- 3.2 Impact of exotic fish, Compatibility of Indian and exotic carps and competition among them.

UNIT-IV: Culture of air-breathing and cold water fish

- 4.1 Recent developments in the culture of clarius, anabas, murrels,
- 4.2 Advantages and constraints in the culture of air-breathing and cold water fishes-seed resources, feeding, management and production.
- 4.3 Special systems of Aquaculture-brief study of culture in running water, re-circulatory systems, cages and pens, sewage-fed fish culture.

UNIT-V: Culture of Prawn

5.1 Fresh water prawns of India –commercial value

5.2 Macro brachium rosen bergii and M.Malcomsonii biology, seed production, pond preparation, stocking management of nursery and grow-out ponds, feeding, and harvesting.

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

DEPARTMENT OF ZOOLOGY

III SEMESTER

B.Sc HONOURS IN AQUACULTURE : MAJOR

MODEL PAPER

Time: 2 hrs.

Max Marks: 50

Answer any THREE of the following. Choosing at least one from each part. Draw labeled diagrams wherever necessary 3x10=30

SECTION - A PART- I

PART- I

Describe the Status, Scope and Prospects of fresh water aquaculture in the India and AP

Describe the Major cultivable Indian carps

Illustrate the Composite fish culture in india

Explain Feeding, management and production in fresh water culture

Describe the Fresh water prawns in Indi

Discuss on Biology of Malcomsonii

SECTION – B

Answer any FOUR of the following

Draw labeled diagrams wherever necessary 4x5=20

7.Indian fish farming

8. Exotic fish species in India

9.Surface feeders

10.Exotic carps

11. Seed resources

12. commercial value

13.Pond preparation

QUESTION BANK

UNIT-I ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Explain present Status, Scope and Prospects of fresh water aquaculture in the world	BT1	CO1	PO2
2	Describe the Status, Scope and Prospects of fresh water aquaculture in the India and AP.	BT2	CO1	PO2
3	Write a note on Different fresh water aquaculture systems	BT1	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Fresh water aqua culture	BT1	CO1	PO2
2	Scope of fresh water aquaculture	BT2	CO1	PO2
3	Fresh water Aquatic animals	BT1	CO1	PO2
4	Indian fish farming	BT1	CO1	PO2

UNIT-II ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Describe the Major cultivable Indian carps	BT1	CO1	PO2
2	Explain Minor carps In india	BT2	CO1	PO2
3	Describe the Exotic fish species in India	BT1	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Brood stock msintanance	BT1	CO1	PO2
2	Carp seed rearing	BT2	CO1	PO2
3	Fingerlings	BT1	CO1	PO2
4	Culture practice	BT1	CO1	PO2
5	Water quality in fresh water	BT2	CO1	PO2
6	Labeo rohits	BT1	CO1	PO2
7	Characteristics of Pangasius			

UNIT-III
ESSAY QUESTIONS

S.No.	QUESTION	BT- LEVEL	CO	PO
1	Illustrate the Composite fish culture in india	BT1	CO1	PO2
2	Write a note on different types of system of Indian and exotic carps	BT2	CO1	PO2
3	Explsain Compatibility of Indian and exotic carps	BT1	CO1	PO2
4	Illustrate the competition and Compatibility of Indian and exotic carps	BT1	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Advantages of composite fish cultuere	BT1	CO1	PO2
2	What rae composite fishes in india	BT2	CO1	PO2

3	Surface feeders	BT1	CO1	PO2
4	Bottom feeders	BT2	CO1	PO2
5	Attributes of fish culture	BT2	CO1	PO2
6	Exotic carps			

UNIT-IV ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Recent developments in the culture of clarius, anabas	BT1	CO1	PO2
2	Explain Advantages and constraints in the culture of air-breathing	BT2	CO1	PO2
3	Explain Advantages and constraints in the culture of cold water fishes	BT1	CO1	PO2
4	Describe Feeding, management and production in fresh water culture			
5	Write a note on study of culture in running water, re-circulatory systems, cages and pens			
6	Explain the sewage-fed fish culture			

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Advantages of air breathing fishes	BT1	CO1	PO2
2	Functions of air breathing fishes	BT2	CO1	PO2
3	Different types of air breathing fishes	BT1	CO1	PO2
4	Seed resources	BT1	CO1	PO2
5	Cage culture	BT2	CO1	PO2
6	Aqua culture systems	BT1	CO1	PO2

UNIT-V
ESSAY QUESTIONS

uy

S.No.	QUESTION	BT LEVEL	CO	PO
1	Describe the Fresh water prawns in India	BT1	CO1	PO2
2	Study of Macrobrachium rosenbergii	BT2	CO1	PO2
3	Discuss on Biology of Malcomsonii			
4	Management of nursery and grow-out ponds			

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Seed production	BT1	CO1	PO2
2	Pond preparation	BT2	CO1	PO2
3	Harvesting	BT1	CO1	PO2
4	commercial value	BT1	CO1	PO2
5	stocking, management	BT2	CO1	PO2
6	Prawn Nursery	BT1	CO1	PO2
7	Green gland	BT1	CO1	PO2

**B.Sc HONOURS IN AQUACULTURE : MAJOR
PRACTICAL SYLLUBUS**

Identification of important cultivable carps.

Identification of important cultivable air-breathing fishes.

Identification of important cultivable freshwater prawns. 4 Identification of different life history stages of fish.

Identification of different life history stages of freshwater prawn.

Identification of commercially viable crabs – *Scylla serrata*, *Portunus pelagicus*, *P. sanguinolentus*, *Neptunus pelagicus*, *N. Sanguinolentus*.

Identification of lobsters – *Panulirus poly phagus*, *P. ornatus*, *P. homarus*, *P. sewelli*, *P. penicillatus*.

Identification of oysters of nutritional significance *Crosso streamadrasensis*, *C. gryphoides*, *C. cucullata*, *C. rivularis*, *Picnodonta*.

Identification of mussels and clams.

10. Identification of developmental stages of oysters.

PRESCRIBED BOOK(S):

1 Jhingran VG 1998. Fish and Fisheries of India. Hindustan Publishing Corporation, New Delhi

REFERENCES:

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

Srivatsava 1993. Fresh water aquaculture in India, Oxford-IBH, New Delhi
Marcel H 1972. Text book of fish culture. Oxford fishing newsbooks.

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

DEPARTMENT OF ZOOLOGY

III SEMESTER

**B.Sc HONOURS IN AQUACULTURE : MAJOR
PRACTICAL MODEL PAPER**

Max Marks 50

Time 2 hrs

**Identify the following specimens and write a short notes on their
commercial importance**

6x5=30M

1. Carp
2. Fresh water prawn
3. Stages of prawn
4. Crab
5. Oysters
6. Mussel/clam

Record

10 marks

Viva voice

10 marks

Total

50 marks

P.R GOVT COLLEGE (A),KAKINADA
DEPARTMENT OF ZOOLOGY & AQUACULTURE
III SEMESTER
Course No.: 8 - Brackish water Aquaculture

	P .R.GOVERNMENT COLLEGE (A) KAKINADA	Program & Semester			
CourseCode	Brackish water Aquaculture				
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	
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SYLLABUS

OBJECTIVES	LEARNING OUT COME
To understand the development and present status of brackish water farming in India. To understand the types of culture systems,commercial value of prawns in India, biology of important shrimps	Knowledge on development and present status of brackish water farming in India Knowledge on the culture system Know about the biology of important shrimps Know about the species of crabs and edible oysters cultured

Course Outcomes:

CO1:Knowledge on development and present status of brackish water farming in India.

CO2::Learn about the types of culture systems

CO3:Gain knowledge on commercial value of prawns in India

CO4:Know about the biology of important shrimps

CO5:Know about the species of crabs and edible oysters cultured

Unit – I Introduction

1.1 Introduction, History, Development and present status of brackish water farming in India.

1.2 Brackish water as a medium for aquaculture, ecological factors – Abiotic and biotic factors.

1.3 Types of culture systems – Traditional, extensive, semi-intensive and intensive culture systems of shrimp, their management and economics.

Unit – II Culture of brackish water prawns

2.1 Culture practices of *Penaeus monodon*/ *P.vannamei*

2.2 Brackish water prawns of India – Commercial value.

2. Morphotypes and harvesting

Unit – III Biology of Shrimp

3.1 Biology of *Penaeus monodon*,

3.2 Biology of *P.indicus*

3.3 Biology of L.vannamei.

Unit – IV Management practices

4.1. Pond preparation, stocking, of Hatchery, Nursery, grow out ponds. and harvesting of shrimp.

4.2. Nutritional requirements of cultivable prawns.

4.3. Natural food and artificial feeds and their importance in shrimp culture

Unit – V Culture of Brackish water species

5.1 Species of crabs cultured, biology and culture technique, prospects in India.

5.2 Species of edible oysters, culture techniques used for farming edible oysters.

5.3 Important species of pearl oysters and method of artificial pearl production.

CO-PO Mapping

	C1	C2	C3	C4	C5	C6	C7	C8	C9	CO10	SO1	SO2	SO3
C1													
C2													
C3													
C4													
C5													

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

Name of the Department	Semester, Program, Paper Number & Title of the Paper,	Title s of Topics deleted	Topic added in 2024 bos	Percentage of changes made in syllabus	Justification per each topic deleted/added
Zoology & Aquaculture	Nil	Nil	Nil	Nil	Useful for Competitive exams Useful for competitive exams

BLUE PRINT FOR QUESTION PAPER SETTER

MODUL ENO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWERQUEST IONS 5 MARKS	MARKS ALLOTE D TO THE UNIT
Module- I	01	02	20
Module- II	01	01	15
Module- III	01	01	15
Module- IV	02	01	25
Module- V	01	02	25
TOTAL	06 Of which 3to be answered	07Of which 5to be answered	95 marks including choice Of which 50marks to be answered

P.R. Govt. College (Autonomous), Kakinad
Aquaculture major Semester-IV

Course No.: 8 TITLE : Brackish water Aquaculture

MODEL QUESTION PAPER

Time: 2 hrs

Max. Marks :50

PART – 1

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

3 X10 = 30M

SECTION- A

1. Write an essay on types of culture systems BT 1 CO 2 PO 1
2. Write about Commercial value of Brackish water prawn in india BT 1 CO 2 PO 1
3. What are the biological features of Penaeus monodon ? BT 1 CO 2 PO 1

SECTION- B

4. Discuss the management of Nursery pond and grow out ponds BT 2 CO 2 PO 1
5. Describe the importance of Natural and artificial feeds in shrimp culture BT 2 CO 2 PO 1
6. Explain the culture techniques used for edible oysters farming BT 2 CO 2 PO 1

PART – 1

Answer any Four questions

4x5=20M

7. Explain Development of brackish water farming BT 2 CO 2 PO 1
8. What are Abiotic and biotic factors BT 1 CO 2 PO 1
9. Morphotypes BT 1 CO 2 PO 1
10. Describe Biology of L.vannamei. BT 2 CO 2 PO 1
11. Explain Pre- stocking management BT 2 CO 2 PO 1
12. write about crab culture BT 1 CO 2 PO 1
13. Explain Importance of pearl oyster BT 2 CO 2 PO 1

Question Bank

Course No.: 8 TITLE : Brackish water Aquaculture

MODULE-I

Essays

S. NO	Question	BT level	C O	P O
1	Explain History Development and present status of brackish water farming in india	BT 1	C O 2	P O 1
2	Write an essay on types of culture systems	BT 1	C O 2	P O 1
3	Write about Commercial value of Brackish water prawn in india	BT 1	C O 2	P O 1

Shorts

S. No	Question	BT level	CO	PO
1	Biotic Abiotic factors	BT1	CO1	PO1
2	Treditional culture	BT1	CO1	PO1
3	Intensive culture	BT1	CO1	PO1
4	Semi intensive culture	BT1	CO1	PO1

Module II Essays

S. No	Question	BT level	CO	PO
1	Write about Commercial value of Brackish water prawn in india	BT1	CO2	PO1
2	Write about Culture practices of <i>Penaeus monodon</i> / <i>P.vanname</i>	BT1	CO1	PO1
3		BT1	CO1	PO1

Shorts

S. No	Question	BT level	CO	PO
5	Morphotypes	BT1	CO2	PO1
6	Comarcial value of brakish water prawn	BT1	CO2	PO1

Module III

S. No	Question	BT level	CO	PO
1	What are the biological features of <i>Penaeus monodon</i> ?	BT1	CO2	PO1
2	What are the biological features of <i>P.indicus</i> ?	BT1	CO1	PO1
3	What are the biological features of <i>L.vannamei</i> ?	BT1	CO1	PO1

Shorts

S. No	Question	BT level	CO	PO
1	<i>P. monodon</i> ?	BT1	CO2	PO1
2	<i>P.indicus</i> ?	BT1	CO1	PO1
3	<i>L.vannamei</i> ?	BT1	CO1	PO1

S Module IV Essays

S. No	Question	BT level	CO	PO
1	Discuss the management of Nursery pond and grow out ponds	BT2	CO2	PO1
2	Discuss the management of Hatchery pond and Stocking pond	BT2	CO1	PO1
3	Nutritional requirements of cultivable prawns.	BT 2	CO1	PO1
4	Natural food and artificial feeds and their importance in shrimp culture	BT1	CO1	PO1
5	Discuss about Pre Stocking and Post Stocking management	BT2	CO1	PO1

Shorts

S. No	Questions	BT Levels	CO	PO
1	Nursery pond	BT1	CO1	PO1
2	Stocking pond	BT2	CO1	PO1
3	Artificial feed	BT1	CO1	PO1
4	Natural feed			
5	Wet feed and Dry feed			

Module - V Essays

Shorts

S. No	Question	BT level	CO	PO
1.	Explain the culture techniques used for crab farming in india	BT2	CO2	PO1
2.	Explain the culture techniques used for edible oysters farming india	BT2	CO1	PO1
3.	Explain the culture techniques used for pearl oysters farming	BT1	CO1	PO1

S. No	Question	BT level	CO	PO
1	Crab culture			
2	Edible oyster forming	BT2	CO2	PO1
3	Artificial pearl production	BT2	CO1	PO1
4	Techniques used in edible oyster forming			

III SEMESTER

Course No.: 8 - Brackish water Aquaculture

credits :1

1. Identification of cultivable fresh water and marine water prawns (any 3 each)
2. Identification of marine crabs and oysters of commercial importance (any 2 each).
3. Identification of Phytoplankton and Zooplankton (any 5 each).
4. Identification of different live feed organisms for shrimp larvae (any 4)
5. Identification of larval stages of prawn.
6. Demonstration of eye stalk ablation in penaeus monodon.

Practical model paper

Course No.: 8 - Brackish water Aquaculture

credits :1

PRACTICAL MODEL PAPER

1. Demonstration of eye stalk ablation in penaeus	12M
Identification of live feed	8M
1. Identification of spotters	5X4=20M
Fresh water Prawn	
Marine water crab	
Phytoplankton	
Larval stages of prawn	
2. Record	05M
Viva	05M
Total	50M

P.R GOVT COLLEGE (A),KAKINADA
DEPARTMENT OF ZOOLOGY & AQUACULTURE
MAJOR AQUACULTURE IV SEMESTER
COURSE 9: FISH HEALTH MANAGEMENT

	P .R.GOVERNMENT COLLEGE (A) KAKINADA	Program & Semester SEMESTER – IV PAPER-9			
TITLE	Fish health management Paper 9				
Course Code					
Teaching	Hours Allocated: 60 (Theory)				
Pre-requisites:	Credits 3				

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship		knowledge	
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SYLLABUS

OBJECTIVES	LEARNING OUTCOME
To understand the various types of diseases among the cultivable fishes, to learn and apply methods of control and precaution of diseases. To understand the tools for diagnosis, and disease management strategies available today.	Knowledge on the diseases will be learnt. Precautionary measures will be known to prevent the spread of the disease. Knowledge on the diagnostic tools will be learnt. Environmental quality disease free practice will be learnt.

Course outcomes:

Provide students with knowledge about fish diseases and pathological aspects of diseases. 2. Learn about Fungal, Viral and Bacterial diseases of finfish.

Gain knowledge of Nutritional deficiency related diseases and antibiotic and chemotherapeutics. 3. Understand and learn the importance of diagnostic tools in identification of diseases and application and development of vaccines.

SYLLABUS

UNIT I: Pathology and parasitology

Introduction to fish diseases – Definition and categories of diseases – Disease and environment

Disturbance in cell structure – changes in cell metabolism, progressive and retrogressive tissue changes, types of degeneration, infiltration, necrosis, cell death and causes

Atrophy, hypertrophy, neoplasms, inflammation, healing and repair

UNIT II: Fungal and viral Diseases of fin fish.

Fungal diseases (both of shell and finfish) – Saprolegniosis, brachiomycosis, ichthyophthirius diseases – Lagenidium diseases – Fusarium disease, prevention and therapy

Viral diseases – Emerging viral diseases in fish, haemorrhagic septicemia, spring viremia of carps, infectious hematopoietic necrosis in trout, infectious pancreatic necrosis in salmonids, swim-bladder inflammation in cyprinids, channel cat fish viral disease,

Prevention and therapy

UNIT III: bacterial Diseases of fin fish.

Bacterial diseases – Emerging bacterial diseases, aeromonas, pseudomonas and vibrio infections, columnaris, furunculosis,

epizootic ulcerative syndrome, infectious abdominal dropsy, bacterial gill disease, enteric red mouth, bacterial kidney disease, proliferative kidney disease, prevention and therapy

UNIT IV: Protozoan Diseases of fin fish.

4.1 Protozoan diseases: Ichthyophthiriasis (White spot Disease), Costiasis, Whirling disease

: Nutritional diseases

Nutritional pathology – lipid liver degeneration, Vitamin and mineral deficiency diseases. Aflatoxin and dinoflagellates. Antibiotic and chemotherapeutics.

Nutritional cataract. Genetically and environmentally induced disease.

Additional topic

General preventive methods and prophylaxis. Methods of pathological examination of fish and infectious diseases, BMP in Aquaculture

CO-PO Mapping:

(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	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	3	2	2	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

Name of the Department	Semester, Program, Paper Number & Title of the Paper,	Titles of Topics deleted	Topic added in 2024 bos	Percentage of changes made in syllabus	Justification per each topic deleted/ added
Zoology & Aquaculture	Sem IV , Major Aquaculture Paper-9 fish health management	Nil	General preventive methods and prophylaxis. Methods of pathological examination of fish and infectious diseases, BMP in Aquaculture	20%	Useful for Competitive exams Useful for competitive exams

P.R. Govt. College (Autonomous), Kakinada DEPARTMENT OF ZOOLOGY AND AQUACULTURE

Major zoology Semester-IV

TITLE: fish health management – PAPER 9 BLUE PRINT FOR QUESTION PAPER SETTER

MODULE NO.	ESSAY QUESTIONS10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTTED TO THE UNIT
Module -I	01	03	20
Module -II	02	01	25
Module - III	01	02	20
Module - IV	02	01	15
TOTAL	06 Of which 3to be answered	07Of which 5 to be answered	95 marks includingchoice Of which 50 marks to be answered

P.R. Govt. College (Autonomous), Kakinada Aquaculture major Semester-IV

TITLE: fish health management – paper 9 MODEL QUESTION PAPER

Time: 2 hrs Max. Marks :50

PART – 1

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

SECTION- A

Explain about the progressive and retrogressive tissue changes BT3. Write an essay on different fungal diseases in fin fish BT2

Explain the different viral diseases and its prevention methods in fin fish BT1

SECTION-B

Describe the aeromonas, pseudomonas and vibrio infections, columnaris, diseases and their prevention methods

Write an essay on Protozoan diseases: Ichthyophthiriasis Costiasis, Whirling disease and their symptoms in fin fish

Illustrate the Antibiotic and chemotherapeutics

Part – II

Answer any Four questions 4x5=20M

Differences between infiltration, necrosis BT2

Types of degeneration BT1

Neoplasms BT1

10 . Define IHN BT1

epizootic ulcerative syndrome and their symptoms BT2

Dinoflagellates BT2

Nutritional cataract BT2

QUESTION BANK

FISH HEALTH MANAGEMENT MAJOR AQUACULTURE

MODULE -I

Essay Questions

S.NO	QUESTION	BT LEVEL	CO	PO
1	Describe the different categories of diseases	BT 1	co 1	Pso 1
2	Explain about the progressive and retrogressive tissue changes	BT 3	co 2	Pso1
3	Write an essay on Atrophy, hypertrophy	BT 1	co 1	Pso 1

Short Answer Question

S.NO	QUESTION	BT LEVEL	CO	PO
1	Types of degeneration	BT 1	CO 2	PSO 3
2	Difference between infiltration, necrosis	BT 1	CO 1	PSO 2
3	Neoplasms	BT 2	CO 3	PSO 3
4	Environmental diseases in fishes	BT 2	CO 3	PSO 3
5	healing Mechanism of cell	BT 1	CO 1	PSO 2

MODULE II

Essay Question

S.NO	QUESTION	BT LEVEL	CO	PO
1	Explain about Fusarium disease, prevention and therapy	BT 1	CO 3	PSO
2	Write an essay on different fungal diseases in finfish	BT 2	CO3	PSO 5
3	Explain the different viral diseases and its prevention methods in fin fish	BT 1	CO3	PSO 5

Short Answer Questions

S.NO	QUESTION	BT LEVEL	CO	PO
1	infectious pancreatic necrosis in salmonids,	BT 1	CO3	PSO 5
3	Define IHN	BT 2	CO3	PSO 5

Essay Questions

MODULE III

S.NO	QUESTION
1	Describe the aeromonas, pseudomonas and vibrio infections, columnaris, diseases and their prevention methods
2	Summarize the infectious abdominal dropsy, bacterial gill disease, enteric red mouth, bacterial kidney disease their symptoms
3	

Short Answer Questions

S. NO	QUESTION	BT LEVEL	CO	PO
1	Furunculosis disease symptoms and prevention	BT 2	CO3	PSO 2
2	epizootic ulcerative syndrome and their symptoms	BT 1	CO4	PSO 5

Essay Question

MODULE IV

S.NO	QUESTION	BT LEVEL	CO	PO
1	Write an essay on Protozoan diseases: Ichthyophthiriasis Costiasis, Whirling disease and their symptoms in fin fish	BT 3	CO3	PSO2

3	Illustrate the Antibiotic and chemotherapeutics	BT 1	CO1	PSO2
	Explain about environmentally induced diseases in fishes.			
➤ 4	Describe the Vitamin and mineral deficiency diseases in fin fish	BT 1	CO1	PSO2

Short Answer Questions

S.NO	QUESTION	BT LEVEL	CO	PO
1	Aflatoxin	BT 2	CO1	PSO3
2	Dinoflagellates	BT 1	CO2	PSO2
3	Nutritional cataract	BT 1	CO2	PSO2
4	Lipid liver regeneration	BT 1	CO3	PSO1

IV SEMESTER

Course No.: 9 - Fish Health Management

credits :1

Enumeration of Bacteria by TPC Method

Enumeration of total Coli forms

Observation of gross pathology and external lesions of fish with reference to the common diseases in aquaculture

Examination of pathological changes in gills and gut lumen, lymphoid organ, muscles and nerves of fish

Collection, processing and analysis of data for epidemiological investigations of viral diseases

Bacterial pathogens – isolation, culture and characterization

Identification of parasites in fishes: Protozoan, Helminths, Crustaceans

Estimation of dose, calculation of concentration, methods of administration of various chemotherapeutics to fish and shell fish

Estimation of antibiotics used in aquaculture practices

PRESCRIBED BOOK(S):

Shaperclaus W. 1991 Fish Diseases- Vol.I & II. Oxonian Press Pvt.ltd

Roberts RJ 1989. Fish pathology. Bailliere Tindall, New York

Lydia Brown 1993. Aquaculture for veterinarians- fish husbandry and medicine. Pergamon Press. Oxford

REFERENCES:

Shankar KM & Mohan CV. 2002. Fish and Shellfish Health Management. UNESCO Publ. Sindermann CJ. 1990

Walker P & Subasinghe RP. (Eds.). 2005 Principal Diseases of Marine Fish and Shellfish. Vols. I, II. 2nd Ed.

Academic Press

DNA Based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animal Pathogens and Diseases. FAO Publ. Wedmeyer

G, Meyer FP & Smith L. 1999.

Bullock G et.al., 1972 Bacterial diseases of fishes. TFH publications, New Jersey

Post G 1987. Text book of Fish Health. TFH publications, New Jersey

Johnson SK 1995. Handbook of shrimp diseases. Texas A & M University, Texas

PRACTICAL MODEL PAPER FISH HEALTH MANAGEMENT

PRACTICAL MODEL PAPER

1. Enumeration of Bacteria by TPC Method	12M
2. Estimation of antibiotics used in aquaculture practices	8 M
1. Identification of Parasites in fishes	5X4=20M
Protozoan,	
Protozoan,	
Helminths	
Helminths	
Crustaceans	
2. Record	05 M
Viva	05 M
Total	50M

P.R GOVT COLLEGE (A),KAKINADA
DEPARTMENT OF ZOOLOGY & AQUACULTURE
MAJOR AQUACULTURE
IV SEMESTER
COURSE :10-SHRIMP HEALTH MANAGEMENT

	P .R.GOVERNMENT COLLEGE (A) KAKINADA	Program & Semester SEMESTER - IV PAPER- II			
TITLE	Shrimp Health Management Core: X				
Course Code					
Teaching	Hours Allocated: 60 (Theory)				
Pre-requisites:	Credits 3				

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship		knowledge	
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SYLLABUS

OBJECTIVES	LEARNING OUT COME
To understand the various types of diseases effects the shrimps to learn and apply methods of control and precaution of diseases. To understand the tools for diagnosis, and disease management strategies available today.	Knowledge on the diseases will be learnt. Precautionary measures will be known to prevent the spread of the disease. Knowledge on the diagnostic tools will be learnt. Environmental quality disease free practice will be learnt.

Course outcomes:

1. Provide students with knowledge about shrimp diseases and pathological aspects of diseases.
2. Learn about Fungal, Viral and Bacterial diseases of shellfish.
3. Gain knowledge of Nutritional deficiency related diseases and antibiotic and chemotherapeutics
4. Understand and learn the importance of diagnostic tools in identification of diseases and application and

development of vaccines.

5.To know about production of disease free seeds and good feed management.

SYLLABUS

UNIT I: Viral Diseases of shell fish (Symptoms, Treatment and Prophylaxis)

- 1.1 Major shrimp viral diseases –Baculovirus penaeii, Monodon Baculovirus,
- 1.2 Baculoviral midgut necrosis, Infectious hypodermal and haematopoietic necrosis virus, Hepatopancreatic parvo like virus,
- 1.3 Yellow head baculovirus, white spot baculovirus.

UNIT II: Bacterial Diseases of shell fish (Symptoms, Treatment and Prophylaxis)

- 2.1 Bacterial diseases of shell fish –aeromonas, pseudomonas and vibrio infections,
- 2.2 Luminous bacterial disease, filamentous bacterial disease. Prevention and therapy

UNIT III: Protozoan Diseases of shell fish (Symptoms, Treatment and Prophylaxis)

- 3-1 Protozoan diseases-Ichthyophthiriasis, Costiasis,
- 3-2 Whirling diseases, trypanosomiasis

UNIT IV: Health management

- 4.1 Diagnostic tools –immune detection-DNA/RNA techniques, General preventive methods and prophylaxis. Application and development of vaccines.
- 4.2 Quarantine –Significance, methods and regulations for transplants.

UNIT V: Production of diseasefree seeds.

- 5.1 Production of disease-free seeds. Evaluation criteria of healthy seeds.
- 5.2 Good Feed management for healthy organisms, Zero water exchange, Probiotics .

General preventive methods and prophylaxis. Methods of pathological examination of Shrimp and infectious diseases.

Name of the Department	Semester, Program, Paper Number & Title of the Paper,	Titles of Topics deleted	Topics added during BOS meeting November, 2022	Percentage of changes made in syllabus	Justification per each topic deleted/added
Zoology/Aquaculture	Sem IV , Major Aquaculture Paper-10 Shrimp health management	Nil	General preventive methods and prophylaxis. Methods of pathological examination of Shrimp and infectious diseases.	20%	Useful for Competitive exams Useful for competitive exams

CO-PO Mapping:

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

[illegible]

P.R. Govt. College (Autonomous), Kakinada
DEPARTMENT OF ZOOLOGY AND AQUACULTURE
Major Aquaculture Semester-IV
TITLE: SHRIMP HEALTH MANAGEMENT – PAPER :10
BLUE PRINT FOR QUESTION PAPER SETTER

MODUL E NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTION S 5 MARKS	MARKS ALLOTE D TO THE UNIT
Module - I	02	01	25
Module - II	01	02	20
Module - III	01	01	15
Module - IV	01	01	15
Module - V	01	02	20
	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

P.R. Govt. College (Autonomous), Kakinad
Aquaculture major Semester-IV
TITLE: SHRIMP HEALTH MANAGEMENT - Core: X

MODEL QUESTION PAPER

Time: 2 hrs

Max. Marks :50

PART – 1

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

SECTION- A

1. Write an essay on Major shrimp viral diseases. BT1
2. Explain Yellow head and white spot baculoviral diseases. BT1
3. Describe the common bacterial diseases and their treatment in shell fish. BT2

SECTION-B

4. Describe the Discussion about the Ichthyophthiriasis, Costiasis. BT2
5. Write an essay on vaccines development and their Applications. BT2
6. Discuss about the Production of disease-free seeds. BT2

Part – II

Answer any Four questions

4x5=20

7. Baculoviral midgut necrosis BT2
8. Prevention and therapy of Bacterial diseases. BT1
9. filamentous bacterial disease
10. trypanosomiasis. BT1
11. Good Feed management BT2
12. Quarantine. BT2
13. Disease Diagnostic tools(PCR) BT2
14. Probiotics BT1

P.R. Govt. College (Autonomous), Kakinad
Aquaculture major Semester-IV
TITLE: Shrimp health management - Core: X

QUESTION BANK

UNIT:I ESSAY QUESTIONS

- 1..Write an essay on Major shrimp viral diseases.BT1
- 2.Discuss the Yellow head and white spot baculoviral diseases.BT2
- 3.Describe the Baculoviral midgut necrosis, Infectious hypodermal and haematopoietic necrosis virus.BT2

Shorts

1. Baculoviral midgut necrosis
2. Hepatopancreatic parvo like virus.
- 3.Treatment and prophylaxes of viral diseases.

UNIT:II ESSAY QUESTIONS

- 1.Describe the common bacterial diseases and treatment in shell fish. BT2
- 2.Describe the aeromonas, pseudomonas and vibrio infections and their prevention.BT2
- 3.Prevention and therapy of bacterial diseases.

Shorts

- 1 Luminous bacterial disease.
- 2.filamentous bacterial disease
- 3.aeromonas, pseudomonas infections
- 4 Vibrio infections.

UNIT:III ESSAY QUESTIONS

1. Describe the Discussion about the Ichthyophthiriasis, Costiasis.BT2
- 2.Write an essay on Whirling diseases and trypanosomiasis.BT1
- 3.Describe the protozoan diseases and their treatment in shell fish .BT2

Shorts

- 1.Ichthyophthiriasis.
- 2.Costiasis.
- 3.Whirling diseases
- 4.trypanosomiasis.
- 5.Preventions of protozoan diseases.

UNIT:IV ESSAY QUESTIONS

- 1.Write an essay on vaccines development and their Applications.BT2
- 2.Discuss about the Immunological techniques used in disease diagnosis.BT2

Shorts

- 1.Quarantine.
- 2.Disease Diagnostic tools.
- 3.Vaccines

UNIT:IV ESSAY QUESTIONS

1. Discuss about the Production of disease-free seeds. BT2
2. Explain Good Feed management for healthy organisms.
3. Define probiotics. Elaborate probiotics used for shell fish growth.

Shorts:

- 1.. Probiotics.
- 2 .Good feed management for shell fish growth.
3. Diseases -free seeds.
4. Evaluation criteria of healthy seeds.

IV SEMESTER

Course No.:10 - Shrimp Health Management

credits :1

1. Enumeration of Bacteria by TPC Method
2. Observation of gross pathology and external lesions of fish and prawn with reference to the common diseases in aquaculture
3. Examination of pathological changes in gut lumen, hepatopancreas, lymphoid organ, muscles and nerves of prawn and shrimp
4. Collection, processing and analysis of data for epidemiological investigations of viral diseases
5. Bacterial pathogens – isolation, culture and characterization
6. Antibigrams – preparation and evaluation
7. Molecular and immunological techniques; Biochemical tests; PCR; ELISA; Agglutination test; Challenge tests; Purification of virus for development of vaccines (Demonstration at institutes/labs)
8. Estimation of dose, calculation of concentration, methods of administration of various chemotherapeutics to fish and shell fish
9. Estimation of antibiotics used in aquaculture practices
10. Estimation of probiotics used in aquaculture

PRACTICAL MODEL PAPER
FISH HEALTH MANAGEMENT

PRACTICAL MODEL PAPER

1.Enumeration of Bacteria by TPC Method	12 M
2. Estimation of antibiotics used in aquaculture practices	8 M
3.Identification of Parasites in fishes	5X4=20M
Protozoan,	
Protozoan,	
Helminths	
Helminths	
Crustaceans	
Record	05 M
Viva	05 M
Total	<u>50M</u>

IV SEMESTER

Course No.: 11 - **Fish nutrition & Feed technology**

credits :3

Course outcomes:

1. Understand Nutritional requirements of cultivable fishes and factors affecting energy partitioning and feeding.
2. Know different types of feed and FCR and different types of feeders
3. Gain Knowledge of Feed manufacture and storage methods of feeds
4. Understand the value of Feed additives and Non-Nutrient ingredients.
5. To create awareness of different nutritional deficiency and importance of natural and supplementary feeds and balanced diet.

P. R. GOVERNMENT COLLEGE (A) KAKINADA

TITLE OF THE COURSE: FISH NUTRITION & FEED TECHNOLOGY

SEMESTER - III PAPER-III

SYLLUBIUS

UNIT-I: Nutritional requirements of cultivable fish

- 1.1 Requirements for energy, proteins, carbohydrates, lipids, fiber, micronutrients for different stages of cultivable fish and prawns
- 1-2 Essential amino acids and fatty acids, protein to energy ratio, nutrient interactions and protein sparing effect
- 1.3 Dietary sources of energy, effect of ration on growth, determination of feeding rate, check tray

UNIT-II: Forms of feeds & Feeding methods

- 2-1 Feed conversion efficiency, feed conversion ratio and protein efficiency ratio
- 2-2 Wet feeds, moist feeds, dry feeds, mash, pelleted feeds, floating and sinking pellets, advantages of pelletization
- 2-3 Manual feeding, demand feeders, automatic feeders, surface spraying, bag feeding and tray feeding

UNIT-III: Feed manufacture & Storage

- 3-1 Feed ingredients and their selection, nutrient composition and nutrient availability of feed ingredients
- 3-2 Feed formulation – extrusion processing and steam pelleting, grinding, mixing and drying, pelletization, and packing
- 3-3 Water stability of feeds, farm made aqua feeds, micro-coated feeds, micro-encapsulated feeds and micro-bound diets
- 3-4 Microbial, insect and rodent damage of feed, chemical spoilage during storage period and proper storage methods.

UNIT-IV: Feed additives & Non-nutrient ingredients

- 4-1 Binders, anti-oxidants, probiotics
- 4-2 Feed attractants and feed stimulants
- 4-3 Enzymes, hormones, growth promoters and pigments
- 4-4 Anti-metabolites, aflatoxins and fiber.

UNIT-V: Nutritional Deficiency in Cultivable fish

5-1 Protein deficiency, vitamin and mineral deficiency symptoms

5-2 Nutritional pathology and ant-nutrients

5-3 Importance of natural and supplementary feeds, balanced diet.

REFERENCE BOOK(S):

1. HALVER JE 1989. Fish nutrition. Academic press, San diego
2. Lovell rt 1998. Nutrition and feeding of fishes, Chapman& Hall, NewYork
3. Sena de silva, trevor a anderson 1995. Fish nutrition in aquaculture. Chapman&Hall,
4. Guiland J.A (ed) 1984. Penaeid shrimps- Their Biology andManagement.
5. Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation, NewDelhi

IV SEMESTER

Course No.:11 - **Fish nutrition & Feed technology**

Practical syllabus

credits :1

1. Estimation of protein content in aquaculture feeds
2. Estimation of carbohydrate content in aquaculture feeds
- 3 Estimation of lipid content in aquaculture feeds
4. Estimation of ash in aquaculture feed
5. Study of water stability of pellet feeds
6. Feed formulation and preparation in the lab
7. Study of binders used in aquaculture feeds
8. Study of feed packing materials
9. Study of physical and chemical change during storage
- 10.Study on physical characteristics of floating and sinking feeds
- 11.Visit to a aqua-feed production unit

PREScribed BOOK(S):

- 1.HALVER JE 1989. Fish nutrition. Academic press, San diego

REFERENCES:

- 1.1 Lovell rt 1998. Nutrition and feeding of fishes, Chapman & Hall, New York
- 1.2 Sena de silva, trevor a anderson 1995. Fish nutrition in aquaculture. Chapman & Hall, New York.

P. R. GOVERNMENT COLLEGE (A) KAKINADA
TITLE OF THE COURSE: FISH NUTRITION & FEED TECHNOLOGY
SEMESTER - III PAPER-III
QUESTION BANK

MODULE-I
ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Describe nutrients required for Cultivable fish.	BT1	CO1	PO2
2	Explain about Factors affecting energy partitioning and feeding.	BT2	CO1	PO2
3	Describe nutrient interactions and protein sparing effect.	BT1	CO1	PO2
4	Explain various types of dietary sources of energy.	BT2	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	List out Essential amino acids.	BT1	CO2	PO2
2	Explain Protein sparing effect	BT2	CO2	PO3
3	Use of Check tray method	BT3	CO1	PO2
4	Define Micronutrients different stages of cultivable fish and prawns.	BT1	CO1	PO2

MODULE-II
ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Illustrate different types of feeds with nutrient composition.	BT3	CO2	PO3
2	Demonstrate the process of selection of feed ingredients	BT3	CO3	PO2
3	Summarize different types of feeds and advantages of pelletization.	BT2	CO2	PO3

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Explain about Pelletization.	BT2	CO2	PO3
2	Define farm made aqua feeds.	BT1	CO1	PO2
3	Explain extrusion processing and steam pelleting.	BT2	CO1	PO2
4	Differentiate Bag feeding & Tray feeding	BT3	CO2	PO3

MODULE-III ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Define about chemical spoilage during storage period and proper storage methods.	BT1	CO2	PO3
2	Summarise the selection of nutrient of feed ingredients	BT2	CO1	PO3
3	List out the feed formulation methods.	BT1	CO2	PO2
4	Explain importance about water stability of feeds.	BT2	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Explain extrusion processing and steam pelleting.	BT2	CO2	PO3
2	Define composition and nutrient availability in feed ingredients.	BT1	CO1	PO2
3	State about microencapsulated feeds.	BT1	CO2	PO3
4	Explain mode of microbial damage of feed.	BT2	CO1	PO2

MODULE-IV
ESSAY QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Explain the importance and usage of Probiotics and Anti metabolites	BT2	CO2	PO3
2	List out the feed additives and their importance.	BT1	CO1	PO2

SHORT QUESTIONS

S.No.	QUESTION	BT LEVEL	CO	PO
1	Explain about feed Binders.	BT2	CO2	PO3
2	Differentiate about the feed attractants and feed stimulants.	BT4	CO3	PO4
3	Use of enzymes, Growth promoters.	BT3	CO2	PO3
4	Define aflatoxins and fibres.	BT1	CO3	PO2

P. R. GOVERNMENT COLLEGE (A) KAKINADA
TITLE OF THE COURSE: FISH NUTRITION & FEED TECHNOLOGY
SEMESTER - III PAPER-III
MODEL QUESTION PAPER
Time: 2 hrs. Max Marks: 50

PART – I

Note: Answer any THREE questions choosing at least one question from each section. Draw diagrams wherever necessary. 3 x10=30 Marks

SECTION- A

Describe nutrients required for Cultivable fish.(BTL1)
Explain various types of dietary sources of energy.(BTL2)
Illustrate different types of feeds with nutrient composition.(BTL3)

SECTION- B

Demonstrate the process of selection of feed ingredients.(BTL2)
Describe about chemical spoilage during storage period and proper storage methods.(BTL1)
Explain the importance and usage of Probiotics and Anti metabolites(BTL2)

PART-II

Answer any FOUR of the following questions. Draw labelled diagrams wherever necessary. 4x5=20 Marks

Explain Protein sparing effect(BTL2)
 Use of Check tray method(BTL1)
 Summarize Feed conversion Ratio(BTL3)
 Explain about Pelletization.(BTL2)
 Define farm made aqua feeds. (BTL1)
 Define Binders.(BTL1)
 List out the Feed attractants and Feed stimulants(BTL3)

P. R. GOVERNMENT COLLEGE (A) KAKINADA
TITLE OF THE COURSE: FISH NUTRITION & FEED TECHNOLOGY
SEMESTER - III PAPER-III

Time: 2 hrs.

Max Marks: 50

BLUE PRINT

MODULE NO.	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTTED TO THE UNIT
MODULE – I	01	02	20
MODULE – II	01	02	20
MODULE – III	02	01	25
MODULE – IV	02	02	30
Total number of Questions	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

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

P.R. GOVERNMENT COLLEGE (A), KAKINADA CHOICE

BASEDCREDIT SYSTEM

	P. R. GOVERNMENT COLLEGE (A)KAKINADA	Pro gram & Seme ster SEMES TER -V PAPER- VI			
Course Code	TITLE OF THE COURSE MARINE BIOLOGY				
Teac hing	Hours Allocated: 60 (Theory)				

Pre-requisites:					
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I.

II. COURSE OUT COMES:

- After successful completion of this course student will be able to
- Understand the Divisions, life of Marine Ecosystem
- Assess the Productivity of Marine Ecosystem
- Know the ecological importance of critical ecosystems associated with marine ecosystem
- Judge the adaptations of animals in the marine ecosystem

III. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

Unit – I Introduction:

Divisions of marine environment- pelagic, benthic, euphotic, aphotic divisions and their subdivisions.

Life in oceans – general account of major groups of phytoplankton, sea weeds, major zooplankton groups.

Environmental factors affecting life in the oceans- salinity, temperature, light, currents, waves, tides, oxygen, and carbon dioxide.

Unit – II

2.1 Primary, secondary and tertiary production.

2.2 Marine food chains and food webs. Vertical migration of zooplankton. Phytoplankton-Zooplankton relationship, plankton and fisheries.

Unit – III

3.1 Benthos- a life in rocky, sandy, and muddy shores.

3.2 Mangroves Ecosystem and Ecological importance

3.3 Coral reefs ecosystem-ecological importance

Unit – IV

4.1 Boring and fouling organisms- examples with adaptations.

4.1 Nekton- outline composition of nekton, habitats of nekton.

4.3 Bioluminescence and indicator species, red tides

Unit –V

5.1 Biology and classification of marine mammals,

5.2 Adaptations in marine mammals for conserving body heat and submersion for long dive.

IV. References:

Reference Books

1. Carmelo, T.R., 1997. Identifying Marine Phytoplankton by Academic Press.
2. ICES Zooplankton Methodology Manual Ed. by Harrish. R., P. Wiebe., J. Leng., H.R. Skyoldal., M. Huntley. Academic Press 2000.
3. Gage. J.D. and Tyler, P.A. 1991. Deep Sea Biology, Cambridge University Press, Cambridge.
4. William, C., 1991. Seashore life between the tides. Dover Publication
5. Makoto, Omori and Tsutomu Ikeda, 1984. Methods in Marine Zooplankton Ecology, Wiley & Sons. Inc. Canada
6. Venkataraman, K., C. Raghunathan. R. Raghuraman and C.R. Sreeraj. 2012. Marine Biodiversity in India, Zoological Surv. India, Kolkata, 164pp.
7. Morrissey, J.F. and J.L. Sumich. 2012. Introduction to the Biology of Marine Life. Jones & Bartlett learning, U.K., 467pp.
8. Kathiresan, K and S.Z. Qasim 2005. Biodiversity of Mangrove Ecosystems. Hindustan Lever Limited.
9. Fish, J.D & S. Fish. 2010. A Students Guide to the Seashore. Cambridge University Press, 527pp.
10. Chapman, V.J. and D.J. Chapman, 1980. Seaweed and Their Use. Chapman & Hall, London.
11. Chapman, V.J., 1976. Mangrove Vegetation. J. Gramer, Berlin.
12. Balakrishnan Nair, N. and D.M. Thampy, 1980. A Text Book of Marine Ecology. The Macmillan Co. of India Ltd., New Delhi
- 13 Svedrup et al The Oceans Prentice Hall
14. Tait RV Elements of marine ecology Butterworths
15. Riley & Skirrow Chemical Oceanography Academic Press

CO-POMapping:

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

[illegible]

BLUE PRINT

Time: 21/2 hrs

Max. Marks: 50

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

P. R. GOVERNMENT COLLEGE (A) KAKINADA

TITLE OF THE COURSE: MARINE BIOLOGY SEMESTER -V PAPER-VI

MODEL QUESTION PAPER

Time: 2 1/2 hrs. Max Marks: 50

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

Draw labeled diagrams wherever necessary 3x10=30

SECTION - A PART- I

Write an essay on environmental factors affecting the life in oceans

Describe the divisions of Marine environment

Explain about the relationship of phytoplankton and zooplankton

PART- II

Describe the ecological importance of mangrove ecosystem

Discuss about boring and fouling organisms

Analyze the advantages of marine mammal adaptations.

SECTION - B

Answer any FOUR of the following:

Draw labeled diagrams wherever necessary 4x5=20

See weed

Primary production

Marine food chain

Rocky shore environment

Nekton habitat

Red tides

Coral reefs

P. R. GOVERNMENT COLLEGE (A) KAKINADA

TITLE OF THE COURSE: MARINE BIOLOGY
SEMESTER -V PAPER-VI Course 6A: MARINE BIOLOGY

PRACTICAL (LAB) SYLLABUS

Lab work - Skills Outcomes:

- After successful completion of this practical course student will be able to
- Operate the instruments for collection of plankton
- Identify the plankton
- Preserve the plankton

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

C 4

1. Study of common instruments used for collection of phytoplankton
2. Study of common instruments used zooplankton
3. Study of common instruments benthos.
4. Collection, preservation and analysis of phytoplankton, zooplankton, and benthos
5. Identification of Phytoplankton – (Identification and Record work)
6. Identification of Zooplankton - (Identification /Microscopy/Record work)
7. Identification of Boring and fouling organisms

Lab references

ICES Zooplankton Methodology Manual Ed. by Harrish. R., P. Wiebe., J. Leng., H.R. Skyoldal., M. Huntley. Academic Press 2000.

[https://drs.nio.org/drs/bitstream/handle/2264/95/Zooplankton_Manual.pdf?sequence=1&isAllowed](https://drs.nio.org/drs/bitstream/handle/2264/95/Zooplankton_Manual.pdf?sequence=1&isAllowed=y)

[y https://drs.nio.org/drs/bitstream/handle/2264/97/Phytoplankton-manual.PDF](https://drs.nio.org/drs/bitstream/handle/2264/97/Phytoplankton-manual.PDF)

http://www.coastalwiki.org/wiki/Sampling_tools_for_the_marine_environment

<https://www.fao.org/3/W3732E/w3732e0s.htm>

<https://adkinstruments.in/categories/oceanography/plankton-nets>

<https://www.slideshare.net/poojakamble1609/fouling-and-boring>

P. R. GOVERNMENT COLLEGE (A) KAKINADA

TITLE OF THE COURSE: MARINE BIOLOGY
SEMESTER -V PAPER-VI

Course 6A: MARINE BIOLOGY PRACTICAL (LAB) MODEL PAPER

1. Phytoplankton /Zooplankton/Benthos collection instrument details explanation with diagram ---10
2. Phytoplankton /Zooplankton/Benthos collection instruments Explanation with diagrams ----- 10
3. Collection of Zooplankton/Phytoplankton/Benthos—procedure / Preservation of

Zooplankton/Phytoplankton/Benthos.....5

Marks

4. Spotters/images/charts 5 x 4= 20 Marks

A. Zooplankton

B. Phytoplankton

C. Benthos

D. Borer

E. Fouler

5. Record 5 Marks

P.R. GOVERNMENT COLLEGE (A), KAKINADA CHOICE BASED CREDIT SYSTEM
MARKET ORIENTED COURSE- AQUACULTURE TECHNOLOGY

	P. R. GOVERNMENT COLLEGE (A) KAKINADA	Pro gram & Seme ster SEMES TER -V PAPER- VII			
Course Code	TITLE OF THE COURSE MARINE FISHERIES				
Teaching	Hours Allocated: 60 (Theory)				
Pre- requisites:					

Semester – V Course 7 A: MARINE FISHERIES

Learning Outcomes:

- After successful completion of this course student will be able to
- Understand Marine fishery resources
- Assess the Pelagic fishery resources
- Know the ecological importance of India's EEZ
- Judge the applications of remote sensing & GIS in capture fishery

I. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

Unit – I

- 1.1 Classification and definition of fishery zones and fishery resources of world.
- 1.2 Overview of marine fisheries resources of the world and India.
- 1.3 Marine capture fishery of Andhra Pradesh.

Unit – II

- 2.1 Major exploited marine fisheries of India, their developmental history and present status
- 2.2 Pelagic fisheries of India: sardines, mackerels, anchovies, tuna, ribbonfish, Bombay duck, pomfrets, mullets.
- 2.3 Features and trends in the production of pelagic fisheries. Conservation of pelagic fish stocks.

Unit – III

3.1 Demersal fisheries of India: sharks, major perches, threadfin, breams, sciaenids, silver belly.

3.2 Features and trends in production of demersal fisheries.

3.3 Impact of trawling. Conservation of demersal fish stocks.

Unit – IV

4.1 Potential marine fishery resources of the India's EEZ.

4.2 History of deep-sea fishing.

4.3 Oceanic and deep-sea fisheries of India. Deep sea fishing policy of India.

Unit – V

5.1 GIS and remote sensing in marine capture fishery

5.2 Ancillary fishery resources - seaweeds, crab, lobsters, chank and bivalves.

II. References:

Text Books

1. Bal, D.V., and Rao, K.V. 1990. Marine Fisheries of India. Tata McGraw Hill Pub. Co.

2. Srivastava, C.B.L. and Mahal, K., 1999. A text book of fishery science and Indian fisheries. Shree Publishers.

Reference Books

1. Carmelo, T.R., 1997. Identifying Marine Phytoplankton by Academic Press.

2. ICES Zooplankton Methodology Manual Ed. by Harrish. R., P. Wiebe., J. Leng., H.R. Skyoldal., M. Huntley. Academic Press 2000.

3. Biswas, K.P. 2011. Marine Prawns & Shrimps. Daya Publishing House, Delhi, 329pp.

4. ICAR 2011. Handbook of Fisheries and Aquaculture. ICAR, New Delhi, 1116 pp.

5. Jhingran, V.G. 1983. Fish and Fisheries of India. Hindustan Publ. Corpn. (India), Delhi, 666 pp.

6. Pillai, N.G.K. 2011. Marine Fisheries & Mariculture in India. Narendra Publishing House, Delhi, 352pp.

7. Aravind Kumar, 2004. Fishery Management. APH Publ. Corpn., New Delhi, 371 pp.

8. Belgrano & Andrea. 2011. Ecosystem Based Management for Marine Fisheries. Cambridge University Press, Cambridge, 402pp.

9. Dholakia, A.D. 2004. Fisheries and Aquatic Resources of India. Daya Publ. Hse., Delhi.

10.

FAO

(2012). The State of World Fisheries and Aquaculture. FAO Fisheries and Aquaculture Department, FAO, Rome
(<http://www.fao.org/docrep/016/i2727e/i2727e00.htm>)

11 ICAR 2011. Handbook of Fisheries and Aquaculture. ICAR, New Delhi, 1116 pp.

BLUE PRINT

Time: 21/2 hrs

Max. Marks: 50

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

TITLE OF THE COURSE: MARINE FISHERIES

SEMESTER -V PAPER-VII

MODEL QUESTION PAPER

Time: 2 1/2 hrs. Max Marks: 50

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

Draw labeled diagrams wherever necessary 3x10=30

SECTION - A PART- I

Write an essay on the marine fishery resources of India

Describe the Divisions of Marine environment

Write an essay on the sardine and mackerel fishery of India

PART- II

Describe the conservation measures of demersal fish stocks.

Describe the history of deep-sea fishing.

Write an essay on the application of remote sensing in marine fish capture.

SECTION - B

Answer any FOUR of the following:

Draw labeled diagrams wherever necessary 4x5=20

Marine fishery of AP

Ribbon fish

Conservation of pelagic fish stock

Silver belly fish

EEZ of India

Deep sea fishing policy

Seaweed economic importance

P.R. GOVERNMENT COLLEGE (A), KAKINADA CHOICE

BASEDCREDIT SYSTEM

MARKET ORIENTED COURESE- AQUACULTURE TECHNOLOGY

Course 7 A: MARINE FISHSERIESPRACTICAL (LAB) SYLLABUS

III. Lab work - Skills Outcomes:

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

Identify the commercially important marine products

Analyze the marine catches

Identify the potential marine landing centers

Understandthe records related to catch data

IV.

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

1. Visit to marine fish landing centers.
2. Familiarization of commercially important groups viz., marine and elasmobranchs, crustaceans, molluscs and seaweeds
3. Analysis of marine catches by major crafts and gears
4. Analysis and species composition of commercial fish catches at landing and centers
5. Maintenance of records of marine fish catch data
6. GIS and Remote Sensing Applications in capture fishery

V.

Lab References:

<http://krishi.icar.gov.in/jspui/handle/123456789/63903>

https://mpeda.gov.in/?page_id=1007

<https://icar.org.in/content/icar-cmfri-launches-gis-based-info-vicinity-fish-landing-centres-covid-19-hotspots>

<https://incois.gov.in/MarineFisheries/PfzAdvisory>

<http://kvkernakulam.org.in/fishwatch.html>

**P. R. GOVERNMENT COLLEGE (A) KAKINADA TITLE OF THE
COURSE: MARINE FISHERIES**

SEMESTER -V PAPER-VII Course 7A: MARINE FISHERIES

PRACTICAL (LAB) MODEL PAPER

- | | |
|---|------------------|
| 1.SPOTTERS | 5 X 4 = 20 Marks |
| A. MARINE FISH | |
| B. MARINE FISH | |
| C. MARINE ELASMOBRANCH | |
| D. MARINE ELASMOBRANCH | |
| E. MARINE CRUSTACEAN | |
| 2.Submission of Report on the filed vist to Fish landing center with photos and catches | 20 Marks |
| 3.Record | 5 Marks |
| 4.Viva-voce | 5 M |

B VOC COMMERCIAL AQUACULTURE

DEPARTMENT OF

Zoology and Aquaculture 2024-25

(CHOICE BASED CREDIT SYSTEM)

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

**.R. Govt. College (Autonomous), Kakinada DEPARTMENT OF
ZOOLOGY AND AQUACULTURE**

**B.VOC (Commercial Aquaculture) SYLLABUS AND NAME OF THE PAPERS NSDC, NSQF & ASCI - LEVELS OF
ASSESSMENT – 2020-21**

II

Second Semester

(30)

1.	Core III	Freshwater	100	4	Major I	Zoology	100	4
		er, Brackishwater and Mariculture Lab	50	1		Practical	50	1
2.	Core IV	Crafts and Gears in Fisheries	50	2	Major II	Chemistry	100	4
		Lab/ind. training	50	1	Languages	Practical	50	1
						English	100	3
						Language T/H/S (ICT)-Computer dept	100	3
							50	2
III	II Year				Life skills and skill development course	(Diary techniques)- Zoology dept	50	2
						(Fruit & Veg preservation)- Botany dept	50	2
Core V	Core VI	Third Semester						(30)
		Aquaculture Nutrition	100	4	Major I	Zoology Practical	100	4
		Lab Inland and	50	2	Major II	Chemistry	100	4
		Marine Fisheries Lab/ind. training	50	1	Languages	Practical	100	4
						English	100	3
						Language T/H/S (Environment education)- Zoology dept.	100	3
					Life skills and skill development course	(Personality development and leadership)-Eng. dept.	50	2
						(Environment audit)- Chemistry dept.	100	2
							100	1
							50	1
IV		Fourth Semester						
		Pathology in Aquaculture	100	4				
Core VII		Practical	50	1	Major I	Zoology I	100	4
		Fisheries	100	4		Practical	50	1
Core VIII		Management	50	1		Zoology II	100	4
						Practical	50	1
		Practical						

Major II					Chemistry I	100	4
					Practical	50	1
					Chemistry II	100	4
					Practical	50	1
V	III Year FIFTH Semester				SEC A	100	4
	CORE IX	MARINE BIOLOGY	100	4	ZOOLOGY	50	1
		LAB	50	1	SEC A LAB	100	4
MAJOR I	CORE X	MARINE FISHERIES	100	4	SEC B	50	1
		LAB	50	1	ZOOLOGY	100	4
					SEC B LAB	50	1
					ZOOLOGY	100	4
					SEC A	50	1
MAJOR II					CHEMISTRY		
					SEC A		
					CHEMISTRY		
					LAB		
					SEC A		
					CHEMISTRY		
					SEC B		
					CHEMISTRY LAB		
SIX Semester INTERNSHIP							

P.R. GOVERNMENT COLLEGE (A),
KAKINADA
CHOICE BASED CREDIT SYSTEM B VOC COMMERCIAL
AQUACULTURE

	P. R. GOVERNMENT COLLEGE (A) KAKINADA	Program & Semester SEMESTER - V			
Course Code	TITLE OF THE COURSE MARINE BIOLOGY				
Teaching	Hours Allocated: 60 (Theory)				
Pre-requisites:	CORE IX				

I. COURSE OUT COMES:

- After successful completion of this course student will be able to
- Understand the Divisions, life of Marine Ecosystem
- Assess the Productivity of Marine Ecosystem
- Know the ecological importance of critical ecosystems associated with marine system
- Judge the adaptations of animals in the marine ecosystem

Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit test etc.)

Unit – I Introduction:

Divisions of marine environment- pelagic, benthic, euphotic, aphotic divisions and their subdivisions.

Life in oceans – general account of major groups of phytoplankton, sea weeds, major zooplankton groups.

Environmental factors affecting life in the oceans- salinity, temperature, light, currents, waves, tides, oxygen, and carbon dioxide.

Unit – II

2.1 Primary, secondary and tertiary production.

2.2 Marine food chains and food webs. Vertical migration of zooplankton.

Phytoplankton-Zooplankton relationship, plankton and fisheries.

Unit – III

- 3.1 Benthos- a life in rocky, sandy, and muddy shores.
 - 3.2 Mangroves Ecosystem and Ecological importance
 - 3.3 Coral reefs ecosystem-ecological importance
-

Unit – IV

- 4.1 Boring and fouling organisms- examples with adaptations.
- 4.1 Nekton- outline composition of nekton, habitats of nekton.
- 4.3 Bioluminescence and indicator species, red tides

Unit –V

- 5.1 Biology and classification of marine mammals,
- 5.2 Adaptations in marine mammals for conserving body heat and submersion for long dive.

II. References:

Reference Books

- 1. Carmelo, T.R., 1997. Identifying Marine Phytoplankton by Academic Press.
- 2. ICES Zooplankton Methodology Manual Ed. by Harrish. R., P. Wiebe., J. Leng., H.R. Skyoldal., M. Huntley. Academic Press 2000.
- 3. Gage. J.D. and Tyler, P.A. 1991. Deep Sea Biology, Cambridge University Press, Cambridge.
- 4. William, C., 1991. Seashore life between the tides. Dover Publication
- 5. Makoto, Omori and Tsutomu Ikeda, 1984. Methods in Marine Zooplankton Ecology, Wiley & Sons. Inc. Canada
- 6. Venkataraman, K., C. Raghunathan. R. Raghuraman and C.R. Sreeraj. 2012. Marine Biodiversity in India, Zoological Surv. India, Kolkata, 164pp.
- 7. Morrissey, J.F. and J.L. Sumich. 2012. Introduction to the Biology of Marine Life. Jones & Bartlett learning, U.K., 467pp.
- 8. Kathiresan, K and S.Z. Qasim 2005. Biodiversity of Mangrove Ecosystems. Hindustan Lever Limited.
- 9. Fish, J.D & S. Fish. 2010. A Students Guide to the Seashore. Cambridge University Press, 527pp.

10. Chapman, V.J. and D.J. Chapman, 1980. Seaweed and Their Use. Chapman & Hall, London.
11. Chapman, V.J., 1976. Mangrove Vegetation. J. Gramer, Berlin.
12. Balakrishnan Nair, N. and D.M. Thampy, 1980. A Text Book of Marine Ecology. The Macmillan Co. of India Ltd., New Delhi
- 13 Svedrup et al The Oceans Prentice Hall
14. Tait RV Elements of marine ecology Butterworths
15. Riley & Skirrow Chemical Oceanography Academic Press
16. Newell RC Biology of intertidal animals Logos Press
17. Kinne O (Ed) Marine ecology John Wiley & Sons
18. Marshall NB Aspects of Deepsea Biology Hutchinson
19. Ekman S Zoogeography of the sea. Sidgwick & Jackson
20. <http://ecoursesonline.iasri.res.in/course/view.php?id=430>

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
CO 1	1	2	2	1	2	2	3	2	3	2	2	2	2
CO 2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO 3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO 4	2	2	3	2	2	2	2	2	2	2	2	2	2
CO 5	2	2	1	1	1	2	2	1	1	1	1	1	2

BLUE PRINT

Time: 2 1/2 hrs

Max. Marks: 50

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

P. R. GOVERNMENT COLLEGE (A) KAKINADA
B VOC COMMERCIAL AQUACULTURE

TITLE OF THE COURSE: MARINE BIOLOGY SEMESTER -V CORE IX

MODEL QUESTION PAPER

Time: 21/2 hrs

Max. Marks: 50

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

Draw labeled diagrams wherever necessary

3x10=30

SECTION - A PART- I

1. Write an essay on the environmental factors affecting the life in oceans
2. Describe the Divisions of Marine environment
3. Explain about the phytoplankton zooplankton relationship.

PART- II

1. Describe the ecological importance of mangrove ecosystem.
2. Write an essay on the boring and fouling organisms with suitable examples.
3. Write an essay on the adaptations in Marine mammals

SECTION - B

Answer any FOUR of the following:

1. Draw labeled diagrams wherever necessary
2. Sea weed
3. Primary production
4. Rocky shore- environment
5. Coral reefs ecological importance
6. Bioluminescence
7. Body heat conservation by marine mammals

4x5=20

AQUACULTURE

TITLE OF THE COURSE: MARINE BIOLOGY SEMESTER -V

CORE IX CORE IX : MARINE BIOLOGY PRACTICAL (LAB) SYLLABUS

Lab work - Skills Outcomes:

- After successful completion of this practical course student will be able to
- Operate the instruments for collection of plankton
- Identify the plankton
- Preserve the plankton

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

1. Study of common instruments used for collection of phytoplankton
2. Study of common instruments used zooplankton
3. Study of common instruments benthos.
4. Collection, preservation and analysis of phytoplankton, zooplankton, and benthos
5. Identification of Phytoplankton – (Identification and Record work)
6. Identification of Zooplankton - (Identification /Microscopy/Record work)
7. Identification of Boring and fouling organisms

Lab references

ICES Zooplankton Methodology Manual Ed. by Harrish. R., P. Wiebe., J. Leng., H.R. Skyoldal., M. Huntley. Academic Press 2000.

https://drs.nio.org/drs/bitstream/handle/2264/95/Zooplankton_Manual.pdf?sequence=1&isAllowed=y

<https://drs.nio.org/drs/bitstream/handle/2264/97/Phytoplankton-manual.PDF>

http://www.coastalwiki.org/wiki/Sampling_tools_for_the_marine_environment

<https://www.fao.org/3/W3732E/w3732e0s.htm>

<https://adkinstruments.in/categories/oceanography/plankton-nets>

<https://www.slideshare.net/poojakamble1609/fouling-and-boring>

P. R. GOVERNMENT COLLEGE (A) KAKINADA
TITLE OF THE COURSE: MARINE BIOLOGY
SEMESTER -V CORE IX
B VOC COMMERCIAL AQUACULTURE CORE IX :
MARINE BIOLOGY PRACTICAL (LAB) MODEL PAPER

1. Phytoplankton /Zooplankton/Benthos collection instrument details explanation with diagram ---10
2. Phytoplankton /Zooplankton/Benthos collection instruments Explanation with diagrams 10
3. Collection of Zooplankton/Phytoplankton/Benthos—procedure / Preservation of Zooplankton/Phytoplankton/Benthos..... 5 Marks
4. Spotters/images/charts 5 x 4= 20 Marks

1. Zooplankton
2. Phytoplankton
3. Benthos
4. Borer
5. Fouler

Record 5 Marks

P.R. GOVERNMENT COLLEGE (A), KAKINADA

CHOICE BASED CREDIT SYSTEM

B VOC COMMERCIAL AQUACULTURE

	P. R. GOVERNMENT COLLEGE (A) KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE MARINE FISH SERIES	SEMESTER - V CORE X			
Teaching	Hours Allocated: 60 (Theory)				
Pre-requisites:	CORE X				

Semester – V Course CORE X : MARINE FISH SERIES Learning Outcomes:

After successful completion of this course student will be able to

Understand Marine fishery resources

Assess the Pelagic fishery resources

Know the ecological importance of India's EEZ

Judge the applications of remote sensing & GIS in capture fishery

Syllabus:

Unit – I

Classification and definition of fishery zones and fishery resources of world.

Overview of marine fisheries resources of the world and India.

Marine capture fishery of Andhra Pradesh.

Unit – II

Major exploited marine fisheries of India, their developmental history and present status

Pelagic fisheries of India: sardines, mackerels, anchovies, tuna, ribbonfish, Bombay duck, pomfrets, mullets.

Features and trends in the production of pelagic fisheries. Conservation of pelagic fish stocks.

Unit – III

Demersal fisheries of India: sharks, major perches, threadfin, breams, sciaenids, silver belly.

Features and trends in production of demersal fisheries.

Impact of trawling. Conservation of demersal fish stocks.

Unit – IV

Potential marine fishery resources of the India's EEZ.

History of deep-sea fishing.

Oceanic and deep-sea fisheries of India. Deep sea fishing policy of India.

Unit – V

GIS and remote sensing in marine capture fishery

Ancillary fishery resources - seaweeds, crab, lobsters, chank and bivalves.

References:

Text Books

Bal, D.V., and Rao, K.V. 1990. Marine Fisheries of India. Tata McGraw Hill Pub. Co.

Srivastava, C.B.L. and Mahal, K., 1999. A text book of fishery science and Indian fisheries. Shree Publishers.

Reference Books

Carmelo, T.R., 1997. Identifying Marine Phytoplankton by Academic Press.

ICES Zooplankton Methodology Manual Ed. by Harrish. R., P. Wiebe., J. Leng., H.R.Skyoldal., M. Huntley. Academic Press 2000.

1. Biswas, K.P. 2011. Marine Prawns & Shrimps. Daya Publishing House, Delhi, 329pp.
2. ICAR 2011. Handbook of Fisheries and Aquaculture. ICAR, New Delhi, 1116 pp.
3. Jhingran, V.G. 1983. Fish and Fisheries of India. Hindustan Publ. Corpn. (India), Delhi, 666 pp.

BLUE PRINT

Time: 21/2 hrs

Max. Marks: 50

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

**TITLE OF THE COURSE: MARINE FISHERIES SEMESTER -V CORE X
MODEL QUESTION PAPER**

Time: 2 ½ hrs. Max Marks: 60

SECTION- A

PART – 1

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

Draw labeled diagrams wherever necessary

3x10=30

1. Write an essay on the marine fishery resources of India
2. Describe the Divisions of Marine environment
3. Write an essay on the sardine and mackerel fishery of India

**PAR
T – II**

1. Describe the conservation measures of demersal fish stocks .
2. Describe the history of deep sea fishing .
3. Write an essay on the application of remote sensing in marine fish capture.

SECTION- B

Answer any FOUR of the following:

Draw labeled diagrams wherever necessary

4x5=20

7. Marine fishery of AP
8. Ribbon fish
9. Bombay duck
10. Silver belly fish
11. EEZ of India
12. Deep Sea fishing policy
13. Red tide

P.R. GOVERNMENT COLLEGE (A), KAKINADA CHOICE BASED

CREDIT SYSTEM

B VOC COMMERCIAL AQUACULTURE

CORE X: MARINE FISHERIES PRACTICAL (LAB) SYLLABUS

II. Lab work - Skills Outcomes:

On successful completion of this practical course, student shall be

able to: Identify the commercially important marine products

Analyze the marine catches

Identify the potential marine landing centers

Understand the records related to catch data

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

- Visit to marine fish landing centers.
- Familiarization of commercially important groups viz., marine and elasmobranchs, crustaceans, molluscs and seaweeds
- Analysis of marine catches by major crafts and gears
- Analysis and species composition of commercial fish catches at landing and centers
- Maintenance of records of marine fish catch data
- GIS and Remote Sensing Applications in capture fishery
- Lab References:

<http://krishi.icar.gov.in/jspui/handle/123456789/63903>

https://mpeda.gov.in/?page_id=1007

<https://icar.org.in/content/icar-cmfri-launches-gis-based-info-vicinity-fish-landing-centres-covid-19-hotspots>

<https://incois.gov.in/MarineFisheries/PfzAdvisory>

<http://kvkernakulam.org.in/fishwatch.html>

IV Co-Curricular Activities

1. For Teacher: Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours various concepts of marine fishery resources- fish landing centers- major catches-records @ landing centers awareness on the GIS and remote sensing applications in marine fishing

2. For Student: Individual laboratory work and visit to Any fish landing center for observation of proceeding at fish landing centers - a brief report preparation with pictures and data /survey

3. Max marks for Field Work Report: 05.

4. Suggested Format for Field work

Name of the landing center visited, date of visit, persons contacted, fish landings visited- details observed in landing center - important points to be correlated with the theory/ practical curriculum

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Visit to fish landing center

2. Collection of web resources on details of landings and revenue

3. Interaction with local fishermen to know about the catch particulars

4. Collection of web resources on the details of development of new fish landing centers in Andhra Pradesh

5. Seminar, Invited lecture, Assignment, Group discussion. Quiz, Collection of Material,

Commissionerate of Collegiate Education

P. R. GOVERNMENT COLLEGE (A) KAKINADA TITLE OF THE COURSE:

MARINEFISHERIES

SEMESTER -V CORE X

CORE X: MARINE FISHERIES PRACTICAL (LAB) MODEL PAPER

1. SPOTTERS

5 X 4 = 20 Marks

A. MARINE FISH

B. MARINE FISH

C. MARINE ELASMOBRANCH

D. MARINE ELASMOBRANCH

E. MARINE CRUSTACEAN

2. Submission of Report on the filed visit to Fish landing center
with photos and catches

20 Marks

Record

5 Marks

Viva-voce

5 Marks

DEPARTMENT OF ZOOLOGY LIST OF EXAMINERS

S. No	Name of the Examiner 	Subject	Name of the College
1.	Dr. N. Sreenivas	Zoology	GDC Ramachandrapuram
2.	B. Ahmad Ali Baba	Zoology	GDC Pithapuram
3.	Dr. P John Kiran	Zoology	GDC Perumallapuram
4.	Dr.M. Vijaya Kumar	Zoology	SRR GDC Vijayawada
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	VSK College, Vizag
11.	Dr. P R Vani	Zoology	VSK College, Vizag
12.	Dr Y. Poli Naidu	Zoology	GDC, Srikakulam
13.	A. Arjuna Apparao	Zoology	GDC, Yellamanchili
14.	Dr G. Mani	Zoology	GDC (M), Srikakulam
15.	P.S.C.H.P Deepika Rani	Zoology	SKR College (W), Rajahmundry
16.	Dr G. Vijay Prathap	Zoology	VSK College, Vizag
17.	Dr. Y. Shantiprabha	Zoology	VSK College, Vizag
18.	M. Hima Sridevi	Zoology	SKR College(W), Rajahmundry

Lecturer in charge
Dept of Zoology & Aquaculture

DEPARTMENT OF ZOOLOGY
LIST OF QUESTION PAPER SETTERS

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