PITHAPUR RAJAH'S GOVT COLLGE (A), KAKINADA

(Re- Accredited by NAAC with A Grade)
Kakinada, AP – 533002

DEPARTMENT OF ZOOLOGY & AQUACULTURE

BOARD OF STUDIES

B.Sc. (Honours) ZOOLOGY (Single Major System)

2023-2024

CHOICE BASED CREDIT SYSTEM

Convened on 31-08-2023

B.Sc. Honours - ZOOLOGY
(Single Major)
2023-2024

Index

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/2023-24 Dt.29 Aug2023

Sub: P.R.G.C[A] – Academic Cell - **Conduct of BOS Meetings for the Academic Year2023-24**

– 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, mandatedto 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 inquisition 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, has 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 **31 August 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 andit shall be approved in the BOS. The Chairmen are also requested to approve the new programmes to be introduced for 2023-24, 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 2023-24 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 ad 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 2023 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 in case 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/ entreprenuership)
1	Zoology	I	Introduction to Classical Biology	Animal cell	Knowledge	Shall be shown Microscope	

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 (2023-24) 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 begiven as per the following structure for the courses with **5 units**

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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

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.

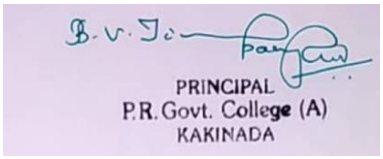
Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M

CIA structure for 3 Major system for Honors programs (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- 5M	Quiz -5M

13. Percentage of syllabus changes in each paper
14. Measure outcome attainment learning levels of students through direct and indirect methodology and mapping COs and POs
15. Text & Reference Books
16. e-content links.



PRINCIPAL
PithapurRajah's**Government(A) 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/2023-24, Dated: 29.08.2023

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 -- ZOOLOGY- 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 & Lecturer In charge, Department of Zoology & Aquaculture
2	Dr. M. Tejo Murthy	University Nominee, PVKN Govt. College (A), Chittoor
3	Dr. P. Ramaneeswari	Subject Expert -I, Department of Zoology, Dean Research Cell, Adikavi Nannaya University, Rajamahendravaram
4	Smt. M. Vasantha Lakshmi	Subject Expert – II, Lecturer In Charge Department of Zoology, ASD Govt. College(A), Kakinada
5	Dr. P. Ram Mohan	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	V. Lakshmi Narasamma	Student Alumni Member
16	P. Abhishek	Student Member
17	Y. Bhavani	Student Member

The above members are requested to attend the BoS meeting on 31 - 08 -2023 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.

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

PRINCIPAL
P. R. Government College(A), Kakinada

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 2023-24

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 2023-24 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 sills, 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 August 2023	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 nee & 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 atleast one book by each faculty member.
- Each department shall discuss, plan & approve atleast two best practices for 2023-24.
- 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 mid term 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	**	Each faculty shall publish atleastone 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 feedback on curriculum design	Semester	1	At least one week before the beginning of BOS meetings
15	Review meetingson syllabus completion by each			
16	Mentoring(Faculty)	Semester	3 times per candidate	1. In first week after commencement of semester 2. In sixth week after commencement of semester 3. In Tenth week after commencement of semester 4.
17	Frequency of tests	At the end of every chapter		Its besides CIA
18	Group Discussions, Quizprograms, etc	Monthly/faculty	1 GD 1 Quiz 1 Extracurricular activity 1 Career Guidance activity (sports/ c ultural)	

19	Participation of students in seminars/ workshopa	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	1. 15 days after commencement of instruction 2. 10 days before the closureof 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 2 conferences, etc., in other colleges @ at least 1/ each semester online or offline.
23	Participation in short term/ FDP/ Orientation/ Refresher course by faculty	Year	1	Each faculty shall invariably take training through mentioned programs 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.
26	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 on 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 tocollege 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 21st century skills/ on its own, each department shall offer valueaddition 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 leastone day in a week attend the college without personal vehicle (Car/ Bike) and rather use public transportation/ bicycle, the environment friendly modes

DEPARTMENT OF ZOOLOGY

Consolidated Report of Board of Studies For The Year 2023– 2024

The Board of studies Meeting in the Department of Zoology was convened on 31-08-2023 at 3 PM under the Chairmanship of Sri. B. Chakravarthi, Lecturer in Charge, Department of Zoology and Aquaculture. The following members are present:

S. No	Name of the Person	Designation
1	Sri. B. Chakravarthi	Chairman & Lecturer In charge, Department of Zoology & Aquaculture
2	Dr. M. Tejo Murthy	University Nominee, PVKN Govt. College (A), Chittoor
3	Dr. P. Ramaneeswari	Subject Expert -I, Department of Zoology, Dean Research Cell, Adikavi Nannaya University, Rajamahendravaram
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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	V. Lakshmi Narasamma	Student Alumni Member
16	P. Abhishek	Student Member
17	Y. Bhavani	Student Member
18	V Ramya	Student Member

Date: 31-08-2023

31/8/2023

Signature of the Chairperson

AGENDA FOR BOARD OF STUDIES MEETING -2023-2024

Agenda

1. Approval of Single major system for UG B.Sc. Hounours (Zoology) SEM I &SEM II From the adamic year 2023-24
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 2023-2024
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 Biodiversity and Conservation Biology**
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 programmes 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 2023-24
19. Any other proposal with the permission of the Chair.

Discussion:

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

Dr. B.V. Tirupanyam, Principal has suggested to start consultancy services to generate funds at the Department level and advised to construct a model fish tank or aquarium to have experiential learning by students.

Dr. P. Ram Mohan Rao has suggested to trim the syllabus where ever possible as the syllabus particularly for HOC and SECs is very vast and advised faculty to tie up with industries and central institutes in and around Kakinada.

Smt. M. Vasantha Lakshmi has suggested to conduct Internships subject related if possible

Sri. M. Phaneendra has suggested to choose courses like poultry and ornamental fishery if possible

PITHAPUR RAJAH'S GOVT COLLGE (A), KAKINADA

DEPARTMENT OF ZOOLOGY & AQUACULTURE

BOARD OF STUDIESMEETING (2023-24) CONVENED ON 31ST August 2023-2024

Resolutions

The members, Board of Studies, Zoology met through online and offline on 31-08-2023 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 Hounours **Zoology** from the adamic year 2023-24 as per the Guidelines of APSHE.

2.It is resolved to follow the syllabus as well as Choice Based Credit System introduced by UGC/APSCHE through Adikavi Nannaya University, Rajamahendravaram for I, II-III- & IV-Year students from the academic year 2023-24.

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, 2023-2024 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 (2023 admitted Batch)
25M	25M	10	03	05	05	02	
I Mid	II Mid	Project	Seminar	Assignment etc,	Total		50 M (2021 admitted batch)
25M	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,5marks 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 2022-2023 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 2022-2023 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 2022-2023

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 II& III Year students. Also resolved to conduct a certificate course in Biodiversity of Mangrove fauna in the academic year 2023-24.

Resolution-10

Resolved to implement the SOP given by APSCHE through Adikavi Nannaya University regarding I Phase of Internship (Community Service Project) between1stand2ndyear, II Phase of Internship between2ndand3rd 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 2023-24 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 2023-24

S.No	Course Code	Title of the new course	Programmes in which it is introduced
1	ZICB23	Introduction to Classical Biology	B.Sc. (Honours) Zoology/SEMI
2	ZIAB23	Introduction to Applied Biology	B.Sc. (Honours) Zoology/ SEMI
3	ZPBS23	Principles Of Biological Sciences (MDC)	B.A/B.Com/(Honours) SEMI
4	ZBNC23	Animal Diversity-I Biology of Non-Chordates	B.Sc. (Honours) Zoology/ SEMII
5	ZCMB23	Cell and Molecular Biology	B.Sc. (Honours) Zoology/ SEMII
6	ZHID23	Human health and infectious diseases	B.Sc. (Honours) Zoology/ SEM VII -
7	ZBDS23	Biodiversity and systematics	B.Sc. (Honours) Zoology/ SEM VII
8	ZWCB23	Wildlife and Conservation biology	B.Sc. (Honours) Zoology/ SEM VII
9	ZMPT23	Milk and milk products technology	B.Sc. (Honours) Zoology/ SEM VII
10	ZMFP23	Milk and meat hygiene, food safety and public health	B.Sc. (Honours) Zoology/ SEM VII

11	ZEBE23	Environment biology and environment physiology	B.Sc. (Honours) Zoology/ SEM VIII
12	ZABC23	Animal behaviour and chronobiology	B.Sc. (Honours) Zoology/ SEM VIII
13	ZBST23	Biosystematics & taxonomy	B.Sc. (Honours) Zoology/ SEM VIII
14	ZMC23	Maricutlure	B.Sc. (Honours) Zoology/ SEM VIII
15	ZOMF23	Ornamental fishery	B.Sc. (Honours) Zoology/ SEM VIII

P.R. GOVT COLEGE (A), KAKINADA
ACTION PLAN 2023-24
DEPARTMENT OF ZOOLOGY & AQUACULTURE

	July- 2023	I Mid EXAMS Sem II/IV Guest lectures to be organized by all Regular faculty Field Trip to B. Voc students	3-7-2023 to 6-7-2023 3rd week of July 2023 4th week of July	Conducted
	August-2023	National Conference I Bridge course to I Sem students I Student seminars BOS for newly introduced Zoology Single major and Honors programme	4th August 2023 2nd week of August 3rd week of Aug-2023 4th week of Aug-2023	
	September 2023	Student Seminars	Ist week of September	
		Training to B.Voc students at SIFT, Kakinada	3rd Week of September	
		Field trip	4th Week of September	
	October 2023	Wild Life week celebrations Certificate course on Biodiversity and conservation Biology	First week of October October 2023	
	November 2023	1. Extension activity in Rural high Schools 2. Guest Lecture by Fisheries experts	3rd Week of November 4th Week of November	
	December 2023	HIV-AIDS awareness programme	1st week of December 2023	

		Field visits, Industrial visits One day workshop for students in laboratory specimen examination and preservation tech. I Mid Exam to III/V Sem	2rd week of December 20-23 Dec	
	January 2024			
		Hands-on training to B.Voc students at CIFE, Kakinada	2ndweek of Jan-2024	
		Field Visit to III-year BZC students	Third week of Jan-2024	
	February 2024	Work shop on Hematological Techniques National Science Day	4th week of February 2024 28th February	
	March 2024	Practical exams Student Projects for Final year students.	1-13 March 3rd week of March	

Tentative Budget Estimate for 2023-2024

1. Field trips - Rs.50,000
2. Guest lectures - Rs.10,000
3. Internships Programmes for CZAC & B Voc – Rs.75,000
4. National Seminar – Rs. 1,25,000
5. Purchase of Consumable items for Practicals -Rs. 50,000
6. BOS Meetings -Rs. 30,000

Total Rs. 3,40,000

The following members attended (Offline/online) and approved resolutions:

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:

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

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

1.

2.

3.

4.

5.

The syllabus is approved with the above suggested modification

Signature with Date

31/08/2023

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

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

ACADEMIC CELL

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

Department Name: Zoology

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

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

1.

2.

3.

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5.

The syllabus is approved with the above suggested modification

MV 31/8/2023.
Signature with Date

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

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

BoS – 2023-24

ACADEMIC CELL

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

Department Name: ZooLOGY/Aquaculture/Bsoe-Aquaculture

Name of the BOS Member :Dr.M .THEJOMOORTHY
(UniversityNomine/Subject Expert/Industrilist/ Member)

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

1.

2.

3.

4.

5.

The syllabus is approved with the above suggested modification

MThejomoorthy
Signature with Date

(Dr.M.Thejomoorthy

31/08/2320

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

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

ACADEMIC CELL

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

Department Name: ZOOLOGY.

Name of the BOS Member Dr. P. Ram Mohan
(UniversityNomine/Subject Expert/Industrilist/ Member)

I certify that the syllabus submitted by the ..... 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

Signature with Date

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

PITHAPUR RAJAH'SGOVERNMENTCOLLEGE(A)
KAKINADA
DEPARTMENT OF ZOOLOGY
BOARD OF STUDIESMEETING 2023-24
CHOICE BASED CREDIT SYSTEM
(2020-21 admitted batch onwards) Old Pattern

YEAR	SEM	PAPER	TITLE	MARKS (100)		CREDITS
				MID	END	
I	I		Animal Diversity–I Biology of Non- Chordates	50	50	04
			Practical-I		50	01
	II		Animal Diversity– II Biology of Chordates	50	50	04
			Practical-II		50	01
II	III	III	Cell biology, Genetics, Molecular Biology& Evolution	50	50	04
			Practical-III		50	01
	IV		Physiology, Cellular Metabolism& Embryology	50	50	04
			Practical-IV		50	01
		6A	Immunology & Animal Biotechnology	50	50	04
			Practical-V		50	01
III	V		Sustainable Aquaculture Management	60	40	04
			Practical		50	01
		7A	Post- Harvest Technology of Fish and Fisheries	60	40	04
			Practical		50	01
	VI		Apprenticeship			

New Pattern

2023-2024 Admitted Batch onwards

Single major System

B.Sc (Honours) with Single Major

Semester	Major* (4 Cr)			Minor (4 Cr)			AECC (3 Cr)			Multi Disny' (2 Cr)			Skill Enhancement 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 Zoology (Major)

w.e.f. AY 2023-24

COURSE STRUCTURE

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

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

B. Sc Major –Zoology

First Semester Structure

S.No	Course/ paper	Title	Total hrs/week	No.of Credits	Remarks
1.	Major Paper– I	Introduction to Classical Biology	05	4	No Lab
2.	Major Paper– II	Introduction to Applied Biology	05	4	No Lab
3.	Multidisciplinary courses	Introduction to Social Work Principles of Psychology Indian History	02	2	A student must choose ONE course from among the six courses listed against the semester.
4.	Skill courses (2 papers)	Entrepreneurship Development Leadership Skills Analytical Skills Communication Skills	2+2 =4 (Each course /Paper -2 hrs/ week)	2+2	A student must choose any TWO of four courses
5.	English	A Course in Communication and Soft Skills	04	3	
6.	Telugu/ Hindi/ Sanskrit	Relevant paper	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. Honours- Zoology

IV Year

AP STATE COUNCIL OF HIGHER EDUCATIONREVISED UG SYLLABUS UNDER CBCS
(Implemented from Academic Year 2020-21)PROGRAMME: FOUR YEAR B.Sc. (Hons)
Domain Subject: ZOOLOGY
Courses for Semesters VII & VIII
(Syllabus with Learning Outcomes, References, & Co-curricular Activities)

Higher Order Courses for semester-VII

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

Skill Enhancement Courses for Semester–VII

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

13	**ONE ONLINE COURSE FROM ANY DISCIPLINE**	**5**

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

Higher Order Courses for semester-VIII

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

Skill Enhancement Courses for Semester–VIII

(To choose one pair from the four alternate pairs of SECs) Course no.	Course Title (Theory + Lab)	Marks	Credits
15 A	MARICUTLURE	100+50	4+1
15 B	ORNAMENTAL FISHERY	100+50	4+1
(OR)			
16 A	LIVESTOCK ECONOMICS, MARKETING AND BUSINESS MANAGEMENT	100+50	4+1
16 B	LIVESTOCK ENTREPRENEURSHIP	100+50	4+1
(OR)			
17 A	POULTRY ECONOMICS, MARKETING	100+50	4+1

	AND INTEGRATION		
17 B	POULTRY ENTERPRENUERSHIP	100+50	4+1
(OR)			
18 A	SERICULTURE MARKETING	100+50	4+1
18 B	SERICULTURE ENTREPRENUERSHIP HUMAN RESOURCE DEVELOPMENT	100+50	4+1

19	**ONE ONLINE COURSE FROM ANY DISCIPLINE**	5

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

Link for detailed syllabus: https://apsche.ap.gov.in/Pdf/Zoology_23_1.pdf

Zoology_23_1 (2).pdf

PROGRAMME OUTCOMES

BZC/ ZOOLOGY

- BZC is a fascinating programme comprising of courses Botany, Zoology and Chemistry that provides a platform to the students to learn not only about the diversity of fauna and flora but also about the chemical and physical structure of biological cells, tissues, organs, organisms, and their physiology.
- The vital role played by plants in the global ecosystems can easily be understood by choosing BZC programme. Creates deep sense of understanding about human health, conservation of nature and natural resources.
- Students can easily understand the concepts of origin of life, Evolution, basic genetics, blood group inheritance, embryonic development, and stem cell technology etc., through this programme.
- The BZC programme creates an understanding of elements and compounds composed of atoms and molecules, and their role in the composition of life. It gives an opportunity to know how biological cells are made up of chemical substances.
- After completing B.Sc., BZC programme students can get lot of employment opportunities in various fields such as agriculture, aquaculture, horticulture and pharmaceuticals either in private or government sectors. This programme enables students to establish their own business in the areas like Aquaculture, Sericulture and Horticulture etc., Students can also pursue higher studies in Botany, Zoology or Chemistry and they may focus on scientific research also.

	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 1: INTRODUCTION TO CLASSICAL BIOLOGY**				
Teaching	Hours Allocated: 60 (**THEORY**)	L	T	P	C
Pre-requisites:	Basics of Zoology	5	1	-	3

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-	
CO1	1. Learn the principles of classification and preservation of biodiversity
CO2	2. Understand the plant anatomical, physiological and reproductive processes.
CO3	3.Knowledge on animal classification, physiology, embryonic development and their economic importance.
CO4	4. Outline the cell components, cell processes like cell division, heredity and molecular processes.
CO5	5. Comprehend the chemical principles in shaping and driving the macromolecules and life processes.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

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:

1. Scope of Biology - For better understanding of importance of Biology in other sciences.
2. Branches of Biology - For systematic study of living things.
3. Microscopy
4. Slide preparation
5. Specimen Collection

1. Reference books:

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

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

4. Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India.

5. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.

6. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.

7. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.

8. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.

9. Karen Timberlake, William Timberlake, 2019. Basic chemistry. 5th Edition. Pearson publishers.

10. 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

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 - I

COURSE I: Introduction to Classical Biology

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, 4questions should be answered 4X5=20M

COMMON QUESTION PAPERPATTERN 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 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

4. Explain ultrastructure of Eukaryotic cell
5. Write an essay on the scope and applications of Chemistry in daily life
6. Write an essay on apiculture

Section II

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

7. Systematics
8. Pollination
9. Fertilization
10. Sericulture
11. DNA
12. Chemical bonding
13. 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**)	L	T	P	C
Pre-requisites:	Basics of Zoology	3	1	-	3

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-	
CO1	Learn the history, ultrastructure, diversity and importance of microorganisms.
CO2	Understand the structure and functions of macromolecules.
CO3	Knowledge on biotechnology principles and its applications in food and medicine.
CO4	Outline the techniques, tools and their uses in diagnosis and therapy.
CO5	Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data.

Skill Development			Employability			Entrepreneurship	

Syllabus

Unit 1: Essentials of Microbiology and Immunology

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

1.2. Groups of Microorganisms – Structure and characteristics of Bacteria, Fungi, Archaea and Virus.

1.3. Applications of microorganisms in – Food, Agriculture, Environment, and Industry.

1.4. 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

5.1. Data collection and sampling. Measures of central tendency – Mean, Median, Mode.

5.2. Measures of dispersion – range, standard deviation and variance. Probability and tests of significance.

5.3. Introduction, Genomics, Proteomics, types of Biological data, biological databases- NCBI, EBI, Gen Bank; Protein 3D structures, Sequence alignment

5.4. **Accessi**ng 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/
2. 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: 21/2 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, 4questions should be answered 4X5=20M

COMMON QUESTION PAPERPATTERN 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.	Program & Semester 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**)	L	T	P	C
Pre-requisites:	Basics of Zoology	3	1	-	3

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

1. Acquire logic to evaluate fundamental biological concepts at various levels of biologicalorganisation 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 itssignificance as biology's overarching unifying principle.
3. Understand the contributions of biology to the resolution of medical, ethical, social, andenvironmental 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'sand 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 reproductiveorgans, Classification of Plant Kingdom,
1.5 Basis of Animal Classification, Classification of Animal Kingdom

UNIT-II Biomolecules and metabolisim

2.1 Ultra structure of cell and Cell organelles (Structure and Functions), Plant cell vs Animalcell
2.2 Plant Physiology: Photosynthesis, Respiration, Transportation, Mechanisms of

Nitrogenfixation.

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 cellanaemia.

3.2 Evolution: Geological time scale for evolution of plants and vertebrates, Origin andevolution 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, Leafspots, Powdery mildew, Blight, Canker.

3.5 Biotechnology: Tools and process of recombinant DNA technology, Applications ofbiotechnology 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, Evolutionand Ecology. S. Chand publishers, New Delhi, India.

Reference Books

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

BLUE PRINT

MODULE	ESSAY QUESTIONS 10 MARKS	SHORT ANSWER QUESTIONS 5 MARKS	MARKS ALLOTED 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

	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 3: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES**				
Teaching	Hours Allocated: 60 (**THEORY**)	L	T	P	C
Pre-requisites:	Basics of Zoology	5	3	2	4

Course Objectives:

- To understand the taxonomic position of protozoa to helminthes.
- To understand the general characteristics of animals belonging to protozoa to hemichordata.
- To understand the structural organization of animals phylum from protozoa to hemi chordata.
- To understand the origin and evolutionary relationship of different phyla from protozoa to hemi chordata.
- To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates.

On Completion of the course, the students will be able to-	
CO1	• Describe concept of animal kingdom classification and general characters of Protozoa
CO2	• Classify Porifera and Coelenterata with taxonomic keys
CO3	• Classify Phylum Platy & Nemathelminthes using examples, parasitic adaptation
CO4	• Describe Phylum Annelida & Arthropoda using examples and economic importance of vermicomposting & economic importance of insects.
CO5	• Describe Mollusca, Echinodermata & Hemi chordata with suitable examples in relation to the phylogeny

Knowledge	**Application**	Employability			Entrepreneurship	

Syllabus

UNIT-I

1.1 Whittaker's five kingdom concept and classification of Animal Kingdom.
1.2 Protozoa General Characters and classification up to classes with suitable examples
1.3 Protozoa Locomotion & nutrition
1.4 Protozoa reproduction

Activity: Assignment /Seminar on the above
Evaluation: Marks to be awarded for written and oral presentations

UNIT –II

2.1 Porifera General characters and classification up to classes with suitable examples
2.2 Canal system in sponges
2.3 Coelenterata General characters and classification up to classes with suitable examples
2.4 Polymorphism in coelenterates & Corals and coral reefs

Activity: Assignment /Seminar /Quiz/Project on the above
Evaluation: Evaluation of Written part + Evaluation of oral Presentation, Assessment of studentsin Quiz participation and Ranking - Evaluation of Project Report and oral presentation

UNIT – III

3.1 Platyhelminthes General characters and classification up to classes with suitable examples
3.2 Parasitic Adaptations in helminthes
3.3 Nemathelminthes General characters and classification up to classes with suitable examples
3.4 Life cycle and pathogenicity of Ascaris lumbricoides

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

4.1 Annelida General characters and classification up to classes with suitable examples
4.2 Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost
4.3 Arthropoda General characters and classification up to classes with suitable examples
4.4 Peripatus - Structure and affinities

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

5.1 Mollusca General characters and classification up to classes with suitable examples
5.2 Pearl formation in Pelecypoda
5.3 Echinodermata General characters and classification up to classes with suitable examples Water vascular system in star fish
5.4 Hemichordata General characters and classification up to classes with suitable examples

Balanoglossus - Structure and affinities

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 (suggested)

- Preparation of chart/model of phylogenic tree of life, 5-kingdom classification
- Visit to Zoology Museum or Coral Island as part of Zoological tour
- Charts on polymorphism
- Clay models of canal system in sponges
- Plaster-of-paris model of Peripatus
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers
- Chart on pearl forming layers using clay
- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Observation of Balanoglossus for its tubicolous habit
-

- **Reference books:**

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

Web Links:

1. Elphidium: Structure and Life History (With Diagram) (notesonzoology.com).pdf
2. WATER VASCULAR SYSTEM IN STARFISH (bioscience.com.pk)

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, 4questions should be answered 4X5=20M

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

DEPARTMENT OF ZOOLOGY

MODEL question PAPER FOR

II SEMESTER - ZOOLOGY - PAPER - I

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

Time: 21/2 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. 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. Pathogenicity of Ascaris
11. Nephridia
12. Gastropoda
13. Affinities of Balanoglossus

	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 3: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES Practicals				
Teaching	Hours Allocated: 30 (Lab)	L	T	P	C
Pre-requisites:		0	0	3	2

Objectives:

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

SYLLABUS:

Study of museum slides / specimens / models (Classification of animals up to orders)

- Protozoa: Amoeba, Paramoecium, Paramoecium Binary fission and Conjugation, Vorticella, Entamoeba histolytica, Plasmodium vivax
- Porifera: Sycon, Spongilla, Euspongia, Sycon- T.S & L.S, Spicules, Gemmule
- Coelenterata: Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium,Gorgonia, Pennatula
- Platyhelminthes: Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium,Redia, Cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium
- Nemathelminths: Ascaris (Male & Female), Drancunculus, Ancylostoma,Wuchereria
- Annelida: Nereis, Aphrodite, Chaetopteurs, Hirudinaria, Trochophore larva
- Arthropoda: Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Peripatus,

Larvae - Nauplius, Mysis, Zoea, Mouth parts of male &female Anophelesand Culex, Mouthparts of Housefly and Butterfly.

- Mollusca:Chiton, Pila, Unio, Pteredo, Murex, Sepia, Loligo, Octopus, Nautilus,

Glochidium larva

- Echinodermata: Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon,

Bipinnaria larva

- Hemichordata: Balanoglossus, Tornaria larva

Dissections:

Computer - aided techniques should be adopted or show virtual dissections Dissection of edible (Prawn/Pila) invertebrate as per UGC guidelines

An "Animal album" containing photographs, cut outs, with appropriate write up about the above-mentioned taxa. Different taxa/ topics may be given to different setsof students for this purpose

Reference books:

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

Virtual Lab Links:

RFERENCE WEB LINKS:

- https://virtualmicroscopy.peabody.yale.edu/
- https://tnhm.in/category/assorted-gallery-for-vertebrates-and-invetebrates/invertebrates/
- http://www.nhc.ed.ac.uk/index.php?page=24.25.312
- https://biologyjunction.com/invertebrate-notes/
- https://lanwebs.lander.edu/faculty/rsfox/invertebrates/
- http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf

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	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 3: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES** **Model question paper**	
Max marks :50		Time 3hrs

I. Identify the following specimens or spotters & slides, draw neat labeled diagram. Write notes on–– ———————————————————— 6x5=30M

1- Paramecium
2- Euspongia
3- Physalia
4- Fasciola hepatica
5- Ascaris
6- Hirudinaria

II. Dissect and draw the labeled diagram of Prawn Nervous system 1x10=10 M

III. Practical Record 5M

IV. 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: CELL & MOLECULAR BIOLOGY**				
Teaching	Hours Allocated: 60 (**THEORY**)	L	T	P	C
Pre-requisites:	Basics of Zoology	3	1	-	3

Course Objectives:

- To understand the cell and distinguish between prokaryotic andeukaryotic cell
- To understand the role of different cell organelles in maintenance of lifeactivities
- To acquaint the students with the concept s of cell division and cell cycle
- To acquaint student with basic concepts of molecular biology as to how characters are expressed with a coordinated functioning of replication, transcription and translation in all living beings
- To acquaint the students on the biological importance of biomolecules.

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Cell and molecular biology by the completion of the course the graduate shall able to –	
CO1	• Understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
CO2	• Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
CO3	• Explain the cell cycle and bioenergetics of the cell
CO4	• Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins

Syllabus
CELL & MOLECULAR BIOLOGY

UNIT – I Cell Biology-I

1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma
1.2 Electron microscopic structure of animal cell.
1.3 Plasma membrane –Models and Fluid mosaic model
1.4 Transport functions of plasma membrane-Active – passive- facilitated.

Activity: Model preparation of cell/Assignment /Students 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 Cell Biology-II

2.1 Structure and functions of Golgi complex & Endoplasmic Reticulum
2.2 Structure and functions of Lysosomes & Ribosomes
2.3 Structure and functions of Mitochondria & Centriole
2.4 Structure and functions of Nucleus & Chromosomes

Activity: Model preparation of cell organelles/Assignment /Students 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 Cell Biology-III

3.1 Cell Division- mitosis, meiosis
3.2 Cell cycle – stages- check points- regulation
3.3 Abnormal cell growth- cancer- apoptosis
3.4 Bio energetics- Glycolysis-Krebs cycle-ETS

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

UNIT IV: Molecular Biology-I

4.1 Central Dogma of Molecular Biology
4.2 Basic concepts of - DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)
4.3 Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics)
4.4 Translation – Initiation, Elongation and Termination

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

UNIT V: Molecular Biology-II

5.1 Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes
5.2 Biomolecules- Carbohydrates (Glucose- structure-properties- biological importance only)
5.3 Biomolecules- Protein (Amino acid- structure- properties- biological importance only)
5.4 Biomolecules- Lipids (Fatty acid- structure - properties- biological importance only)

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

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

Co-curricular activities (Suggested)

- Model of animal cell
- Working model of mitochondria to encourage creativity among students
- Photo album of scientists of cell biology
- Charts on plasma membrane models/cell organelles
- Charts on central dogma/lac operon/genetic code
- Model of semi-conservative model of DNA replication
- Power point presentation of any of the above topics by students

- **Reference books:**

- Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell „Molecular Cell Biology"W.H. Freeman and company New York.
- Cell Biology by De Robertis
- Bruce Alberts, Molecular Biology of the Cell
- Rastogi, Cytology
- Varma & Aggarwal, Cell Biology
- C.B. Pawar, Cell Biology
- Molecular Biology by Frei fielder
- Instant Notes in Molecular Biology by Bios scientific publishers and Viva BooksPrivate Limited
- James D. Watson, Nancy H. Hopkins „Molecular Biology of the Gene"

Web Links:

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3197541/
2. https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/16%3A_Gene_Expression/16.02%3A_Regulation_of_Gene_Expression_-_Prokaryotic_versus_Eukaryotic_Gene_Expression

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

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

DEPARTMENT OF ZOOLOGY

MODEL PAPER FOR II SEMESTER ZOOLOGY -

PAPER - II

COURSE 4: CELL & MOLECULAR BIOLOGY

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. Fluid mosaic model of Plasma Membrane.
2. Structure and functions of Mitochondria
3. Mechanism of Apoptosis

PART- II

4. Central Dogma of Molecular Biology
5. Gene Expression in eukaryotes
6. Structure and Properties of Fatty Acids

SECTION - B

Answer any FOUR of the following:

Draw labeled diagrams wherever necessary **4x5=20**

7. Virus
8. Ribosomes
9. Meiosis
10. Glycolysis
11. Initiation
12. Gene Expression
13. Amino acid- structure

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, 4questions should be answered 4X5=20M

BLUE PRINT

	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: CELL & MOLECULAR BIOLOGY**				
Teaching	Hours Allocated: 30 (**Lab**)	L	T	P	C
Pre-requisites:		0	0	3	2

- **Objectives:**

- Acquainting and skill enhancement in the usage of laboratory microscope
- Hands-on experience of different phases of cell division by experimentation
- Develop skills on human karyotyping and identification of chromosomal disorders
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny ad eological history of origin & evolution of animals

SYLLABUS:

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis with prepared slides
3. Observation of various stages of Meiosis with prepared slides
4. Mounting of salivary gland chromosomes of Chironomus
5. Test for carbohydrate in given biological sample (Benedicts test)
6. Test for Protein in given biological sample (Nitric acid test -white ring)
7. Test for lipid in the given biological sample (Saponification test)

RFERENCE WEB LINKS:

- https://cbi-au.vlabs.ac.in/
- https://www.youtube.com/watch?v=xhnUZAyNdQk
- https://www.youtube.com/watch?v=l8LXQq5_VL0
- https://www.labster.com/simulations
- https://www.sciencecourseware.org/BiologyLabsOnline/protected/TranslationLab/index.php
- https://virtual-labs.github.io/exp-analysis-of-carbohydrates-au/procedure.html
- https://www.labxchange.org/library/items/lb:LabXchange:f10fd7ad:lx_simulation:1
- http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf

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	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: CELL & MOLECULAR BIOLOGY** **Model question paper**	
Max marks :50		Time 3hrs

I. Identify the given spotter/slides and write identification points with neat labeled diagrams 5X4=20 marks

A.

B.

C.

D.

E.

II. Major experiment ----------15M.

III. Minor experiment _____----------5M.

IV. Viva –Voce----------5M

V. Record----------5M

_____-

Total ----------50M

ZOOLOGY MINOR - SEMESTER-II

COURSE 1: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES

Theory Credits: 3 3hrs/week

LEARNING OBJECTIVES:

- To understand the taxonomic position of protozoa to helminthes.
- To understand the general characteristics of animals belonging to protozoa to hemichordata.
- To understand the structural organization of animals phylum from protozoa to hemi chordata.
- To understand the origin and evolutionary relationship of different phyla from protozoa to hemi chordata.
- To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates.

LEARNING OUTCOMES: By the completion of the course the graduate should able to –

- Describe concept of animal kingdom classification and general characters of Protozoa
- Classify Porifera and Coelenterata with taxonomic keys
- Classify Phylum Platy & Nemathelminthes using examples, parasitic adaptation
- Describe Phylum Annelida & Arthropoda using examples and economic importance of vermicomposting & economic importance of insects.
- Describe Mollusca, Echinodermata & Hemi chordata with suitable examples in relation to the phylogeny

SYLLABUS:

UNIT-I

1.1 Whittakers five kingdom concept and classification of Animal Kingdom.
1.2 Protozoa General Characters and classification up to classes with suitable examples
1.3 Protozoa Locomotion & nutrition
1.4 Protozoa reproduction

Activity: Assignment /Seminar on the above

Evaluation: Marks to be awarded for written and oral presentations

UNIT –II

2.1 Porifera General characters and classification up to classes with suitable examples
2.2 Canal system in sponges
2.3 Coelenterata General characters and classification up to classes with suitable examples
2.4 Polymorphism in coelenterates & Corals and coral reefs

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

Evaluation: Evaluation of Written part + Evaluation of oral Presentation, Assessment of studentsin Quiz participation and Ranking - Evaluation of Project Report and oral presentation

UNIT – III

3.1 Platyhelminthes General characters and classification up to classes with suitable examples

3.2 Parasitic Adaptations in helminthes

3.3 Nemathelminthes General characters and classification up to classes with suitable examples

3.4 Life cycle and pathogenicity of Ascaris lumbricoides

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

4.1 Annelida General characters and classification up to classes with suitable examples

4.2 Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost

4.3 Arthropoda General characters and classification up to classes with suitable examples

4.4 Peripatus - Structure and affinities

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

5.1 Mollusca General characters and classification up to classes with suitable examples

5.2 Pearl formation in Pelecypoda

5.3 Echinodermata General characters and classification up to classes with suitable examples Water vascular system in star fish

5.4 Hemichordata General characters and classification up to classes with suitable examples Balanoglossus - Structure and affinities

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 (suggested)

- Preparation of chart/model of phylogenic tree of life, 5-kingdom classification
- Visit to Zoology Museum or Coral Island as part of Zoological tour
- Charts on polymorphism
- Clay models of canal system in sponges
- Plaster-of-paris model of Peripatus
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers
- Chart on pearl forming layers using clay
- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Observation of Balanoglossus for its tubicolous habit

REFERENCE BOOKS:

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

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, 4questions should be answered 4X5=20M

BLUE PRINT

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

DEPARTMENT OF ZOOLOGY

MODEL question PAPER FOR

II SEMESTER - ZOOLOGY - MINOR

BIOLOGY OF NON-CHORDATES

Time: 21/2 hrs Max. Marks: 50

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

SECTION - A

PART- I

14. What is the Whittaker's Five Kingdom concept and how does it classify the animal kingdom?
15. Describe the Canal system in sponges
16. Explain Parasitic Adaptations in Helminthes

PART- II

17. Explain Vermicompost, economic importance of vermicompost
18. Describe the Pearl formation in Pelecypoda
19. Describe the Water vascular system in star fish

SECTION - B

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

20. Amoeboid Movement
21. Ascon type canal System
22. Trematoda
23. Pathogenicity of Ascaris
24. Nephridia
25. Gastropoda
26. Affinities of Balanoglossus

	P.R. Government College (Autonomous) Kakinada	Program & Semester III II BZC			
Course Code	**CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION**				
Teaching	HoursAllocated:60(**Theory**)	L	T	P	C
Pre-requisites:	Basic structure of Cell – Mendelian Principles – Structure of DNA–Fundamentals of Evolution	4	1	2	4

Course Outcomes:

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Cell Biology, Genetics and Evolution and by the completion of the course the graduate shall be able to–

CO1 To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.

CO2 Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.

CO3 To understand the history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals

CO4 Acquiring in-depth knowledge on principles of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders.

CO5 Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.

CO6 Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society

Course Outcomes:

On Completion of the course, the students will be able to-		Cognitive Domain
CO1	understand the basic unit of the living organisms and to differentiate the organisms by their cell structure	Remembering /Understanding
CO2	Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.	Application
CO3	Analyze various aspects of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals	Analyzing
CO4	Have in-depth knowledge on various of aspects of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders	Knowledge & Application
CO5	Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.	Understanding
CO6	Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society	Understanding & Application

Knowledge		Skill		Employability		Entrepreneurship	

Module –I Cell Biology

1.1Definition, history, prokaryotic and eukaryotic cells, virus , Bacteriophages*

1.2 Electron microscopic structure of animal cell

1.3 Plasma membrane – Unit membrane model* - Fluid mosaic model and functions

1.4 Structure and functions of Endoplasmic Reticulum, Mitochondria and

1.5. Nucleus and Chromosomes

Module–II Genetics - I

2. 1 Mendel's Laws of Inheritance

2. 2 Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes

2.3 Multiple alleles Blood group inheritance - *

2. 4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination)

2. 5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

Module – III Genetics - II

3.1 Chromosomal Disorders (Autosomal and Allosomal), Human Karyotyping

3.2 Basics on Genomics and Proteomics

3.3 DNA replication

3.4 Gene Expression in prokaryotes (Lac Operon),

3.5 Gene Expression in eukaryotes

Module – IV Evolution

4.1 Origin of life

4.2. Geological time scale*

4.3 Theories of Evolution: Lamarckism, Darwinism, Germ PlasmTheroy, Mutation theory

4.4Neo-Darwinism: Modern Synthetic theory of Evolution, Hardy-Weinberg Equilibrium

4.5 Forces of Evolution: Isolation, Speciation

Additional Module

• Models of Plasma membrane – Bilamellar, Micellar

• Golgi complex Lysosomes and Ribosomes

• Genetic Drift, Natural Selection,

Co-curricular activities (Suggested)

- Model of animal cell
- Working model of mitochondria to encourage creativity amongstudents
- Photo album of scientists of cell biology
- Charts on plasma membrane models/cell organelles
- Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden or local village as a student study project activity
- Observation of blood group inheritance in students, from their parents and grandparents
- Karyotyping and preparation of pedigree charts for identifying diseases in familyhistory
- Charts on chromosomal disorders
- Charts on central dogma/lac operon/genetic code
- Model of semi-conservative model of DNA replication
- Model of tRNA and translation mechanism
- Power point presentation of transcription or any other topic bystudents

- Draw geological time scale and highlight important events along the timeline Chart on industrial melanism to teach directed selection, Darwin's finches to teach genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

- PROGRAMME SPECIFIC OUTCOMES

- PSO1: Analyze the metabolism and principles of plant physiology, genetics and plant breeding techniques. Understand the principles of plant tissue culture and bio technological applications and plant diversity

- PSO2. Analyze and understand the origin of life, principles of evolution and microbial diversity

- PSO3: Recognize and apply the principles of atomic and molecular structure to predict chemical properties and chemical reactivity.

- PSO4: Acquire basic knowledge and skills in certain applied branches to enable them for self-employment Students gain knowledge and skills in the fundamentals of animal sciences, understands the complex interactions among various loving organisms

- PSO 5: Recognize and apply key principles Genetics, Molecular biology, and Evolution in day-to-day life

- COURSE OUTCOMES

- **CO1** To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.

- **CO2** Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.

- **CO3** To understand the history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals

- **CO4** Acquiring in-depth knowledge on principles of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders.

- **CO5** Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.

CO-PO– PSO Mapping:

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

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

REFERENCES:

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology' W.H. Freeman and company New York.
2. Cell Biology by DeRobertis
3. Bruce Alberts, Molecular Biology of the Cell
4. Rastogi, Cytology
5. Varma & Aggarwal, Cell Biology
6. C.B. Powar, Cell Biology
7. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India.
8. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and SonsInc.
9. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
10. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
11. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
12. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing

13. Molecular Biology by freifielder
14. Instant Notes in Molecular Biology by Bios scientific publishers and Viva Books Private Limited
15. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
16. Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.
17. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
18. Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.
19. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
20. Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.
21. Gupta P.K.,'Genetics

TOPICS INCLUDED UNDER AUTONOMOUS SETUP

CLASS : II B.Sc.,
SEMESTER : III
PAPER : III
TITLEOFTHEPAPER : Cell Biology, Genetics, Molecular Biology and Evolution

ADDITIONS	JUSTIFICATION
1.Unit membrane model	1. Provides conceptual understanding about structure of Plasma membrane
2. Multiple alleles	2. One of the important deviations from Mendelian Genetics
3.Geological time scale	3. Tool to portray the history of Earth

II B.Sc., (BZC), SEMESTER-III
ZOOLOGY SYLLABUS
w.e.f. 2022-23 (Revised in SEPTEMBER-2022)
AT THE END OF SEMESTER-III

Blue print for **CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION**

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1.Cellbiology	1	2	20
2. Genetics I	2	1	25
3. Genetics II	1	2	20
4.Evolution	2	2	30
5.Total	6 Of which 3 to be answered	7 Of which 4 to be answered	95 Marks including choice. Of which 50 Marks to be answered

QUESTION BANK FOR CYTOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

MODULE -I

Essay Questions

1. Enumerate differences between prokaryotes and eukaryotes
2. How do you correlate the structure and functions of Plasma Membrane?
3. Endoplasmic Reticulum is an important cell organelle, elaborate
4. Interpret the Structure and Types of Chromosomes

Short Answer Question

1. Prokaryotes
2. eukaryotes
3. Virus
4. Fluid Mosaic model
5. Mitochondria
6. Nucleus

MODULE II

Essay Questions

1. Give an account of Mendel's laws of inheritance
2. Compare unique features of incomplete dominance andco-dominance
3. Explain the law of independent assortment with suitable illustrations
4. Analyse different methods of sex determination
5. Give an account on X Linked inheritance

Short Answer Questions

1.Law of segregation
2. Epistatis
3. Y linked inheritance
4. Genic balance theory
5. sex determination in Human beings
6.XY linked inheritance

MODULE III

Essay Questions

1. Critically examine the features of Autosomal disorders in human beings
2. Describe the process of DNA replication and the significance
3. Explain the concept of Lac operon in detail
4. Write an essay on Gene expression in Eukaryotes

Short Answer Questions

1. Edward's Syndrome
2. Turner syndrome
3. Klinefelter syndrome
4. Genomics
5. lacoperon

MODULE IV

Essay Questions

1. Link up different phases of the origin of life sequentially
2. Make critical analysis on Darwinism
3. Write an essay on Isolation
4. What is speciation? Write an essay on types of speciation.

Short Answer Questions

1. Practical evidence for origin of life / Miller and Urey experiment
2. Lamarckism
3. Neo-Darwinism
4. Hardy-Weinberg law
5. Germ plasm theory

ZOOLOGY MODEL PAPER

III SEMESTER - ZOOLOGY - PAPER - III

CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Time:21/2hrs **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. Enumerate differences between prokaryotes and eukaryotes

2. Explain the role of chromosomes in sex determination

3.Compare X and Y linked inheritance

SECTION-B

4. Write an essay on gene expression in eukaryotes

5. Give an account on Modern synthetic theory

6. Write an essay on Speciation

Part – II

Answer any **Four** questions **4x5=20**

7. Prokaryotic cell

8.Mitochondria

9. Genic balance theory

10. Incomplete Dominance

11. Turner syndrome

12. Lacoperon

13. Hardy Weinberg Equilibrium

14. N

ZOOLOGY PRACTICAL SYLLABUS

III SEMESTER - ZOOLOGY - PAPER - III

CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

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

Learning Objectives:

- Acquainting and skill enhancement in the usage of laboratory microscope
- Hands-on experience of different phases of cell division by experimentation
- Develop skills on human karyotyping and identification of chromosomal disorders
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny ad geological history of origin & evolution of animals

I. Cell Biology

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

II. Genetics

1. Study of Mendelian inheritance using suitable examples and problems
2. Problems on blood group inheritance and sex-linked inheritance
3. Study of human karyotypes (Down's syndrome, Edwards syndrome, Turner's syndrome and Klinefelter syndrome)

III. Evolution

1. Study of homology and analogy from suitable specimens and pictures
2. Phylogeny of horse with pictures
3. Study of Genetic Drift by using examples of Darwin's finches(pictures)

REFERENCE BOOKS

1. Burns GW. 1972. The Science of Genetics. An Introduction to Heredity. Mac Millan Publ.Co.Inc.

2. Gardner EF. 1975. Principles of Genetics. John Wiley & Sons, Inc. New York.

3. Harth and Jones EW. 1998. Genetics – Principles and Analysis. Jones and Bar Hett Publ. Boston.

4. Levine L. 1969. Biology of the Gene. Toppan.

5. Pedder IJ. 1972. Genetics as a Basic Guide. W. Norton &Company, Inc.

6. Rastogi VB. 1991. A Text Book of Genetics. KedarNath Ram Nath Publications, Meerut, Uttar Pradesh, India.

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

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9. White MJD. 1973. Animal Cytology and Evolution. CambridgeUniv.Press.

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

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

PRACTICAL MODEL PAPER

CELL BIOLOGY, GENETICS, MOLECULOR BIOLOGY& EVOLUTION

Max marks: 50

Time: 2Hrs

1. Prepare temporary slides of Mitotic divisions with onion root tips	10M
2. Identification of 6 spotters/Genetic Problems	6X5=30M
A) (Cytology)	
B) (Cytology	
C) (Genetics)	
D) (Genetics)	
E) (Evolution)	
F) (Evolution)	
3. Record	5M
4.Viva	5M
Total	**50M**

SEMESTER IV

	P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA DEPARTMENT OF ZOOLOGY	**Program & Semester** BZC – IV ACTZC-IV BTZC-IV			
Course Code **ZO 4208**	**ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY**				
Teaching	HoursAllocated:60 (**Theory**)	L	T	P	C
Pre-requisites:	Knowledge on the physiological process in the animal kingdom. Knowledge on the embryological processes	4	0	2	4

On completion of the course, the students will be able to-		Cognitive Domain
CO1	Understand the functions of important animal physiological systems including digestion, cardio-respiratory and renal systems.	REMEMBERING/ UNDERSTANDIN G
CO2	Understand the muscular system and the neuro-endocrine regulation of animal growth, development and metabolism with a special knowledge of hormonal control of human reproduction.	UNDERSTANDING/ APPLICATION
CO3	Describe the structure, classification and chemistry of biomolecules and enzymes responsible for sustenance of life in living organisms	KNOWLEDGE AND APPLICATION
CO4	Develop broad understanding the basic metabolic activities pertaining to the catabolism and anabolism of various biomolecules	UNDERSTANDING/ APPLICATION
CO5	Describe the key events in early embryonic development starting from the formation of gametes up to gastrulation and formation of primary germ layers. Describe the key events in early embryonic development starting from the formation of gametes up to gastrulation and formation of primary germ layers.	KNOWLEDGE,SKILL, AND APPLICATION

Learning Objectives

- To achieve a thorough understanding of various aspects of physiological systems and their functioning in animals.
- To instill the concept of hormonal regulation of physiology, metabolism and reproduction in animals.
- To understand the disorders associated with the deficiency of hormones
- To demonstrate a thorough knowledge of the intersection between the disciplines of Biology and Chemistry.
- To provide insightful knowledge on the structure and classification of carbohydrates, proteins, lipids and enzymes
- To demonstrate an understanding of fundamental biochemical principles such as the function of biomolecules, metabolic pathways and the regulation of biochemical processes
- To make students gain proficiency in laboratory techniques in biochemistry and orient them to apply the scientific method to the processes of experimentation and hypothesis testing

ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

UNIT I Animal Physiology – I 15 hrs

1.1 Process of digestion and assimilation-K

1.2 Respiration - Pulmonary ventilation, transport of oxygen and CO2-KS

(Note: Need not study cellular respiration here)

1.3 Circulation - Structure and functioning of heart, Cardiac cycle-KS

1.4 Excretion - Structure and functions of kidney urine formation, counter current Mechanism-KSE

UN IT II Animal Physiology – II 15 hrs

2.1 Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibers-KS
2.2 Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction-KS
2.3 Endocrine glands - Structure, functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas-UK
2.4 Hormonal control of reproduction in a mammal-UKS

UNIT III Cellular Metabolism 10 hrs

3.1 Carbohydrates - Classification of carbohydrates. Structure of glucose-KE

3.2 Proteins - Classification of proteins. General properties of amino acids-KS

3.3 Lipids - Classification of lipids, Properties of Lipids -KS

3.4 Enzymes: Classification and Mechanism of Action of enzymes -KU

UNIT IV Embryology 15 hrs

4.1 Gametogenesis-US

4.2 Fertilization-UK

4.3 Types of eggs-UKS

4.4 Types of cleavages-UKS

4.5 Development of Frog up to formation of primary germ layers-UKS

CO-PO– PSO Mapping:

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

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

Co-curricular activities (Suggested)

- Chart on cardiac cycle, human lung, kidney/nephron structure etc.
- Working model of human / any mammalian heart.
- Chart of sarcomere/location of endocrine glands in human body
- Chart affixing of photos of people suffering from hormonal disorders
- Student study projects such as identification of incidence of hormonal disorders in the local primary health centre, studying the reasons thereof and measures to curb or any other as the lecturer feels good in nurturing health awareness among students
- Chart on structures of biomolecules/types of amino acids (essential and non-essential)Chart preparation by students on Glycolysis / kreb‟s cycle/urea cycle etc.
- Model of electron transport chain
- Preparation of models of different types of eggs in animals
- chart on frog embryonic development, fate map of frog blastula, cleavage etc.

REFERENCE BOOKS

1. Eckert H. Animal Physiology: Mechanisms and Adaptation. W.H. Freeman & Company.
2. Floray E. An Introduction to General and Comparative Animal Physiology. W.B. SaundersCo., Philadelphia.

3. Goel KA and Satish KV. 1989. A Text Book of Animal Physiology, Rastogi Publications, Meerut, U.P.

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

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

6. Prosser CL and Brown FA. Comparative Animal Physiology. W.B. SaundersCompany, Philadelphia.

7. Developmental Biology by Balinksy

8. Developmental Biology by Gerard Karp

9. Chordate embryology by Varma and Agarwal

10. Embryology by V.B. Rastogi

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

Press.

12. Gilbert SF. 2006. Developmental Biology, 8th Edition. Sinauer Associates Inc., Publishers,Sunderland, USA.
13. Longo FJ. 1987. Fertilization. Chapman & Hall, London.

P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA
DEPARTMENT OF ZOOLOGY
w.e.f. 2022-23 (Revised in NOVEMBER -2022)
ZOOLOGY – SEMESTER IV
Blue print for PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1. Animal Physiology - I	1	03	25
2. Animal Physiology - II	2	01	25
3. Cellular Metabolism	1	02	20
4. Embryology	2	01	25
5.Total	06 Of which 3 to be answered	7 Of which 4 to be answered	95 Marks including choice. Of which 50 Marks to be answered

P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA
DEPARTMENT OF ZOOLOGY
MODEL PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY
Model Question Paper

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

PART-I

Answer any THREE questions choosing at least one question from each section
All questions carry equal marks 3 x 10 = 30 Marks

SECTION – A

1. Write an essay on Urine formation
2. Describe Muscle contraction mechanism
3. Describe the hormonal control of reproduction of mammals

SECTION -B

4. Explain mechanism of enzyme action
5. Describe the process of spermatogenesis
6. Describe in detail the development of frog up to gastrulation level?

PART-II

Answer any **FOUR** of the following 4 x 5 = 20 Marks

7. Oxygen transport
8. Digestion in stomach
9. Action Potential
10. Thyroid gland
11. Lipid structure
12. Glucose structure
13. Types of eggs

P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA
DEPARTMENT OF ZOOLOGY
w.e.f. 2022-23 (Revised in September -2022)
II B.Sc., (BZC), SEMESTER-IV ZOOLOGY
PRACTICALSYLLABUS
ZOOLOGY - PAPER - IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY Periods: 24
Max. Marks: 50

Learning Objectives:

- Identification of an organ system with histological structure
- Deducing human health based on the information of composition of blood cells
- Demonstration of enzyme activity in vitro
- Identification of various biomolecules of tissues by simple colorimetric methods and also quantitative methods
- Identification of different stages of earl embryonic development in animals

ANIMAL PHYSIOLOGY

- Qualitative tests for identification of carbohydrates, proteins and fats
- Study of activity of salivary amylase under optimum conditions
- T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage
- Differential count of human blood

CELLULAR METABOLISM

- Estimation of total proteins in given solutions by Lowry‟s method.
- Estimation of total carbohydrate by Anthrone method.
- Qualitative tests for identification of ammonia, urea and uric acid

EMBRYOLOGY

- Study of T.S. of testis, ovary of a mammal
- Study of different stages of cleavages (2, 4, 8 cell stages)
- Construction of fate map of frog blastula

REFERENCE BOOKS:

- Harper's Illustrated Biochemistry
- Cell and molecular biology: Concepts & experiments. VI Ed. John Wiley &sons. Inc.
- Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
- Laboratory techniques by Plummer

P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA
DEPARTMENT OF ZOOLOGY
ZOOLOGY - PAPER – IV PRACTIAL MODEL PAPER
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY Periods: 24
Max. Marks: 50

1. Salivary amylase activity experiment with detailed procedure		12 Marks
2. Test for Ammonia		08 Marks
3. Embryology slides a. b.	2 x 5	10 Marks
4. Physiology Slides: a. b.	2x5	10 Marks
5. Record		05 Marks
6. Viva voce		05 Marks
Total		**50 Marks**

SEMESTER IV

	P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA DEPARTMENT OF ZOOLOGY	Program & Semester BZC – IV ACTZC-IV BTZC-IV Semester IV Paper V			
Course Code	**Immunology & Animal Biotechnology**				
Teaching	HoursAllocated:60 (**Theory**)	L	T	P	C
Pre-requisites:	Knowledge on the Basics of Immunology & Biotechnology	4	0	2	4

HOURS: 60 **Max. Marks: 50**

Course Outcomes:

This course will provide students with a deep knowledge in immunology, genetics, embryology, and ecology and by the completion of the course the graduate shall able to

CO1 To get knowledge of the organs of Immune system, types of immunity, cells, and organs of immunity.

CO2 To describe immunological response as to how it is triggered (antigens) and regulated (antibodies)

CO3 Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.

CO4 Get familiar with the tools and techniques of animal biotechnology.

Learning Objectives

- To trace the history and development of immunology
- To provide students with a foundation in immunological processes
- To be able to compare and contrast the innate versus adaptive immune systems and humoral versus cell-mediated immune responses
- Understand the significance of the Major Histocompatibility Complex in terms of immune response and transplantation
- To provide knowledge on animal cell and tissue culture and their preservation
- To empower students with latest biotechnology techniques like stem cell technology, genetic engineering, hybridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms

- To explain in vitro fertilization, embryo transfer technology and other reproduction manipulation methodologies.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To understand principles of animal culture, media preparation.

• Knowledge		Skill		Employability		Entrepreneurship	

Unit – I Immunology – I (Overview of Immune system) 15 hrs

1.1 Introduction to basic concepts in Immunology

1.2 Innate and adaptive immunity, Vaccines, and Immunization programme

1.3 Cells of immune system

1.4 Organs of immune system

Unit – II Immunology – II
(Antigens, Antibodies, MHC and Hypersensitivity) 15 hrs

2.1 Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants; Factors influencing immunogenicity

2.2 Antibodies: Structure of antibody, Classes and functions of antibodies

2.3 Structure and functions of major histocompatibility complexes

2.4 Exogenous and Endogenous pathways of antigen presentation and processing

2.5 Hypersensitivity – Classification and Types

Unit – III Biotechnology Techniques 15hrs

3.1 Animal Cell, Tissue, and Organ culture media: Natural and Synthetic media,

3.2 Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); Organ culture; Cryopreservation of cultures

3.3 Stem cells: Types of stem cells and applications

3.4 Hybridoma Technology: Production & applications of Monoclonal antibodies (mAb)

Unit – IV Applications of Animal Biotechnology 15 hrs

4.1 Genetic Engineering: Basic concept, Vectors, Restriction Endonucleases and Recombinant DNA technology

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

4.3 Transgenic Animals: Strategies of Gene transfer; Transgenic – sheep, - fish; Applications

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

Co-curricular activities (suggested)

- Organizing awareness on immunization importance in local village in association with
- NCC and NSS teams
- Charts on types of cells and organs of immune system
- Student study projects on aspects such as – identification of allergies among students (hypersensitivity), blood groups in the class (antigens and antibodies duly reported) etc., as per the creativity and vision of the lecturer and students
- Visit to research laboratory in any University as part of Zoological tour and exposure and/or hands-on training on animal cell culture.
- Visit to biotechnological laboratory in university or any central/state institutes and create awareness on PCR, DNA finger printing and blot techniques or Visit to a fermentation industry or Visit to a local culture pond and submit report on culture of fishes etc.

REFERENCE BOOKS

- Immunology by Ivan M. Riott
- Immunology by Kubey
- Sreekrishna V. 2005. Biotechnology –I, Cell Biology and Genetics. New Age International
- Publ.New Delhi, India.

CO-PO– PSO Mapping:

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

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

P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA
DEPARTMENT OF ZOOLOGY
w.e.f. 2022-23 (Revised in September -2022)
II B.Sc., (BZC), SEMESTER-IV ZOOLOGY SYLLABUS
AT THE END OF SEMESTER IV
Blue print for PAPER – V
COURSE – 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
1. Immunology – I (Overview of Immune system)	1	02	20
2. Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)	2	01	25
3. Biotechnology Techniques	1	03	25
4. Applications of Animal Biotechnology	2	01	25
5.Total	06 Of which 3 to be answered	7 Of which 4 to be answered	95 Marks including choice. Of which 50 Marks to be answered

P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA
DEPARTMENT OF ZOOLOGY
w.e.f. 2022-23 (Revised in September -2022)
II B.Sc., (BZC), SEMESTER-IV ZOOLOGY
MODEL PAPER – V
COURSE – 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

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

PART-I

Answer any THREE questions choosing at least one question from each section
All questions carry equal marks 3 x 10 = 30 Marks

SECTION – A

1. Write an essay on the cells of Immune system
2. Describe various classes of Antibodies
3. Explain in detail exogenous path way of antigen presentation

SECTION -B

4. Explain media preparation in detail
5. Describe the Restriction endonucleases
6. What is the application of transgenic animals and give examples?

PART-II

Answer any 4 of the following 4 x 5 = 20 Marks

7. Adaptive immunity
8. Thymus gland
9. Spleen
10. Paratope.
11. Tissue culture media
12. Primary cell culture
13. MABs

P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA
DEPARTMENT OF ZOOLOGY
w.e.f. 2022-23 (Revised in September -2022)
II B.Sc., (BZC), SEMESTER-IV
ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER COURSE – 5
IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Periods: 24 Max. Marks: 50

Learning Objectives:

- Acquainting student with immunological techniques vis-à-vis theory taught in the class room
- Interconnect the theoretical and practical knowledge of immunity with the outer world for the development of a healthier life.
- Demonstrate basic laboratory skills necessary for Biotechnology research
- Promoting application of the lab techniques for taking up research in higher studies

I. IMMUNOLOGY

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

II. Animal biotechnology

1. DNA quantification using DPA Method.

2. Separation, Purification of biological compounds by paper chromatography

3. Preparation of culture media.

REFERENCE BOOKS

1. Immunology Lab Biology 477 Lab Manual; Spring 2016 Dr. Julie Jameson2. Practical Immunology A Laboratory Manual; LAP LAMBERT Academic

Publishing

3. Manual of laboratory experiments in cell biology by Edward, G

4. Laboratory Techniques by Plummer

P R GOVERNMENT COLLEGE (AUTONOMOUS): KAKINADA
DEPARTMENT OF ZOOLOGY
w.e.f. 2022-23 (Revised in September -2022)
II B.Sc., (BZC), SEMESTER-IV
ZOOLOGY PRACTICAL SYLLABUS FOR IV SEMESTER COURSE – 5
IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Periods: 24 Max. Marks: 50 Time 2 Hrs

Practical Examination Model paper

1.	Paper chromatography		15 Marks
2.	Blood Group determination		10 Marks
3.	Slides A Slide B Slide C	3 x 5	15 Marks
4.	Record		05 Marks
5.	Viva Voce		05 Marks
	Total		50 Marks

	P.R. Government Degree College (A) Kakinada	**Program & Semester**			
CourseCode	**TITLE OF THE COURSE** **Domain Subject: ZOOLOGY Semester –V** **Course 6 A: SUSTAINABLE AQUACULTURE MANAGEMENT**	III B.Sc., (V SEM)			
Teaching	Hours Allocated: 50 (**Theory**)	L	T	P	C
Pre-requisites:		3	1	-	3

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students at the successful completion of this course will be able to
CO2	Evaluate the present status of aquaculture at the Global level and National level
CO3	Classify different types of ponds used in aquaculture
CO4	Demonstrate induced breeding of carps
CO5	Acquire critical knowledge on commercial importance of shrimps

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Knowledge		Employability		Entrepreneurship	

Syllabus

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

Unit: 1

1.1 Present status of Aquaculture – Global and National scenario

1.2 Major cultivable species foraquaculture:freshwater,brackish waterand marine.

1.3 Traditional, extensive, modified extensive, semi-intensiveandintensiveculturesoffishandshrimp.

1.4 Design and construction of fish and shrimp farms

Unit: 2

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

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

2.3 Need of fertilizer in aquaculture

2.4 Physio-chemicalconditions of soil and water optimum for culture

2.5 (Temperature, depth, turbidity,light,water,PH, BOD, CO_2andnutrients)

Unit: 3

3.1. Induced breeding in fishes

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

3.3. Culture of Indian major carps –Stocking management

3.4. Culture of Indian major carps-post-stocking management

Unit: 4

4.1 Commercial importanceof shrimp and prawn

4.2 Macro brachium rosenbergii-Biology, seed production.

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

4.4 Mixed culture of fish and prawns

Unit: 5

5.1 Viral diseases of Fin fish &shell fish

5.2 Fungal diseases of Fin &Shell fish

5.3 Bacterial diseases of Fin fish &Shell fish

5.4 Prawn Diseases pertaining to East Godavari with special reference to White gut, WSSV, Gill rot, Black shell diseases

Textbooks:

1. Textbook of Fish Biology and Fisheries, By SS Khanna
2. Post-Harvest Technology of Fish and Fish Products, K. K. Balachandran (Author)
3. RECENT TECHNOLOGIES IN FISH AND FISHERIES, G.KrishnaveniandN.Veerabhdra Mr.K.Veeranjaneyulu

Referencebooks:

1. PillayTVR&M.A.Dill, 1979. Advances in Aquaculture. FishingNews BooksLtd.,London
2. StickneyRR 1979. Principles of WarmWaterAquaculture. John Wiley&SonsInc.1981
3. BoydCE1982. Water QualityManagementfor Pond FishCulture.ElsivierScientificPublishingCompany.
4. BoseANet.al. 1991.CostalAquacultureEngineering.Oxford&IBHPublishingCompanyPvt.Ltd
5.

WebLinks:

1. http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6708e06.htm
2. http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf
3. https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871

CO-PO Mapping:

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

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

Course 6 A: SUSTAINABLE AQUACULTURE MANAGEMENT
(Skill Enhancement Course (Elective), -Credits: 05)

Additions And Deletions of Paper SustainableAquaculture Management

	Deleted Topics	Reasons for deleting
1.	5. Prophylaxis in aquaculture	It is dealt already individually in 5.1, 5.2, 5.3
2.	2. Manure application in culture ponds	It is dealt in 2.3
	List of Added topics	Reasons for adding
1.	1. Blue revolution	It is important in explaining present status of aquaculture
2.	5. Prawn Diseases pertaining to East Godavari with special reference to White gut, WSSV, Gillrot, Black shell diseases	Catering to local needs by studying the local epidemics.

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
UNIT I	1	01	15
UNIT II	1	02	20
UNIT III	2	01	25
UNIT IV	1	02	20
UNIT V	1	01	15
5.Total	06 Of which 3 to be answered	07 Of which 4 to be answered	95 Marks including choice. Of which 60 Marks to be answered

Blue Print

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

P.R. GOVERNMENT COLLEGE (A), KAKINADA

CHOICE BASED CREDIT SYSTEM

Four – year B.Sc. (Hons)

Domain Subject: ZOOLOGY

Course 6 A: SUSTAINABLE AQUACULTURE MANAGEMENT

MODEL PAPER

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

SECTION-B

4. Write an essay on Induced breeding
5. Explain the mixed culture of Fish and Prawn
6. Explain the viral diseases in Fin Fish

Part – II

Answer any Six questions 6x5=30

7. Nursery pond
8. Turbidity
9. Fertilizer in culture pond
10. Algal bloom
11. Quarantine pond
12. Macrobrachium
13. White Spot Disease

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

Four – year B.Sc. (Hons)
Domain Subject: ZOOLOGY
Course 6 A: SUSTAINABLE AQUACULTURE MANAGEMENT

PRACTICAL SYLLABUS

I. Learning Outcomes:

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

- Identify the characters of Fresh water cultivable species
- Estimatephysico chemical characteristics of water used for aquaculture
- Examine the diseases of fin and shell fish
- Suggest measures to prevent diseases in aquaculture

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

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

2. Brackish water cultivable species (Fin &Shell fish- Specimens- Observation of Morphological Character by observing drawing) - ANY THREE

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

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

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

6. Bacterial diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/Models - ANY THREE

7. Fungal diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish) ANY THREE

III. Lab References

1. Boyd CE 1982. Water Quality Management for Pond Fish Culture.Elsevier Scientific Publishing Company
2. http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6 70 8e06.htm
3. http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf
4. https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and control- fishery/871
Web resources suggested by the teacher concerned and the college librarian including reading material

IV. Co-Curricular Activities

a) **Mandatory**:(Student training by teacher in field skills: Total 15 hrs., Lab:10 + field 05)

1. For Teacher: Training of students by the teacher in laboratory/field fornotlessthan15 hours on Breeding- Induced breeding in carps -hatchery technology of L. Vennami- Farming techniques- disease diagnostic techniques—concepts –Demonstration @ any aqua laboratory

2. For Student: Students shall (individually) visit a Hatchery/Farm/ Aqua diagnostic center and make careful observations of the process method and implements- protocols and report on the same in 10 pages hand written Fieldwork/Project work Report.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work**:** Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.
5. (IE).Unit tests.

b) Suggested Co-Curricular Activities

1. Preparation of Model/Charts of Cultivable species of fin fish shell fish
2. Preparation of Model/Chart of Ideal fish Pond- with the standards prescribed.
3. Observation of aquaculture activities in their area (Observation of any activity related to aquaculture in the vicinity of the college/village)

4. Preparation of Model – charts of Fin /Shell fish Diseases with eco-friendly material.
5. Assignments, Group discussion, Seminar, Quiz, Collection of Material, Video preparation etc., Invited lecture

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

Four – year B.Sc. (Hons)
Domain Subject: **ZOOLOGY**
Course 6 A: SUSTAINABLE AQUACULTURE MANAGEMENT

PRACTICAL MODEL PAPER

Model paper for Practical semester End Examination

Max. Marks 50 Time: 2 Hours

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

A Fresh water fishes
B. Brackish water fish
C. Viral disease fish/prawn
D. Bacterial Disease fish/prawn

E. Marine Fish
F. Fungal Disease fish/prawn

2.	Record	05M
3.	Field note book/project work report	10M
4.	Viva voce	05M
	Class tests	
	Total	50M

P.R. GOVERNMENT COLLEGE (A), KAKINADA

CHOICE BASED CREDIT SYSTEM

Four – year B.Sc. (Hons)

Domain Subject: **ZOOLOGY**

Course 6 A: SUSTAINABLE AQUACULTURE MANAGEMENT

Question Bank for Sustainable Aquaculture Management

Module I

Essay Questions

1. What is the current status of aquaculture at global and national level?
2. Describe Major Cultivable Fresh water fishes
3. Write an essay on Design and Construction of Fish farm

Short Answer Questions

1. Any 2 Brackish water food fishes
2. Any 2 Marine food fishes
3. Criteria for selection of Fishes for cultivation
4. Extensive fish culture

5. Traditional fish culture

Module II

Essay Questions

1. What are the Physico-chemical conditions of water required for aqua culture
2. What is the Functional Classification of Ponds in a fish farm

Short Answer Questions

1. Nursery Pond
2. Turbidity
3. Fertilizer in Culture Pond
4. Quarantine Pond
5. Stocking Pond

Module III

Essay Questions

1. Write an essay on Induced Breeding
2. Culture of Indian Major carps

Short Answer Questions

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

Module IV

Essay Questions

1. Explain the mixed culture of Fish and Prawn
2. Commercial Importance of Prawn

Short Answer Questions

1. Vannamei
2. Macrobrachium
3. Larval Stages of Prawn
4. Types of Hatcheries
5. Eye stalk oblation

Module IV

Essay Questions

1. Explain the viral diseases in Fish
2. Explain the Bacterial Diseases in Prawns
3. Explain the Fungal Diseases of Fish

Short answers

1. Any two viral diseases in Prawns
2. Any two bacterial diseases in fish
3. White spot disease
4. Dropsy
5. Prophylaxis

	P.R Government College (Autonomous) Kakinada	**Program & Semester** B. Sc, BZC , CZAC, CA Sem V Paper VII A			
Course Code	**TITLE OF THE COURSE Domain Subject: ZOOLOGY Semester –V Course7A: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:		3	1	-	3

CourseOutcomes:

OnCompletion of thecourse, the students willbe able to-	
CO1	• Identify the types of preservation methods employed in aquaculture
CO2	• Choose the suitableProcessingmethods in aquaculture

CO3	• Maintain the standard quality control protocols laid down in aqua industry
CO4	• Identify the best Seafoodqualityassurance system

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Knowledge		Entrepreneurship	

Syllabus

Unit –I Handling and Principles of fish Preservation

1. 1 Handling of fresh fish, storage and transport of fresh fish, postmortem changes (rigor mortis and spoilage), spoilage in marine fish and freshwater fish.

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

UNIT II: Methods of fish Preservation

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

2.2. Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, irradiation and

Accelerated Freeze drying (AFD).

UNIT III: Processing and preservation of fish and fish by-products

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

3.2 Fish by-products – fish glue, Using glass, chitosan, pearl essence, shark fins, fish Leather and fish maws.

UNIT IV: Sanitation and Quality control

4.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processingplants.

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

UNIT V: Quality Assurance, Management and Certification

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

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

CO-PO Mapping:

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

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

REFERENCES:

1. **Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture,Oxford-IBH, NewDelhi**
2. Lakshmi Prasad's, Fish Processing Technology 2012, Arjun PublishingHouse
3. Dr Sunitha Rai, Fish Processing Technology, 2015, RandomPublications

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

Web Resources:

1. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=145743
2. https://ecourses.icar.gov.in/e-Leaarningdownload3_new.aspx?Degree_Id=03

Topics included under autonomous setup

CLASS : II B.Sc.,
SEMESTER : III
PAPER : III
TITLEOFTHEPAPER : Cell Biology, Genetics, Molecular Biology and Evolution

ADDITIONS	JUSTIFICATION
1. Industrial Safety in Processing plants	1. Employee Safety and Employability skill
DELETED TOPICS	
1. Icing, Fish maws and chitoson	1. Topic repeated, Fish maws and chitoson are not prominent in Indain market

BLUEPRINT

P.R. GOVERNMENTCOLLEGE(A),
KAKINADA
CHOICE BASED CREDIT SYSTEM

SEC 7A POST HARVEST TECHNOLOGY OF FISH AND FISHERIES

Module Name	PART I Essay Type Questions 10 marks each	Part II Short Answer Questions 5 marks each	Marks Allotted to the Chapter
UNIT I	1	01	15
UNIT II	1	02	20
UNIT III	2	01	25
UNIT IV	1	02	20
UNIT V	1	01	15
5.Total	06 Of which 3 to be answered	07 Of which 4 to be answered	95 Marks including choice. Of which 60 Marks to be answered

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

POST HARVEST TECHNOLOGY OF FISH AND FISHERIES

MODEL QUESTION PAPER

Time:2½hrs. **MaxMarks: 60**

PART – 1

Note: Answer any THREE questions choosing at least one question from each section.
Draw diagrams wherever necessary3X10=30

SECTION-A

1. Describe various aspects of storage and transport of fishes
2. What are different traditional methods of fish preservation
3. Explain Chilling, Freezing and Accelerated Freeze drying

SECTION-B

4. Write an essay on various fish by-products
5. Write an essay on Seafood Quality Assurance Systems.
6. Explain various environmental hygiene practices followed in processing plants

Part–II

Answer any **4** questions **4x5=20**

7. Postmortem Changes
8. Canning
9. Smoking offish
10. Fish Oils
11. Good Laboratory Practices
12. Seaweeds
13. Sanitation.

Course 7 A:

POST HARVEST TECHNOLOGY OF FISH AND FISHERIES

PRACICAL SYLLABUS

Learning Outcomes:

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

- Identify the quality of aqua processed products.
- Determine the quality of fishery by products by observation
- Analyze the protocols of aqua processing methods

Practical (Laboratory) Syllabus:

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured, and fermented fish products for detailed procedure method visit sites:
3. Examination of salt, protein, moisture in dried / cured products
4. Examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
5. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
6. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet
7. Corrective action procedures in processing of fish- flow chart- work sheet preparation

(** Refer the following web sites for complete procedure method and estimations of above listed practicals)

References:

1. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications
2. https://ecourses.icar.gov.in/e-Leaarningdownload
3_new.aspx?Degree_Id=03
3. https://vikaspedia.in/agriculture/fisheries/post-harvest-and-marketing/processing-infisheries/fermented-products
4.https://krishi.icar.gov.in/jspui/bitstream/123456789/20500/1/Fermentation%20technology%2 0for%20fish.pdf
5. http://jebas.org/00200620122014/Abujam%20et%20al%20JEBAS.pdf
6.https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic %20drying%20and%20packing%20of%20fish.pdf
7.https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic %20drying%20and%20packing%20of%20fish.pdf

8. https://agritech.tnau.ac.in/fishery/fish_byproducts.html

9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5352841/

10. http://www.fao.org/3/i1136e/i1136e.pdf

11.http://www.fao.org/3/x5989e/X5989e01.htm#What%20is%20sensory%20assessmet)

VII. Co-Curricular Activities

a) Mandatory:

(Lab/field training of students by teacher (lab 10 + field 05):

1. For Teacher: Training of students by the teacher in laboratory/fieldfornotlessthan15hourson various steps of post-harvest techniques of fishes, on the advanced techniques in post-harvest technology – Training of students on other employability skills in the post-harvest sector of Aquaculture Industry- like Processing, Packing, marketing of processed aqua products.

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

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

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

5. (IE): Unit tests,

b) Suggested Co-Curricular Activities

1. Observation of fish/shrimp processing plants – visit web sites of processing companies and record the details of that Unit

2. Interaction with local fishermen to know the method of preservation and details with the available traditional technology

Syllabus for B.Sc. Honours- Zoology

IV Year

AP STATE COUNCIL OF HIGHER EDUCATION REVISED UG SYLLABUS UNDER CBCS

(Implemented from Academic Year 2020-21)

Domain Subject: ZOOLOGY

Higher Order Courses for Semesters VII

Domain Subject: ZOOLOGY

Higher Order Courses for Semesters VII

COURSE –8. D

HUMAN HEALTH AND INFECTTIOUS DISEASES

Hours- 60+30 **Max. Marks-T100+P50**

I. Learning Outcomes:

While studying the Human Health and Infectious Diseases course, the student shall be able to:

- Introduce the basic concepts of pathophysiology of infectious diseases
- Study the major infectious diseases transmission to humans and response of immunity
- Understand the Pathogenesis, mechanisms of pathogenesis; transmission and epidemiology of various bacterial, viral, fungal and protozoan diseases.
- Study the Sexually transmitted diseases.
- Study the prevention and control measures of infectious diseases

II. Syllabus

Unit-1.

1.1 Introduction to Infectious Diseases:

1.2 Basic concepts in pathophysiology of infectious diseases

1.3 Outline of physiological mechanisms leading to diseased state, Infectious disease transmission, Infection and immunity, Acute and Chronic Infections Major infectious diseases of humans.

Unit-2.

Bacterial Infections:

1.1 Pathogenesis, mechanisms of pathogenesis; transmission, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major human infections **-Tuberculosis**

1.2 Pathogenesis, mechanisms of pathogenesis; transmission, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major human infections- **Cholera**

1.3 Pathogenesis, mechanisms of pathogenesis; transmission, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major human infections - **Typhoid.**

Unit-3.

Viral Diseases:

3.1 Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and anti-retroviral therapy of Human immunodeficiency virus (HIV/AIDS)

3.2 Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and anti-retroviral therapy of Sexually transmitted diseases

Unit-4.

Fungal Diseases:

4.1 Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major Fungal human pathogens- Dermatophytes

4.2 Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major Fungal human pathogens: - Candida

4.3 Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and treatment of major Fungal human pathogens: - Aspergillus

Unit-5.

Protozoan Diseases:

5.1 Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and treatment of Protozoan human pathogen- *Trypanosoma*.

5.2 Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and treatment of Protozoan human pathogen- *Giardia intestinalis*,

5.3 Pathogenesis, mechanisms of pathogenesis; transmission, life cycle, epidemiology, public health implications, diagnosis, prophylaxis and treatment of Protozoan human pathogen- *Leishmania* donovani

III. Reference Books

1. Environmental Microbiology, Pepper, I. L., Gerba, C. P. and Gentry, T. J. (2015), 3rd edition, Academia Press, Elsevier
5. Textbook of Environmental Microbiology, Mohapatra, P. K. (2008), I.K. International (P)Ltd.
6. Basic Biotechnology, Ratledge, C. and Kristiansen, B. (2003), 2nd edition, Cambridge University Press
7. Pocket Guide to Bacterial Infections – K. Balamurugan and Prithika Udayakumar (2019). CRC Press.

IV. Recommended activities

- Report preparation on community health
- Awareness on Viral diseases in the Student Community
- Collect paper clippings related to human health and discuss in the class
- Visit to PHC and know about TB treatment and HIV treatment and collect pamphlets and charts

HUMAN HEALTH AND INFECTTIOUS DISEASES LAB

Hours- 30 Max. Marks-P50

I. LEARING OURCOMES

While studying the Human Health and Infectious Diseases Lab course, the student shall be able to:

- Know the infectious diseases in the community
- Know the diseases transmission to humans
- Understand epidemiology of various bacterial, viral, fungal and protozoan diseases.
- Study the prevention and control measures of infectious diseases

Syllabus

Epidemiology of following infectious diseases with the images/photographs:

1. Tuberculosis
2. Cholera
3. Typhoid.
4. Human immunodeficiency virus (HIV/AIDS)
5. Sexually transmitted diseases.
6. Dermatophytes
7. Candida
8. Aspergillus
9. *Trypanosoma.*
10. *Giardia intestinalis,*
11. *Leishmania donovani*

Web resources for Lab

- https://pubmed.ncbi.nlm.nih.gov/15520481/
  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9279679/

BIODIVERSITY AND SYSTEMATICS

Hours- 60+30 Course: 8E Max. Marks-T100+P50

I. Learning Outcomes:

While studying the biodiversity and systematics course, the student shall be able to:

- Understand the Concept and significance of Biodiversity at Global level & National level
- Understand the threats to biodiversity
- Know the conservation strategies of wild life
- Understand the concepts of systematics

II. Syllabus

UNIT-1

1.1 Biodiversity: Definition and significance; biodiversity at global, national and local levels; magnitude and distribution of biodiversity.
1.2 Patterns of biodiversity: Latitudinal and altitudinal gradients; species area relationship.
1.3 Biogeographic realms of the world.

UNIT-2

1.1 Biogeographic zones of India and faunal diversity; Hotspots in the world and in India.
1.2 Hierarchical components of biodiversity: Species diversity, genetic diversity and ecosystem diversity.
1.3 Biodiversity values: Direct values and indirect values.

UNIT-3

3.1 Biodiversity in peril: Causes of biodiversity losses and extinction; anthropogenic impact on biodiversity.
3.2 Biodiversity and biotechnology: DNA based wildlife forensics; genetically modified organisms and Bioremediation.
3.3 Biodiversity management and conservation

UNIT – 4

1.1 IUCN classification of wildlife.
1.2 Biodiversity threats; In-situ conservation and Ex-situ conservation. Gene banks; conservation of genetic resource; cryopreservation.
1.3 Wildlife protection acts; organizations involved in protection of Biodiversity.

UNIT – 5

4.1 Systematics: Species concept. Taxonomy and its components –classification and phylogeny, cladistic classification.

4.2 Identification: Keys, biodiversity documentation, species identification and identification tools.Nomenclature: International Code of Zoological Nomenclature (ICZN);

4.3 Types: Holotype, Paratype, Neotype, Lectotype, Syntype, Homonymy and Synonymy. Molecular taxonomy: DNA fingerprinting.

III. Text Books

- Prabodh K. Maiti and Paulami Maiti. 2011. Biodiversity: Perception, Peril and Preservation.
- Saharia VV. 1982.Wildlife in India.Natraco Publishers, Dehradun.
- TandonRK.1999. Biodiversity, Taxonomy & Ecology. Prithipal singh Scientific Publishers, Jodhpur.

IV. Reference Books

- Agarwal KC. 1998. Biodiversity. India.
- International Code of Zoological Nomenclature. 1985. Third edition adopted by XX General assembly of the International Union of Biological Sciences, University of California Press, Berkeley and Los Angeles Edition.
- Kormondy EJ. 1996. Concepts of Ecology. Eastern Economy Edition.
- Oliver S & Owen Mc. Natural Resource Conservation: An Ecological Approach. Macmillan Publ. Co. New York.
- Peggy I. Fieldler and Perer M. Kareiva. 1997. Conservation Biology.

V. Recommended Activities

- Preparation of Biodiversity chart of India
- Preparation of Local area Biodiversity chart
- Visit to BMC at village level
- Acquittance/Awareness on Peoples Biodiversity Register of the local area
- Visit to near by Zoo/ Sanctuary/National park/wetland/Mangrove/sea shore/river and observe fauna and take photos
- Take photos of birds/butterflys/moths/insects/fish..etc of your area.
- Prepare Fauna book of your village
- Celebrate World Biodiversity Day May 22

AP STATE COUNCIL OF HIGHER EDUCATION
Semester-wise Revised Syllabus under CBCS 2020-21
Four Year – B.Sc. (Hons), Semester – VII
Domain Subject: ZOOLOGY
COURSE – 8 E

BIODIVERSITY AND SYSTEMATICS LAB

Hours- 30 Max. Marks- 50

I. Learning Outcomes:

While studying the biodiversity and systematics Lab course, the student shall be able to:

- Understand the Concept Biodiversity Map
- Understand the local biodiversity
- Know the wild life Fauna in the local community

II. Syllabus

1. Biodiversity- Map Preparation
2. List of local fauna (invertebrates and vertebrates).
3. Faunal diversity of man-made ecosystem.
4. Report preparation on the BMC Activities
5. Preparation of Peoples Biodiversity Register at a given site
6. Using photographs / paintings / coloured drawings identify and study distribution and ecological role of common bivalves and gastropods that occur along a sea-shore.

III. Web resources for the Lab

- http://biodiversitylab.ncbs.res.in/home

Domain Subject: ZOOLOGY

COURSE – 8 F

WILD LIFE AND CONSERVATION BIOLOGY

Hours- 60+30 Max. Marks-T100+P50

I. Learning Outcomes

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

- Know the Concept of wild life and reasons for their depletion
- Know the wild life management strategies
- Know the Importance of ecologically sensitive areas
- Know the human Impact on environmental resources
- Understand the human wild life interaction

II. Syllabus

Unit 1

1.1 Wildlife in India- Wildlife wealth of India & threatened wildlife.

1.2 Reasons for wildlife depletion in India. Wildlife conservation approaches and limitations. National and State mammals and birds of India.

1.3 Wild life Habitat- Protected Area concept: National Parks, Sanctuaries and Biosphere Reserves, cores and Buffers, Nodes and corridors. Community Reserve and conservation Reserves

Unit 2

2.1 Management of Wildlife- Red Data Book and Conservation status (endangered, vulnerable, rare, threatened and near threatened species)-definitions.

2.2 Distribution, status. Habitat utilization pattern, threats to survival of Slender Loris, Musk deer, Great Indian Bustard, Olive Ridley turtle.

2.3 Wild life Trade & legislation- Assessment, documentation, Prevention of trade. Policies and laws in Wild life management (national) and ethics.

Unit 3

3.1 Biodiversity extinction and conservation approaches- Perspectives and Expressions. Identification and prioritization of Ecologically sensitive area (ESA). Coarse filter and fine filter approaches. Regional and National approaches for biodiversity conservation.

3.2 Theory and analysis of Conservation of populations- Stochastic perturbations - Environmental, Demographic, spatial and genetic stochasticity.

3.3 Population viability analysis-conceptual foundation, uses of PVA models.

Unit 4

4.1 National and International efforts for conservation- Information on CITES, IUCN, CBD

4.2 International agreements for conserving marine life. Convention on wetlands of International Importance (Ramsar convention). Important projects for the conservation of endangered species in India.

4.3 Human impact on Terrestrial and Aquatic resources. Conservation of invertebrates with special reference to corals and butterflies. Overview of conservation of Forest &Grassland resources

Unit 5

5.1 Human – wildlife interactions

5.2 Strategies to reduce human-wildlife interactions

5.3 Role of Government and NGOs in controlling human-wildlife interactions Socio-economic issues related to human-wildlife interactions

III. Reference Books

- M.Kato. The Biology of Biodiversity, Springer.
- J.C. Avise. Molecular Markers, Natural History and Evolution, Chapman & Hall, New York.
- E.O. Wilson. Biodiversity, Academic Press, Washington.
- G.G. Simpson. Principle of animal taxonomy, Oxford IBH Publishing Company.
- E. Mayer. Elements of Taxonomy.
- E.O. Wilson. The Diversity of Life (The College Edition), W.W. Northem& Co.
- B.K. Tikadar. Threatened Animals of India, ZSI Publication, Calcutta.

IV. Suggested activities:

Visit to nearby biosphere reserve/Sanctury/National Park/ Sea Shore/Zoo
Visit to local Ramsar site and report preparation with pics
Celebrate World wetland Day February 2nd

Celebrate World Wildlife Day March 3rd
Celebrate World Sparrow Day March 20th

Celebrate Wildlife week from October 1st to October 7- Conduct Quiz, photoexhibition,essay writing competitions ..to create awareness among students and public

COURSE – 8 F

WILD LIFE AND CONSERVATION BIOLOGY- LAB

Hours- 30 Max. Marks- P50

I. LEARNING OUTCOMES

By the successful completion of the course the graduate shall able to –

- Understand the importance of various biomes
- Understand and gain knowledge of animal architecture

II. Syllabus

1. Using photographs / paintings / coloured drawings identify and study ecological role of characteristic animal species (major representative species only) of various Biomes.
2. Study of animal architecture (photographs / diagram / abandoned specimen) ; Hive of honey bee, nest of COURSE wasp, nest of potter wasp, Mount of termite, Nests of Weaver Bird and tailor bird.
3. Endangered species of Indian sub-continent
4. Compare and interpret given sonograms of bird calls (any two e.g. Courtship calls, Alarm calls)
5. On a phytogeographic map of India locate & demarcate major sanctuaries / national parks

III. Web resources for lab

https://www.naturepl.com/pictures/pdfs/NPL_Architecture.pdf
https://youtu.be/31PWjb7Do1s

SEMESTER VII – SKILL ENHANCEMENT COURSES

COURSE – 10A

MILK AND MILK PRODUCTS TECHNOLOGY

Hours- 60+30 Max. Marks-T100+P50

LEARNING OUTCOMES

By the successful completion of the course the graduate shall able to –

- Understand the basics of milk and milk products
- Know the composition, processing, and packaging of milk and milk products
- Understand the reasons for deterioration of milk and milk products
- Understand the process in preparation of different milk products
- Gain knowledge about different organic milk products
- Understanding the regulations and standards related to milk and milk products.

SYLLABUS

UNIT-1:

1.1 Definition of milk and milk products

1.2 Composition of milk and factors affecting composition

1.3 Nutritional value of milk and milk products

1.4 Types of milk products

UNIT-2

2.1 Collection and transportation of milk

2.2 Processing of milk

(Chilling, standardization, pasteurization, UHT treatment, homogenization, bactofugation)

UNIT-3

3.1 Packaging, storage and distribution of milk and milk products.

3.2 Microbiological deterioration of milk and milk products.

3.3 Common defects of milk products and their remedial measures.

UNIT-4:

4.1 Preparation of cream, butter, paneer or channa, ghee,

4.2 Preparation of khoa, lassi, dahi, ice-cream, mozzarella

4.3 Preparation of cheese, Yogurt, Butter and Ghee

UNIT-5:

5.1 Organic milk products.

5.2 Pesticides residues in milk and milk products

Legal and BIS standards of milk and milk products

REFERENCE BOOKS

1. Dairy Science and Technology Handbook by P. Walstra, J.T.M. Wouters, and T.J. Geurts
2. Dairy Processing and Quality Assurance by Ramesh C. Chandan, Arun Kilara, and Nagendra Shah
3. Principles of Dairy Science by W.J. Hurst, R.W. Griffiths, and T.P. Toulouse

PRACTICAL COURSE – 10A

MILK AND MILK PRODUCTS TECHNOLOGY

Hours-30 Max. Marks- P50

LEARNING OUTCOMES

By the successful completion of the course the graduate shall able to –

- Develop skill in estimation of fat content in milk
- Develop skill in estimation of SNF content in milk
- Gain knowledge about various platform tests at milk reception sites
- Develop practical skills in milk testing, quality control and assurance
- Develop practical skills in determination of specific gravity of milk
- Develop practical skills in analysis of butter and cream content.

PRACTICAL SYLLABUS

1. Estimation of Fat Content in milk
2. Estimation of SNF Content in Milk
3. Various Platform Tests at milk reception sites
4. Tests For Adulteration in Milk
5. Determination of Specific Gravity by Lactometer
6. Analysis of Butter by Khoman Method
7. Estimation of Fat in Cream by Fat Method
8. Estimation of Acidity in Cream

LAB REFERENCE BOOKS

1. Dairy Processing and Quality Assurance by Ramesh C. Chandan, Arun Kilara, and Nagendra Shah
2. Practical Manual for Quality Assurance in Milk and Milk Products by M.S. Grewal and S. Chavan
3. Manual of Methods of Analysis of Milk and Milk Products by BIS (Bureau of Indian Standards)
4. Dairy Plant Management and Pollution Control by S. Ranganathan and K.K. Srivastava

CO-CURRICULAR ACTIVITIES

- Conduct a milk quality and safety awareness campaign to promote safe and healthy consumption of milk and milk products.
- Organize an industrial visit to a dairy plant to provide hands-on experience to students on milk and milk products technology.
- Organize a dairy product exhibition or fair to showcase and market student-made dairy products.
- Conduct a milk testing competition to test the knowledge and practical skills of students
- Organize a cheese, yogurt, butter, or ghee making competition to encourage
- creativity and innovation among students

THEORY COURSE – 10B

MILK AND MEAT HYGIENE, FOOD SAFETY AND PUBLIC HEALTH

Hours- 60+30 Max. Marks-T100+P50

I. LEARNING OUTCOMES

By the successful completion of the course the graduate shall able to –

- Understand the importance of Milk and Meat Hygiene in public health
- Identify sources of milk and meat contamination
- Describe methods for milk and meat quality control and inspection
- Identify and control milk and meat-borne pathogens
- Understand about hazards of milk and meat
- Understand food safety regulations and laws
- Implement HACCP principles in food safety evaluation
- Evaluate food preservation techniques

II. SYLLABUS

UNIT-1: INTRODUCTION OF MILK AND MEAT HYGIENE
1.1 Definition and scope of Milk and Meat Hygiene
1.2 Historical development and importance of Milk and Meat Hygiene
1.3. Public health aspects of Milk and Meat Hygiene

UNIT-2: MILK HYGIENE
2.1 Sources of milk contamination
2.2 Pasteurization and sterilization of milk
2.3 Milk-borne diseases
2.4 Milk quality control and inspection

UNIT-3: MEAT HYGIENE
3.1 Sources of meat contamination
3.2 Slaughtering and dressing of animals
3.3 Meat-borne diseases
3.4 Meat quality control and inspection

UNIT-4: HAZARDS FOR MILK AND MEAT
4.1 Chemical and microbial toxicities associated with milk, meat and aquatic foods.
4.2 Toxic residues: pesticides, antibiotics, metals and hormones in food and their health hazards.
4.3 Microbial toxins in food and their health hazards.
4.4 Sanitary and phytosanitary measures in relation to foods of animal origin and aquatic foods.

UNIT-5: FOOD SAFETY AND PUBLIC HEALTH

5.1 Hazard Analysis and Critical Control Points (HACCP)
5.2 Food safety regulations and laws
5.3 Food preservation techniques
5.4 Emerging issues in food safety and public health

REFERENCE BOOKS

1. Food Safety: Principles and Practices by Ronald Schmidt and Gary Rodrick
2. Food Safety and Quality Systems in Developing Countries, Volume One: Export Challenges and Implementation Strategies by Jeffrey Hoorfar, Sibel Roller, and Jorgen Schlundt
3. Meat Hygiene by K. Singh and R. K. Sharma
4. Milk and Dairy Products: Technology, Chemistry and Microbiology by Nivedita Datta and Dattatreya Mukhopadhyay
5. Handbook of Food Safety Engineering by Da-Wen Sun
6. Food Safety and Toxicity by Debasis Bagchi and Sreejayan Nair
7. Handbook of Food Preservation by M. Shafiur Rahman
8. Food Safety: The Science of Keeping Food Safe by Ian C. Shaw
9. Milk Processing and Quality Management edited by Adnan Y. Tamime
10. Meat Hygiene by J.F. Gracey, D.S. Collins, and R.J. Huey
11. Handbook of Food Science, Technology, and Engineering edited by Y.H. Hui
12. Principles of Food Sanitation by Norman G. Marriott and Robert B. Gravani

PRACTICAL PAPER – 10B
MILK AND MEAT HYGIENE, FOOD SAFETY AND PUBLIC HEALTH

Hours- 30 Max. Marks-50

I. LEARNING OUTCOMES

1. Demonstrate skills Microbiological analysis of raw milk and meat samples
2. Skill in grading of milk by MBR test process
3. Skill development in Ante-mortem inspection of food animals.
4. Skill development in Post mortem inspection of food animals.
5. Understand Food safety and hygiene practices among consumers, food handlers, and food processors.

II. SYLLABUS

1. Microbiological examination of raw milk and meat samples
2. Grading of milk by MBR test.
3. Ante-mortem inspection of food animals.
4. Post mortem inspection of food animals.
5. Food safety and hygiene practices among consumers, food handlers, and food processors.
6. Study the role of the Andhra Pradesh Public Health and Municipal Engineering Department (PHMED) in food safety and hygiene

III. REFERENCE BOOKS

1. Practical Meat Hygiene by J. J. Vogel and S. G. Tindall
2. Practical Dairy Chemistry: Methods of Analysis by T. Varadarajan and B. S. Narang
3. Food Safety and Quality Management: A Practical Approach by Hal King and Joyce Igoe
4. Meat Processing Technology: For Small- to Medium-Scale Producers by Fidel Toldrá and Leo M.L. Nollet
5. Dairy Processing Handbook by Tetra Pak Processing Systems AB
6. Food Microbiology: Fundamentals and Frontiers by Michael Doyle and Robert Buchanan

IV. CO-CURRICULAR ACTIVITIES

1. Visit to local dairy and meat processing facilities
2. Guest lectures by industry professionals and government regulators
3. Research and presentation on a specific food safety issue or outbreak
4. Food safety training for local community members or organizations
5. Participation in food safety competitions or events.

THEORY COURSE – **11A**

POULTRY PRODUCTS AND MANAGEMENT

Hours- 60+30 Max. Marks-T100+P50

I. LEARNING OUTCOMES

This course will provide students with a deep knowledge in endocrinology by the successful completion of the course the graduate shall able to –

- Understand about various poultry products and their management
- Analyze the different types of poultry products and their nutritional value
- Knowledge in poultry product processing and preservation
- Skill in poultry products evaluation
- Understand the importance of quality of egg and sanitation
- Understand Sources of contamination of Eggs and prevention methods.
- Knowledge in grading of poultry meat
- Develop skills in poultry product processing and preservation techniques

II. SYLLABUS

UNIT-1: INTRODUCTION TO POULTRY PRODUCTS

1.1 Types of poultry products
1.2 Nutritional value of poultry products
1.3 Factors affecting the quality and safety of poultry products
1.4 Value-added poultry products

UNIT-2: POULTRY PRODUCT PROCESSING AND PRESERVATION

2.1 Principles of poultry product processing
2.2 Processing techniques for various poultry products
2.3 Preservation techniques for poultry products
2.4 Packaging and labelling of poultry products

UNIT-3: POULTRY PRODUCTS EVALUATION

3.1 Sensory evaluation of poultry products
3.2 Quality control and assurance of poultry products
3.3 Factors affecting the shelf life of poultry products

UNIT-4: QUALITY OF EGG AND SANITATION

4.1 Methods of cooking of Eggs
4.2 The Nutritive value of Egg before cooking after cooking, other advantages of Egg.
4.3 Selection of types of Detergents and Sanitizers for controlling Egg Quality and Poultry Products
4.4 Sources of contamination of Eggs and its Products and prevention methods.

UNIT-5: GRADING OF POULTRY MEAT

5.1 Grade - I, Grade - II
5.2 Abnormalities in Processed Broiler Meat
5.3 Preservation of Meat

REFERENCE BOOKS

1. Poultry Science by Colin G. Scanes
2. Handbook of Poultry Science and Technology, Volume 1 by Isabel Guerrero-Legarreta
3. Commercial Chicken Meat and Egg Production by Donald D. Bell
4. Poultry Products Processing: An Industry Guide by Simeon Oladele Fasina
5. The Poultry Health Handbook by Dr. M. K. Jain

WEB LINKS

https://cari.icar.gov.in/pht.php http://ecoursesonline.iasri.res.in/mod/page/view.php?id=63725

PRACTICAL PAPER – 11A
POULTRY PRODUCTS AND MANAGEMENT

Hours- 30 Max. Marks-50

I. LEARNING OUTCOMES

1. Develop skills in Estimation of External Quality of Chicken Egg
2. Develop skills in Estimation of Internal Quality of Chicken
3. Skill in sensory evaluation tests assess the quality of poultry products
4. Develop practical skills in poultry product processing and preservation techniques
5. Skill in estimation of percentage of losses in Processing of Broilers
6. Knowledge about different Government agencies that provide hands-on experience related to poultry products

SYLLABUS

7. Estimation of External Quality of Chicken Egg
8. Estimation of Internal Quality of Chicken
9. Study on sensory evaluation tests to assess the quality of poultry products- appearance, flavor, texture, juiciness, and aroma.
10. Study on steps involved in processing and preserving poultry products
11. Estimation of Percentage of Losses in Processing of Broilers
12. Data collection about different Government agencies that provide hands-on experience related to poultry products.

REFERENCE BOOKS

13. Poultry Products Processing: An Industry Guide by Thomas J. Roach
14. Poultry Meat and Egg Processing, Second Edition by Richard J. Stier
15. Technology of Chicken Meat and Poultry Products by Dr. V.K. Singh
16. The Science of Poultry and Meat Processing by Dr. Shai Barbut
17. Sensory Evaluation of Food: Statistical Methods and Procedures by Michael O'Mahony
18. Handbook of Food Preservation by M. Shafiur Rahman

CO-CURRICULAR ACTIVITIES

19. Visit a poultry farm to learn about the various poultry products
20. Participation in trade shows, conferences, and workshops related to poultry products and technologies.
21. Collection and display of articles related to poultry industry

    Working on internship or apprenticeship programs with poultry processing plants
22. Conducting research projects on topics related to poultry products, such as processing, quality, or safety,

23. Visit Restaurants, KFC, Bekary. And identify different value added Products sold in the market .

24. Collect recipe s of different Value-added products and try to prepare them in the college or at home

25. Conduct “Chicken fest “ in the college and prepare different value added products of egg and meat and sell the products to others

THEORY COURSE – **12B**

POULTRY WASTE MANAGEMENT

Hours- 60+30 Max. Marks-T100+P50

I. LEARNING OUTCOMES

By the successful completion of the course the graduate shall able to –

- Understand the basic principles of poultry waste management
- Understand the sources and types of poultry waste.
- Evaluate and select appropriate poultry waste treatment technologies
- Understand the importance of poultry litter and its value addition
- Understand about poultry litter management
- Gain knowledge about the methods and types of poultry litter disposal and uses

II. SYLLABUS

UNIT-1: INTRODUCTION TO POULTRY WASTE MANAGEMENT
Definition, Types, Importance of poultry waste management
Environmental and health concerns associated with poultry waste
Basic principles of poultry waste management

UNIT-2.: POULTRY WASTE TREATMENT TECHNOLOGIES
Conventional treatment methods (composting, land application, anaerobic digestion)
Innovative treatment methods (wetland systems, bioreactors, thermal treatment)
Selection of appropriate treatment methods based on waste characteristics and local conditions

UNIT-3.: POULTRY LITTER
Poultry Litter - Bedding Material
Importance of Poultry Farm Pollution
Value of Poultry Manure

UNIT-4.: POULTRY LITTER MANAGEMENT
Moisture management methods.
Litter Re-utilization methods
Litter Amendments
Acidifiers and other Amendments

UNIT-5: POULTRY LITTER DISPOSAL AND USES
Methods of disposal of faecal material
Types of uses of faecal material
Environmental advantages due to use of poultry litter

REFERENCE BOOKS

1. Poultry Waste Management: Agricultural and Environmental Issues edited by B. P. Singh and T. A. El-Masry
2. Poultry Waste Management: Towards a Sustainable Future by G. T. Patel and B. V. Changela
3. Poultry Production and Management by N. G. Das (available on Amazon)
4. Livestock Waste Facilities Handbook by G. L. Riskowski
5. Handbook of Poultry Science and Technology, Volume 2: Secondary Processing by Y. H. Hui and S. C. Dai

WEBLINKS

https://www.pashudhanpraharee.com/poultry-waste-management/

PRACTICAL COURSE – 11B
POULTRY WASTE MANAGEMENT

Hours- 30 Max. Marks-P50

I.LEARNING OUTCOMES

This course will provide students with a deep knowledge in endocrinology by the successful completion of the course the graduate shall able to –

- Skill in sampling techniques for poultry waste
- Skill in preparation of manure from poultry waste
- Analyze the composition of litter
- Skill in preparing fuel from faecal material
- Skill in preparing of fertilizer from poultry litter
- Awareness about litter collection from cage rearing systems
- Awareness on site selection and preparation for poultry waste management
- Skill development in poultry waste treatment techniques

II SYLLABUS

1. Study of different types of sampling techniques for poultry waste
2. Preparation of manure from poultry waste and spreading on cropland or green land
3. Composition of litter
4. Preparing fuel from faecal material
5. Preparing fertilizer from poultry litter
6. Steps to be considered for site selection and preparation for poultry waste management
7. Study of some common poultry waste treatment techniques
8. Data collection of different methods on disposal of chicken skin waste and carcass waste from chicken shops.

III. REFERENCE BOOKS

1. Handbook of Poultry Science and Technology, Volume 2: Secondary Processing by Y. H. Hui and S. C. Dai (available on Amazon.in)
2. Livestock Waste Facilities Handbook by G. L. Riskowski (available on Amazon.in)
3. Poultry Science and Practice by J. L. Shelton and N. B. Anthony (available on Amazon.in)
4. Reference Books:
5. Poultry Diseases by H. V. Narasimha Murthy (available on Amazon.in)
6. Poultry Nutrition by T. Kotaiah (available on Amazon.in)
7. Handbook of Poultry Feed from Waste: Processing and Use by P. B. Patil and S. K. Sahoo (available on Amazon.in)

IV. CO-CURRICULAR ACTIVITIES

- Field trips to poultry farms and waste management facilities
- Guest lectures by industry professionals and government regulators
- Group projects on poultry waste management planning and implementation
- Case studies of successful and unsuccessful poultry waste management systems
- Participation in conferences and workshops related to poultry waste management
- Visit to all the chicken shops in your village/town and know the approximate quantity of chicken waste generated per day/per month and calculate amount of waste produced in your town/village

SEMESTER VIII HEC

COURSE 14 C

ENVIRONMENT BIOLOGY AND ENVIRONMENT PHYSIOLOGY

Hours- 60+30 Max. Marks-T100+P50

I. Learning out comes

By the successful completion of the course the graduate should able to –

- Know the structure and Components of Ecosystem
- Understand the Community dynamics
- Know the natural resources and their conservation
- Understand the Stress physiology
- Understand the importance of yoga and meditation

II. Syllabus

UNIT- 1

1.1 Structure and components of ecosystem. Types and functions of ecosystem. Ecological modeling. Limiting factors

1.2 Energy flow, food chain, food web and trophic levels, ecological pyramids. Ecological succession

1.3 Biogeochemical cycles: water cycle, carbon, oxygen and nitrogen cycles.

UNIT-2

2.1 Population dynamics- Dynamics of population growth. Factors that increase or decrease population.

2.2 Community dynamics- Characteristics and composition- Development and classification of communities.

2.3 Renewable and non-renewable resources: Forest, water and mineral resources. Conservation of energy sources.

UNIT-3

3.1 Levels of adaptation. - Mechanisms of adaptation.

3.1. Adaptations to different environments. Marine, shores and estuaries. Freshwater. Terrestrial Life.

3.1 Adaptations to different environments. Aerial-Polar-Deep Sea environment- Desert- cave- Wet land- Parasitic habitats.

UNIT-4

1.1 Stress Physiology - Basic concepts of environmental stress and strain, Concept of elastic and plastic strain.

4.2. Stress avoidance, stress tolerance and stress resistance. Acclimatization, acclimation and adaptation.

4.3 Endothermic and physiological mechanism of regulation of body temperature.

UNIT-5

5.1 Stress physiology in different conditions
5.2 Physiological response to oxygen deficient stress.Physiological response to body exercise.
5.3 Effect of meditation and yoga

III. Suggested Text books

FUNDAMENTALS OF ECOLOGY Odum P.

IV. Reference Books

- ECOLOGY with special reference to animal& man S. Charles, Kendeigh Prentice hall of India Pvt. Ltd. New Delhi
- ELEMENTS OF TROPICAL ECOLOGY- Yanney Ewusie (English language Book Society, Heine mann educational book publication)
- ANIMAL PHYSIOLOGY, MECHANISM AND ADAPTATION - Eckert, R., W,H, Freeman and Co.
- BIOCHEMICAL ADAPTATION- Hochachka, P.W, and Somero S.N, Princeton, New Jersey
- ANIMAL PHYSIOLOGY: ADAPTATION AND ENVIRONMENT. - Schiemidt Nielsen, Cambridge
- GENERAL & COMPARATIVE ANIMAL PHYSIOLOGY Hoar W.S. Princeton Hall of India

V. Suggested activities

- Case study Meditation and yoga
- Collection of specimens from various environments

COURSE 14 C - LAB

ENVIRONMENT BIOLOGY AND ENVIRONMENT PHYSIOLOGY- LAB

Hours- 30 Max. Marks-P50

Learning out comes

By the successful completion of the course the graduate should able to –

- Observe the opercular activity of a model fish
- Study Toxicology effects
- Observe the adaptations in various animals

Syllabus

1. Study of the effects of starvation / surfacing prevention on opercular activity in a teleost fish
2. Study of effect of fluoride toxicity on muscle protein in a fish.
3. Study of changes in chromatophores in fish kept against white and black backgrounds.
4. Toxicity test (LC 50)
5. Adaptive modification of feet or claws in birds.
6. Adaptive modification in mouth parts of insects.
7. Analysis of soil and water.
8. Study of biogeochemical cycles by way of models.

Visit to some natural habitats and man- made habitats to study the human impact on environment.

Water analysis for fresh and waste water

Lab web resources:

https://sites.google.com/site/cynthiajdowns/teaching

https://www.scientistcindy.com/environmental-biology-laboratory.html

COURSE 14 D

ANIMAL BEHAVIOUR AND CHRONOBIOLOGY

Hours-60+30 Max. Marks-100+50

Learning out comes

By the successful completion of the course the graduate should able to –

- Conceptualize ethology profiles of various scientists
- Understand the concepts of Ethology
- Know the animal behavior patterns
- Observe the adaptations in various animals
- Understand the principles of chronobiology

II. Syllabus

UNIT 1:

1.1 Introduction to Animal Behaviour

1.2 Origin and history of Ethology; Brief profiles of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen

1.3 Proximate and ultimate causes of behaviour Methods and recording of a behaviour

UNIT 2: Patterns of Behaviour

2.1 Stereotyped Behaviours (Orientation, Reflexes)

2.2 Individual Behavioural patterns; Instinct vs. Learnt Behaviour

2.3 Associative learning, classical and operant conditioning, Habituation, Imprinting.

UNIT 3: Social and Sexual Behaviour

3.1 Social Behaviour: Concept of Society; Communication and the senses

3.2 Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance.

3.3 Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.

UNIT 4: Introduction to Chronobiology

4.1 Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and period.

4.2 Adaptive significance of biological clocks

4.3 Relevance of biological clocks; Chronopharmacology, Chronomedicine, Chronotherapy.

UNIT 5: Biological Rhythm

5.1 Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms

5.2 Concept of synchronization and masking; Photic and non-photic zeitgebers

5.3 Circannual rhythms; Photoperiod and regulation seasonal reproduction of vertebrates; Role of melatonin.

Text Books

Reference Books

- David McFarland, Animal Behaviour, Pitman Publishing Limited, London, UK.
- Manning, A. and Dawkins, M. S, An Introduction to Animal Behaviour, Cambridge, University Press, UK.
- John Alcock, Animal Behaviour, Sinauer Associate Inc., USA.
- Paul W. Sherman and John Alcock, Exploring Animal Behaviour, Sinauer Associate Inc., Massachusetts, USA.
- Chronobiology Biological Timekeeping: Jay. C. Dunlap, Jennifer. J. Loros, Patricia J. De Coursey (ed). 2004, Sinauer Associates, Inc. Publishers, Sunderland, MA, USA
- Insect Clocks D.S. Saunders, C.G.H. Steel, X., Afopoulou (ed.) R.D. Lewis. (3rdEd) 2002 Barens and Noble Inc. New York, USA
- Biological Rhythms: Vinod Kumar (2002) Narosa Publishing House, Delhi/ Springer-Verlag, Germany.

Suggested activities

- Observation – recording of behavior pattern of pet animals /animals in the community
- Observation of behavioural changes in Honey bees

COURSE 14 D - LAB
ANIMAL BEHAVIOUR AND CHRONOBIOLOGY- LAB

Hours-30 Max. Marks-50

Learning out comes

By the successful completion of the course the graduate should able to –

- Understand behavioral responses of insects
- Know the geotaxis behaviour patterns
- Observe phototaxis behavior in various larvae

Syllabus

To study nests and nesting habits of the birds and social insects.

1. To study the behavioral responses of wood lice to dry and humid conditions.
2. To study geotaxis behaviour in earthworm.
3. To study the phototaxis behaviour in insect larvae.
4. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioral activities of animals and prepare a short report.
5. Study and actogram construction of locomotor activity of suitable animal models.
6. Study of circadian functions in humans (daily eating, sleep and temperature patterns).

Lab resources:

Biological Rhythms: Vinod Kumar (2002) Narosa Publishing House, Delhi/ SpringerVerlag, Germany.

- https://ccb.ucsd.edu/the-bioclock-studio/education-resources/basics/part2.html

https://ccb.ucsd.edu/the-bioclock-studio/education-resources/basics/index.html

COURSE 14F
BIOSYSTEMATICS & TAXONOMY

Hours- 60+30 Max. Marks-T100+P50

I. Learning out comes

By the successful completion of the course the graduate should able to –

- Understand the concepts of Biosystematics and taxonomy
- Acquire skills on collection of samples for Taxonomic studies
- Understand the rules of ICZN
- Under stand the different types of molecular species concepts

II. Syllabus

UNIT-1

1.1 Definition and basic concepts of Biosystematics and taxonomy
1.2 Historical resume of systematic Stages in taxonomy
1.3 Importance of taxonomy Aims and tasks of a taxonomist

UNIT-2

2.1 Treads in Biosystematics-concepts of different conventional and newer aspects- Ecotaxomony- Behavioural taxonomy- Cytotaxonomy- Biochemical taxonomy- Numerical taxonomy
2.2 Dimension of speciation and species concept- Typological species concept-Biological species concept

UNIT-3

3.1 Evolutionary species concept- Polytypic & monotypic species, subspecies, infraspecific groups, super species and other kind of species.
3.2 Concept of zoological classification - Theories of biological classification Kinds & Component of classification-Phyletic Lineages-Linnaean hierarchy

UNIT-4

4. 1Taxonomic collections, methods & data recording-Collecting ways and data collection
1.2 Preservation of collected material and curating-Methods of identification and problems encountered in identification
1.3 Taxonomic characters and taxonomic keys Preparation of taxonomic publication and taxonomic paper

UNIT-5

5.1 Zoological Nomenclature- International code of Zoological Nomenclature (ICZN)
5.2 Operative principles and important rules of nomenclature- Important Latin words & abbreviations and Linnaean Signs

III. **Text Books**:

IV. **Reference Books:**

- M.Kato.The Biology of Biodiversity. Springer.
- E.O. Wilson, biodiversity. Academic Press, Washington.

- G.G. Simpson, Principle of animal taxonomy. Oxford IBH Publishing company.
- E. Mayer. Eleements of Taxonomy. Oxford IBH Publishing company.
- E.O. Wilson. The diversity of Life (The College edition W.W. Northem & Co.
- B.K. Tikadar. Threatened Animal of India, ZSI publication Calcutta
- V.C. Kapoor. Theory and Practice of Animal Taxonomy. Oxford & IBH Publishing Co.
- J.c. Avise, Molecuular Markers, Natural History and Evolution, Chapman & Hall, New York.

V. Suggested Activities:

- Project work on the Taxonomic key – with reference to local species
- Take photos of atleast 20 varieties of butterflies from your mobile and observe them carefully and describe each species. Observe their size ,colour of the wings, spots on the wings , colour pattern on the wings,number of colours on wings .

- Take photo of different Birds and try to identify them

COURSE 14F
BIOSYSTEMATICS & TAXONOMY
LAB

Hours- 30 Max. Marks-50

I. Learning out comes

By the successful completion of the course the graduate should able to –

- Assess the Biosystematics and taxonomy at local area
- Understand the climate influence on the Taxonomic diversity

II. Syllabus

1. Composition assessment of the taxonomic diversity / biodiversity in a habitat (e.g. grassland, arid land, wet land, etc.). – Detailed report
2. Influence of climatic conditions on taxonomic diversity in a given habitat.
3. Preparation of models showing the status of certain taxa or species in a particular habitat.-project
4. Collection and preservation techniques

Taxidermi-Definition and methods (reptiles birds and mammals)

Skill Enhancement Courses for Semester–VIII

THEORY COURSE – 15 A MARICUTLURE

Hours- 60+30 Max. Marks-T100+P50

I. LEARNING OUTCOMES

By the successful completion of the course the graduate shall able to –

- Understand the basic principles and objectives of mariculture
- Learn the techniques of site selection and preparation for mariculture
- Understand the types of culture systems used in mariculture
- Understand the culture aspects of fin fish and crustaceans in mariculture
- Understand the culture aspects of mussel farming, pearl oysters and seaweeds of mariculture

II. SYLLABUS

UNIT-I:

1.1 Definition, history and scope of mariculture
1.2 Principles and objectives of mariculture
1.3 Advantages and disadvantages of mariculture

UNIT-II:

2.1 Factors affecting site selection for mariculture
2.2 Techniques for site preparation
2.3 Environmental impact assessment and management

UNIT-III:

3.1 Types of mariculture systems: open sea culture, closed system, land-based tanks, and cages
3.2 Design and construction of mariculture systems
3.3 Water quality management in mariculture systems

UNIT-IV:

4.1 Culture of milkfish, grey mullets, Asian seabass, groupers
4.2 Culture of Crustaceans-Shrimp culture, Mud crab culture

UNIT-5:

4.1 Mussel farming
4.2 Culture of pearl oysters
4.3 Culture of seaweeds

III. REFERENCE BOOKS

1. Mariculture: Principles and Practices by John A. Hargreaves and James E. McVey
2. Aquaculture: Farming Aquatic Animals and Plants by John S. Lucas and Paul C. Southgate
3. Aquaculture Engineering by Odd-Ivar Lekang
4. Handbook of Mariculture: Aquaculture of Bivalve Molluscs by John W. Castello and C. D. D. Tacon
5. Marine Aquaculture: Opportunities for Growth by National Research Council

1. Aquaculture Production Systems by James E. McVey
2. Mariculture: Principles and Practices by B. Madhusoodana Kurup and K. K. Vijayan.
3. Marine Aquaculture: Principles and Practices by N. P. Kurup and K. K. Vijayan.
4. Marine Fisheries and Mariculture by R. B. Simha and S. S. Mishra.
5. Handbook of Fisheries and Aquaculture by B. C. Mahapatra.
6. Fishery Science and Aquaculture: Principles and Practices by R. K. Singh and P. C. Thomas.
7. Mariculture and Aquaculture Engineering by K. R. Gupta.

PRACTICAL COURSE – 15A MARICUTLURE

Hours-30 Max. Marks-P50

I. LEARNING OUTCOMES

By successful completion of this lab course the graduate can gain

- Skill in water quality management techniques for mariculture systems
- Skill in identification and characters of different marine cultivable fin fishes
- Skill in identification and characters of different marine cultivable shrimps and crabs
- Skill in identification and characters of different marine cultivable bivalves
- Skill in identification and characters of different marine cultivable seaweeds

II. SYLLABUS

1. Techniques for water quality improvement- Aeration, Filtration, Nutrients management, chemical treatment and RAS
2. Identification of cultivable finfish-Mugil cephalus, Chanos chanos, Lates calcarifer, Cromileptes altivelis, Epinephelus areolatus.
3. Identification of cultivable shrimps and crabs-Penaeus indicus, Penaeus merguiensis, Penaeus monodon, Scylla serrata, Scylla tranquibarica
4. Identification of cultivable bivalves- Crossostrea madrasensis, Pinctada fucata, Perna viridis, Perna indica, Anadara granosa.
5. Identification of seaweeds Ulva, Sargassum, Gelidiella, Gracilaria, Hypnae

III. REFERENCE BOOKS

1. Marine Aquaculture: Opportunities for Growth edited by Sandra Shumway and Gary Loveridge
2. Seaweeds: Edible, Available, and Sustainable edited by Ole G. Mouritsen and Jonas Drotner Mouritsen
3. Marine Shrimp Culture: Principles and Practices by James M. Wyban
4. Mariculture: Principles and Practices by John A. Hargreaves and James E. McVey
5. Handbook of Mariculture: Aquaculture of Bivalve Molluscs by John W. Castello and C. D. D. Tacon
6. Marine Aquaculture: Opportunities for Growth by National Research Council
7. Mariculture: Principles and Practices by B. Madhusoodana Kurup and K. K. Vijayan.
8. Marine Fisheries and Mariculture by R. B. Simha and S. S. Mishra.
9. Handbook of Fisheries and Aquaculture by B. C. Mahapatra.
10. Mariculture and Aquaculture Engineering by K. R. Gupta.

IV. CO-CURRICULAR ACTIVITIES

- Visit to a mariculture farm to observe site selection and practical techniques

- Interactions with industry experts
- Attending/ Conducting Seminars and workshops on mariculture
- Participate in mariculture-related competitions and quizzes

THEORY COURSE –15B
ORNAMENTAL FISHERY

Hours- 60+30 Max. Marks-T100+P50

I. LEARNING OUTCOMES

By the successful completion of the course the graduate shall able to –

- Understand the basics of ornamental fishery
- Understand about types of ornamental fishes
- Gain knowledge about freshwater ornamental fishes' habitats, feeds and breeding units
- Gain knowledge about Marine environment ornamental fishes' habitats, feeds and breeding units
- Understand the principles of ornamental fish production techniques
- Apply proper management practices for water quality, disease prevention, and health management in ornamental fish farming
- Gain knowledge about the commercial production of aquarium fishes and plants.

II. SYLLABUS

UNIT-I: INTRODUCTION

1-1 Aquarium and ornamental fishes – introduction
1-2 Present status of Aquarium trade in the world and India
1-3 Aquarium accessories – aerators, filters, lighters and heaters
1-4 Water quality needs and different kinds of feeds

UNIT-II: FRESH WATER ORNAMENTAL FISHES

2-1 Live bearers, gold fish, koi, gourami, barbs abd tetras, angel fish and cichlid fish
2-2 Brood stock development, breeding, larval rearing and grow out
2-3 Larval feeds and feeding

UNIT- III: MARINE ORNAMENTAL FISHES

3-1 Varieties and habitat of marine ornamental fishes 3-2
major marine ornamental fish resources of India
3-3 Collection and transportation of live fish, use of anaesthetics 3-4
Breeding of marine ornamental fish
3-5 Other aquarium animals – sea anemones, lobsters, worms, shrimps, octopus and starfish

UNIT IV: AQUARIUM MANAGEMENT

4-1 Setting up fresh water, marine and reef aquariums
4-2 Water quality management for different types of aquariums
4-3 Common diseases of aquarium fish, diagnosis and treatment
4-4 Temperature acclimatization and oxygen packing for aquarium fish

UNIT V: COMMERCIAL PRODUCTION OF AQUARIUM FISH AND PLANTS

5-1 Commercial production units of ornamental fish- requirements and design
5-2 Commercial production of goldfish, live bearers, gouramies, barbs, angels and tetras
5-3 Mass production of aquarium plants
5-4 Retail marketing and export of ornamental fish

III. REFERENCE BOOKS

1. Jameson JD and Santhanan R 1996. Manual of ornamental fishes and farming technologies, Fisheries College and research institute, Tuticorn
2. Stephen Spotte 1993. Marine aquarium keeping. John wiley and sons, USA
3. Dick Mills 1998. Aquarium fishes, Dorling Kindersly Ltd, London
4. Van Ramshort JD 1978. The complete aquarium encyclopaedia, Elseveir
5. Ornamental Fish Production and Management by A. K. Roy and N. K. Barman
6. Ornamental Fish Farming by F. C. Thomas and R. S. Liew
7. Ornamental Fish Culture and Aquarium Management by B. S. Bisht

****

PRACTICAL COURSE – 15 B
ORNAMENTAL FISHERY

Hours-30 Max. Marks-50

LEARNING OUTCOMES

By the successful completion the course graduate will acquire

- Skill in identification of different types of aerators and their usages
- Skill in using different methods of water circulation methods in aquarium
- Skill in identification of aquarium plants, marine aquarium fishes, fresh water aquarium fishes
- Skill in breeding of egg layers and live bearers

SYLLABUS

1. Study of aerators – types and structures
2. Water circulation methods in aquarium and filtration
3. Collection and identification of aquarium plants
4. Identification of common marine aquarium fishes
5. Identification of common fresh water aquarium fishes
6. Breeding of egg layers
7. Breeding of live bearers
8. Evaluation of significance of aquaria for commercial and domestic use

REFERENCE BOOKS

1. Ornamental Fish Farming: Principles, Procedures, and Practices" by P.K. Panda and A.K. Jana
2. "Handbook of Ornamental Fish" by Dr. D. D. Sharma and Dr. M. N. Bhat
3. "Ornamental Fishes and Aquatic Invertebrates: Self-Assessment Color Review" by Chris Andrews and Adrian Exell
4. "Ornamental Fishes and Aquatic Plants" by Dr. B. C. Jana
5. "Ornamental Fish Culture and Aquarium Management" by K. Gopalakrishnan and K. K. Vijayan

CO-CURRICULAR ACTIVITIES

1. Visit to ornamental fish farms
2. Guest lectures by experts in the field
3. Participation in ornamental fish shows and exhibitions
4. Conducting water quality tests and monitoring parameters
5. Participating in a business plan competition for an ornamental fish farm.

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BOS Changes

Name of the Department	Sl.No	Semester Programme	Paper Number & Paper Title	Titles of the Topics Deleted	Topics to be added during BOS meeting November 2022	Percent age of changes Made in the Syllabus	Justification for each topic deleted	Justification for each topic added
Zoology	01	I	Biology of Non-chordates	Nil				
Zoology	02	II	Biology of Chordates	Nil				
Zoology	03	III	Cell biology, Genetics, Molecular biology and Evolution	Nil	Unit Membrane model ,Multiple allels, GeologicalTimeS cale	10	Repeated.Comes under modern synthetic theory	1.Provides conceptual understanding 2.One of the important from mendilian Genitics 3.Tool to Potray the history of earth
Zoology	04	IV	Animal physiology,cellularmetabolism,Embryology	nil	1.Abnormal cardiac rhythms-tachycardia,bradycardia 2.synaptic transmission 3.properties of lipids	10		1.Student can able to understand the abnormalties in hear rhythms in day to day activities 2.Chemial transmission of impulse can be clearly explained with this topic

Zoology	05	IV	Animal biotechnology	nil	1.Applications of transgenic animals 2.Media preparation for animal cell culture	12		1.Now a days transgenic food materials widely used for consumption knowledge on the applications for the transgenic animal is highly useful 2.practical knowledge on the media preparation will be impared with this topic
Zoology	06	V Semister	Course 6 A: Sustainable Aquaculture Management	2. Manure application in culture ponds	5. Prawn Diseases pertaining to East Godavari with special reference to White gut, WSSV, Gillrot, Black shell diseases	12	2. It is dealt in 2.3Reasons for Adding 1. It is important in explaining present status of aquaculture 2. Catering to local needs by studying the local epidemics.	Catering to local needs by studying the local epidemics.
Zoology	07		Course 6 A: Sustainable Aquaculture Management	5. Prophylaxis in aquaculture	1. Blue revolution		Reasons for Deleting 1. It is dealt already individually in 5.1, 5.2, 5.3	It is important in explaining present status of aquaculture

Zoology	08	V semester	Post-harvest technology	Icing, fish maws,chitosan	Industrial safety in Processing plants	10	Icing is a Reptetion topic and Fish maws chitosan are not being implemented in Indian markets	Employability Skill

ANNEXURE I

SYLLABUS FOR

LIFE SKILL & SKILL DEVELOPMENT COURSES

AP State Council of Higher Education

Revised Syllabus under CBCS Pattern
(w.e.f. 2020-'21 Academic Year)

A Mandatory Course for BA/BCom/BSc etc.

ENVIRONMENTAL EDUCATION

(Total hours of Teaching – 30 Hrs. @ 02 Hrs. per Week)

Course objective: A Generic Course intended to create awareness that the life of human beings is an integral part of environment and to inculcate the skills required to protect environment from all sides.

Learning outcomes: On completion of this course the students will be able to …..

1. Understand the nature, components of an ecosystem and that humans are an integral part of nature.
2. Realize the importance of environment, the goods and services of a healthy biodiversity, dependence of humans on environment.
3. Evaluate the ways and ill effects of destruction of environment, population explosion on ecosystems and global problems consequent to anthropogenic activities.
4. Discuss the laws/ acts made by government to prevent pollution, to protect biodiversity and environment as a whole.
5. Acquaint with international agreements and national movements, and realize citizen's role in protecting environment and nature.

Unit 1: Environment and Natural Resources 06 Hrs.

1. Multidisciplinary nature of environmental education; scope and importance.
2. Man as an integral product and part of the Nature.
3. A brief account of land, forest and waterresources in India and their importance.

4. Biodiversity : Definition; importance of Biodiversity - ecological,consumptive, productive, social, ethical and moral, aesthetic, and option value.
5. Levels of Biodiversity: genetic, species and ecosystem diversity.

Unit-2: Environmental degradation and impacts 10Hrs

1. Human population growth and its impacts on environment; land use change, land degradation, soil erosion and desertification.
2. Use and over-exploitation of surface and ground water, construction of dams, floods, conflicts over water (within India).
3. Deforestation: Causes and effects due to expansion of agriculture, firewood, mining, forest fires and building of new habitats.
4. Non-renewable energy resources, their utilization and influences.
5. A brief account of air, water, soil and noise pollutions; Biological, industrial and solid wastes in urban areas. Human health and economic risks.
6. Green house effect - global warming; ocean acidification, ozone layer depletion, acid rains and impacts on human communities and agriculture.
7. Threats to biodiversity: Natural calamities, habitat destruction and fragmentation, over exploitation, hunting and poaching, introduction of exotic species, pollution, predator and pest control.

Unit 3: Conservation of Environment 10 Hrs

1. Concept of sustainability and sustainable development with judicious use of land, water and forest resources; afforestation.
2. Control measures for various types of pollution; use of renewable and alternate sources of energy.
3. Solid waste management: Control measures of urban and industrial waste.
4. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
5. Environment Laws: Environment Protection Act; Act; Wildlife Protection Act; Forest Conservation Act.
6. International agreements: Montreal and Kyoto protocols; Environmental movements: Bishnois of Rajasthan, Chipko, Silent valley.

Suggested activities to learner: (4 hours)

1. Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc
2. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural site.
3. Study of common plants, insects, birds and basic principles of identification.
4. Study of simple ecosystems-forest, tank, pond, lake,mangroves etc.
5. Case study of a Forest ecosystem or a pond ecosystem.

Suggested text book :

- ErachBarucha (2004) Text book of Environmental Studies for Undergraduate courses (Prepared for University Grants Commmission) Universities Press.
- PurnimaSmarath (2018) Environmental studies Kalyani Publishers, Ludhiana

Reference books :

- Odum, E.P., Odum, H.T. & Andrews, J. (1971) Fundamentals of Ecology. Philadelphia: Saunders.
- Pepper, I.L., Gerba, C.P. &Brusseau, M.L. (2011). Environmental and Pollution Science. Academic Press.
- Raven, P.H., Hassenzahl, D.M. & Berg, L.R. (2012) Environment. 8th edition. John Wiley & Sons.
- Singh, J.S., Singh, S.P. and Gupta, S.R. (2014) Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
- Sengupta, R. (2003) Ecology and economics: An approach to sustainable development. OUP.
- Wilson, E. O. (2006) The Creation: An appeal to save life on earth. New York: Norton.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll (2006) Principles of Conservation Biology. Sunderland: Sinauer Associates,

Model question paper for theory examination at the end of IV Semester
Life Skill Course / ENVIRONMENTAL SCIENCE

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

Max. Marks: 50 Time: 1 1/2 hrs (90 Minutes

Section -A (Total: 4x5=20 Marks)

(Answer any **four questions**. Each answer carries **5 marks**

(Total 8 questions. At least 1 question should be given from each Unit)

1.
2.
3.
4.
5.
6.
7.
8.

Section- B (Total: 3x10 = 30 Marks)

(Answer any **three questions**. Each answer carries **10 marks**

(Total five questions. At least 1 question should be given from each Unit)

1.
2.
3.
4.
5.

Note: Questions may be set in such a way to test the outcomes instead of recalling of informati

A.P. STATE COUNCIL OF HIGHER EDUCATION

B A, B Com & B Sc Programmes

Revised CBCS w.e.f. 2020-21

SKILL DEVELOPMENT COURSES

To be Offered from Semesters I to IV

ZOOLOGY STREAM

Syllabus of

POULRY FARMING

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

Learning Outcomes:

By successful completion of the course, students will be able to;

1. Understand the field level structure and functioning of insurance sector and it's role inprotecting the risks
2. Comprehend pertaining skills and their application for promoting insurance coverage
3. Prepare better for the Insurance Agent examination conducted by IRDA
4. Plan 'promoting insurance coverage practice' as one of the career options.

SYLLABUS:

Section I (Introduction to Poultry Farming): 10Hrs

General introduction to poultry farming -Definition of Poultry; Past and present scenario ofpoultry industry in India.

Principles of poultry housing. Poultry houses. Systems of poultry farming. Management of chicks, growers and layers. Management of Broilers. Preparation of project report for banking and insurance

Section II (Feed and Livestock Health Management): 10 Hrs

Poultry feed management – Principles of feeding, Nutrient requirements for different stagesoflayers and broilers. Feed formulation and Methods of feeding.

Poultry diseases – viral, bacterial, fungal and parasitic(two each); symptoms, control andmanagement; Vaccination programme.

Section III(Harvesting of Eggs and Sanitation): 10 Hrs

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

Farm and Water Hygiene, Recycling of poultry waste.

Co-curricular Activities Suggested: (4 hrs)

1. Group discussion& SWOT analysis
2. Visit to a poultry farm
3. Invited Lectures by Concerned officers of government or private farms
4. Cheap and Healthy Feed preparation by students based on government standards
5. Market study and Survey (Monitoring of daily price hike in poultry market and analysis)
6. Online SwayamMoocs course on poultry farming (see reference 9 below)

Reference books:

1. Sreenivasaiah., P. V., 2015. Textbook of Poultry Science. 1st Edition. Write & Print Publications, New Delhi
2. 2. Jull A. Morley, 2007. Successful Poultry Management. 2nd Edition. Biotech Books, New Delhi"
3. Hurd M. Louis, 2003. Modern Poultry Farming. 1st Edition. International Book Distributing Company, Lucknow."
4. Life and General Insurance Management, "
5. Financial services, Tata McGraw hill
6. http://www.asci-india.com/BooksPDF/Small%20Poultry%20Farmer.pdf
7. https://nsdcindia.org/sites/default/files/MC_AGR-Q4306_Small-poultry-farmer-.pdf
8. http://ecoursesonline.iasri.res.in/course/view.php?id=335
9. https://swayam.gov.in/nd2_nou19_ag09/preview

MODEL QUESTION PAPER & PATTERN

Max. Marks: 50 **Time: 1 1/2 hrs (90 Minutes)**

SECTION A (Total: 4x5=20 Marks)

(Answer any **four questions**. Each answer carries **5 marks**
(At least 1 question should be given from each Unit)

1.	Poultry house
2.	Broilers
3.	Any two viral diseases of poultry
4.	Any two bacterial diseases of poultry
5.	Any two fungal diseases of poultry
6.	Egg testing
7.	Brooding
8.	Sexing chicks

SECTION B (Total: 3x10 = 30 Marks)

(Answer any **three questions**. Each answer carries **10 marks**
(At least 1 question should be given from each Unit)

1.	Discuss briefly the past, present and future scenario of poultry farming industry in India.
2.	Explain principles of poultry housing in detail, with examples.
3.	Write an essay on viral diseases of poultry.
4.	Give an account of fungal and bacterial diseases (any two each) of poultry
5.	Write an essay on selection, handling and hatching of eggs.

@@@@@

Note: Please read the following in addition to the Guidelines sent.

1. In Unit-2 and Unit-3, Sub-titles highlighted in Yellow colour are Skills. Sub-titles not highlighted are of Theoretical base.
2. Skills, though separately shown, shall also have 'content' to be learnt and written in theexamination by the students.
3. The field (hands on) skills are learnt through the Co-curricular Activities.
4. One or two books referred shall be related to 'learning of skills'
5. Topics and syllabus may be prepared keeping all (BA/BSc/BCom) urban as well as rural students in view.

A.P.STATECOUNCILOFHIGHEREDUCATION

BA,B Com &B Sc Programmes

RevisedCBCSw.e.f.2020-21

SKILLDEVELOPMENTCOURSES

To beOfferedfromSemestersItoIV

ZOOLOGYSTREAM

Syllabus of

DAIRYTECHNOLOGY

Total30 hrs (02h/wk), 02Credits &Max50 Marks

Learning Outcomes:

After successful completion of the course, students will be able to;

1. Understand the pre-requisites for starting a Dairy farm
2. Recognize different breeds of Cows buffaloes following safety pre cautions.
3. Prepare and give recommend feed and water for live stock
4. Maintain health of livestock along with productivity
5. Vaccination of cattle, nutrients requirements
6. Entrepreneurship i.e., Effectively market dairy products
7. Ensure safe and clean dairy farm and Standard safety measures to be taken in establishing industry
8. Efficiently start and manage to establish or develop a Dairy Industry

SYLLABUS:

Section I (Introduction and Establishment of a Dairy Farm): 05 Hrs

1.1 Dairy development in India–Dairy Cooperatives (NDRI, NDDB, TCMPF) (1hr)

1.2 Constraints of Present Dairy Farming and Future Scope of Dairy Farmer. (1 hr)

1.3 Selection of site for dairy farm; systems of housing–Loose housing system, Conventional Dairy Farm; Records to be maintained in a dairy farm. (2 hrs)

Section II (Livestock Identification and Management):13Hrs

2.1 Breeds of Dairy Cattle and Buffaloes Identification of Indian cattle and buffalo breeds and Exotic breeds; Method so selection of Dairy animals. (5 hrs)

2.2 Systems of inbreeding and cross breeding. (2hrs)

2.3 Weaning of calf, Castration, Dehorning, Deworming and Vaccination programme (3hrs)

2.4 Care and management of calf, heifer, milk animal, dry n pregnant animal, bulls, and bullocks. (3hrs)

SectionIII(FeedManagement, DairyManagement,CleaningandSanitation):8Hrs

3.1 Basic Principles of Feed, Important Feed Ingredients, Feed formulation and FeedMixing(2hrs)

3.2 OperationFlood–DefinitionofMilkandNutritivevalueofmilkandICMRrecommendation of nutrients–Per Capita Milk production and availability inIndiaandAndhraPradesh-MethodsofCollectionandStorageofMilk–LabellingandStorageof milk products(4 hrs)

3.3 Cleaning and sanitation of dairy farm – Safety precautions to prevent accidents in anindustry.(2 hrs)

Co-curricularActivities Suggested:(4hrs)

1. Groupdiscussion&SWOTanalysis
2. Visitto aDairyFarm
3. VisittoMilkCooperativeSocieties
4. VisittoFeed MillingPlants
5. Market Study and Identification of Government Schemes, Insurance and Bank Loans inrelation to dairyfarming

Referencebooks:

1. DairyScience: Petersen(W.E.)Publisher –Lippincott&Company
2. Principlesandpractices ofDairyFarm–Jagdish Prasad
3. Textbook of AnimalHusbandry-GCBenarjee
4. Handbook ofAnimal Husbandry- ICAR Edition
5. Outlines ofDairyTechnology–Sukumar(De) –OxfordUniversitypress
6. Indian DairyProducts– Rangappa(K.S.) &Acharya (KT) –AsiaPublishingHouse.
7. The technology of milk Proceesing – Ananthakrishnan, C.P., Khan, A.Q. andPadmanabhan,P.N. – ShriLakshmi Publications.
8. DairyIndia 2007, Sixth edititon
9. EconomicsofMilkProduction–BharatiPratimaAcharyaPublishers.
10. http://www.asci-india.com/BooksPDF/Dairy%20Farmer%20or%20Entrepreneur.pdf
11. https://labour.gov.in/industrial-safety-health

MODEL QUESTION PAPER

Max.Marks:50 **Time:11/2hrs(90Minutes)**

SECTION A : 4x5=20Marks

Answer any four questions.
Each answer carries 5marks
At least 1question should be given from each Unit

1.	Conventional Dairy Farm
2.	Animal Inbreeding
3.	Sanitation of Dairy Farm
4.	Dairy development in India
5.	Feed Mixing
6.	Deworming
7.	Milk Storage Methods
8.	Identification ofcharacters of any Two Dairy cattle

SECTIONB

3x10=30Marks)(An

Answer any **three questions**.
Each answercarries**10marks**
(Atleast1questionshouldbegivenfromeachUnit)

1.	WriteanessayonDairydevelopment inIndia,its currentpositionand futurescenario.
2.	Listourdifferentmethodsinvolvedinselectionofdairyanimalsanddiscussbriefly.
3.	Giveanaccountoffeedingredientsandfeedmanagement requiredfordairyanimals.
4.	Explaindifferentmethodsofcollectionofmilk.
5.	Explaintwo methodsof systemsof housingofdairyanimals.

@@@@@

Note:Pleasereadthe followingin additionto the Guidelines sent.

1. In Unit-2 and Unit-3, Sub-titles highlighted in Yellow colour are Skills. Sub-titles nothighlightedareof Theoretical base.
2. Skills, though separately shown, shall also have 'content' to be learnt and written in theexamination bythe students.
3. Thefield (handson)skillsarelearntthrough theCo-curricular Activities.
4. Oneortwobooksreferredshallberelatedto'learningofskills'
5. Topics and syllabus may be prepared keeping all (BA/BSc/BCom) urban as well as ruralstudents inview.

4. HEALTHANDHYGIENE

ANDHRAPRADESHSTATECOUNCILOFHIGHEREDUCATION

(AStatutorybodyoftheGovernment ofAndhraPradesh)

3rd,4thand5thfloors,NeeladriTowers,SriRamNagar,6thBattalionRoad,At makur (V), Mangalagiri(M), Guntur-522 503, AndhraPradesh

Web:www.apsche.org**Email**:acapsche@gmail.com

SYLLABUSOF

HEALTHANDHYGIENE

ASPARTOFLIFESKILLSCOURSES

UNDERCBCSFRAMEWORKWITHEFFECT FROM2020-21

HEALTH&HYGIENE

IVSemester/ Optional

(Total teaching hours–30 Hrs.@ 02Hrs. per Week)

The course is designed to provide a complete guidance on health and hygiene systems, guidelines for implementing and role of government and public in maintaining a healthy life. At the end of the course the student shall be able to understand–

- The importance of the health and hygiene in life
- the importance of nutrition for a healthy life
- different health care programmes of India
- basicconceptofhealthimpactassessmentasameansofassessingthepolicies,plansandprojects usingquantitiativeand qualitative techniques
- importanceof communityandpersonalhealth&hygienemeasures
- Importanceoffood,social tenets,mentalcondition,physical activityonhealth

LearningObjectives:

- To provide knowledge on different health indicators and types of hygiene methods
- To impart knowledge on different health care programmes taken up by India
- TomakestudentunderstandthelatestconceptsofhealthsuchasHIA,EIA,SIA andSEA
- Toenablestudentwithdisastermitigationstrategies
- Tocreate awarenesson communityhealthandhygiene
- To enrich knowledge on communicable and non-communicable diseases and theircontrol
- To aware the student on the importance of food, social strategies,
- To introduce different community-based mobile apps on health to student and therebyto thecommunity

Learning/Course Out comes: On completion of this course,

What is a healthy diet

- How can we use available information to optimize our diet?
- Can nutrition be used for a healthy life?
- Is there a one-size-fits-all“good”diet or should we individualize our dietary goals?
- Disaster management and responsiveness of public in pandemic and epidemic diseases
- Assess the impact of policies on health and hygiene Health measures to consider while travelling
- Awareness in public through digital media viz.,Mobile apps

UnitI: Basics of Nutrition **10 Hrs.**

1. Nutrition–definition, importance, good nutrition and mal nutrition; Balanced Diet: Basics of Meal Planning
2. Carbohydrates–functions ,dietary sources, effects of deficiency.
3. Lipids–functions, dietary sources, effects of deficiency.
4. Proteins–functions, dietary sources, effects of deficiency.
5. Brief account of Vitamins-functions, food sources, effects of deficiency,
6. Macro and micro minerals **–**functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc
7. Importance of water–functions, sources, requirement and effects of deficiency.

UnitII:Health **10 Hrs.**

8. Health - Determinants of health, Key Health Indicators, Environment health & Publichealth;Health-Education: Principles and Strategies
9. Health Policy & Health Organizations: Health Indicators and National Health Policy ofGovt. of India-2017; Functioning of various nutrition and health organizations in Indiaviz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR(Indian Council of Medical Research), IDA (Indian Dietetics Association),WHO-India,UNICEF-India
10. NationalHealthMission:NationalRuralHealthMission(NRHM)Framework,NationalUrbanHealthMission(NUHM) Framework
11. Women& Child HealthCare Schemes:Reproductive,Maternal,Newborn,Childand Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK);Rashtriya Bal SwasthyaKaryakram(RBSK); India Newborn Action Plan (INAP);Adolecent Heatlh-Rashtriya Kishor Swasthya Karyakram(RKSK)
12. DisasterManagement–
    Containment,ControlandPreventionofEpidemicsandPandemics– Acts, Guidelines andRoleofGovernment and Public

UnitIII:Hygiene **10 Hrs.**

13. Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH(**WA**ter,**S**anitation and**H**ygiene) programme
14. Rural Community Health:Village health sanitation & Nutritional committee (Roles& Responsibilities);AboutAccreditedSocialHealthActivist(ASHA); VillageHealthNutrition Day, Rogi Kalyan Samitis
15. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Publicplaces
16. PublicAwarenessthroughDigitalMedia- An Introduction to Mobile apps of Governmentof India:NHP,Swasth Bharat,No MoreTension,Pradhan MantriSurakshitMantritva Abhiyan (PM Suman Yojana), My Hospital (Meraaspataal),India fights Dengue,JSKHelpline, Ayushman Bhava, Arogya Setu, Covid19AP

REFERENCES

- **Bamji,M.S.,K.Krishnaswamy&G.N.V.Brahmam(2009)**TextbookofHumanNutrition(3rdedition)OxfordandIBHPublishingCo.Pvt. Ltd.,New Delhi
- **Swaminathan(1995)**Food&Nutrition(VolI,SecondEdition)TheBangalorePrinting&PublishingCoLtd., ,Bangalore
- **VijayaKhader(2000)**Food,nutrition&health, KalyanPublishers,NewDelhi
- **Srilakshmi,B.,(2010)**FoodScience, (5thEdition)NewAgeInternationalLtd.,NewDelhi
- Weblinks:https://nhm.gov.in/
    - NationalRuralHealthScheme: https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=49
    - NationalUrbanHealthScheme: https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137
    - Villagehealthsanitation&Nutritionalcommittee https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=149&lid=225
    - AboutAccreditedSocial HealthActivist(ASHA) https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=150&lid=226
    - VillageHealthNutritionDay https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=152&lid=228

- RogiKalyanSamitis https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=153&lid=229
- HealthImpactAssessment-https://www.who.int/hia/about/faq/en/ (suggested information only) http://www.euro.who.int/data/assets/pdf_file/0011/261929/Health-in-Impact-Assessments-final-version.pdf?ua=1
- WASHhttps://www.unicef.org/wash/andhttps://www.unicef.org/wash/files/UNICEF_Strategy_for_WASH_2016_2030.PDF
- HealthyLivinghttps://www.nhp.gov.in/healthylivingViewall

ANNEXURE - II

PITHAPUR RAJAH'S GOVERNMENT COLLEGE [A]:: KAKINADA

25TH ACADEMIC COUNCIL MEETING: 2023-24

2 SEPTMBER 2023.

LEARNING OUTCOME ATTAINMENT/ GRADUATE ATTRIBUTE ATTAINMENT MEASUREMENT METHODOLOGY FROM 2023-24

Assessment Manual

ANNEXURE II

COURSE OUTCOMES ASSESSMENT PROCESS

Student learning outcomes articulate what a student should know or can do after completing a course or program. The assessment of student learning outcomes provides information that puts student learning at the forefront of academic planning processes.

Course outcome assessment process is measuring of the ability of the student attaining the learning outcomes.

Process for writing Course Outcomes:

Course Outcomes were written based on the blooms taxonomy levels. The course instructor identifies the best possible action verb in the taxonomy table to frame the course outcome taking the syllabus as the base. These outcomes will be framed by considering the ability of the student after learning the topic. These course outcomes are finalized in BoS meeting after a brainstorming session and get them approved by the Academic Council followed by Governing Body. The curricular plans are designed and developed so as help students realize the outcomes

Sample course outcomes were given below

Table1: Course Outcomes

CO No	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	**Explain** the concept of Pulse code Modulation	1,2,6 & 11	2
CO2	**Examine** the working of the constitution of India since its adoption .	1,2,6 & 11	3
CO3	**Categorize** the electronic modulation systems based on the their modulation indices and suggest the best modulation technique..	1,2,11 & PSO 1	4
CO4	**Critically Analyze** the various stages of production/manufacturing system.	1,2,11 & PSO 1	3
CO5	**How would you bring out frequencies and amplitudes of sinusoidal waves that constitute a saw-tooth wave. (Application) Application**	2,3 & PSO2	3
CO6	**Evaluate** the roles of judiciary and legislative system in democratic system	1,2,6,10 & PSO 1	4

Process of Mapping Course Outcomes with Program Outcomes:

The process of mapping course outcomes with program outcomes is based on impact of the topics of the unit on the action verbs in the POs. The weightage is calculated based on the questions given for the examinations and the splitting of marks for the each mapped PO. The rubric for the level of mapping based on

the marks is given in the table given hereunder.

Table2: Rubric table for CO-PO Mapping

Level 3	If the percentage is >= 30
Level 2	If the percentage is >=20 and =29
Level 1	If the percentage is >=10 and =19
-	If the percentage is <10

Table 3: Split of marks based on action verbs

CO	Skill	Bloom's	Units	Assessing tools can be used to measure CO (CIE) Marks	CIE-Total	Assessing tools can be used to measure CO (SEE) Marks	Total (CIE+SEE)	Percentage (%)	Percentage (%)	Tools Used for Assessment	PO	PO Level of Mapping
CO1	Explain	L2	1	Sessional Test –3 Quiz-2 Assignment –1	6	14	20	Apply 2	2/6 = 33.3	M1 Q1	1	3
								Analysis -2	2/6 = 33.3	M1 Q1	2	3
								Context Knowledge – 1	1/6 =16.6	M1	6	2
								Member & Leader-1	1/6 = 16.6	A1	11	2
CO2	Examine	L3	2	Sessional Test –3 Quiz-2 Assignment –1	6	14	20	Apply-2	33.3	M1 Q1	1	3
								Analysis-2	33.3	M1 Q1	2	3
								Contextual Knowledge - 1	16.6	M1	6	2
								Member & Leader- 1	16.6	A1	11	2
CO3	Categorise	L3	3	Sessional Test –1.5 Quiz-1 Assignment –0.5	3	7	10	Apply – 1	1/3 = 33.3	M1 Q1	1,	3
								Analyse – 0.5	16.6	M1 Q1	2,	2
								Member & Leader- 0.5	16.6	M1	11	2
								Specify/Test – 1	33.3	A1	PSO1	3
	Classify	L3	4	Sessional			10	Apply- 1	1/3 = 33.3	M2 Q2	1, 2,	3

CO4				Test –1.5 Quiz-1 Assignment–0.5	3	7		Analyse -0.5	16.6	M2 Q2	11 PSO1	2
								Member &Leader-0.5	16.6	M2		2
								Specify/Test – 1	33.3	A2		3
CO5	Identify	L4	5	Sessional Test –3 Quiz-2 Assignment –1	6	14	20	Apply - 2	33.3	M2 Q2	1, 2, 6, 10 PSO1	3
								Analyse-1	16.6	M2 Q2		2
								Member & Leader- 1	16.6	M2		2
								Effective Presentation – 1	16.6	A2		2
								Specify/Test – 1	16.6	M2 Q2		2

Table4: CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**3**				**2**					**2**			
CO2	**3**	**3**				**2**					**2**			
CO3	**3**	**2**									**2**		**3**	
CO4	**3**	**2**									**2**		**3**	
CO5	**3**	**2**				**2**				**2**			**2**	
Average CO	**3**	**2.4**				**2**				**2**	**2**		**2.66**	

Table 5: CO-PO Mapping of the course

Course Name	Course Code	Program Outcomes												PSOs	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
PPC	C424	3	2.4				2				2	2		2.66	

Procedure for Assessment of Course Outcomes:

CO Assessment tools which are used to assess the course learning outcomes and graduate attributes are categorized into two - direct and indirect methods.

- **Direct methods:**
  Direct Methods display the student's knowledge and skills from their performance in the continuous internal assessment tests, semester examinations, seminars, class room and laboratory assignments etc. These methods provide a sampling of what students know and/or can do and provide strong evidence of student learning.

- **Indirect methods** such as surveys and interviews ask the stakeholders to reflect on student's learning. They assess opinions or thoughts about the graduate's knowledge or skills and their valued by different stakeholders.

Direct Assessment:

Direct attainment of COs can be determined from the performance ofstudents in all the relevant tools used for assessment. The weightage for the assessment are given as 30% to Internal and 70% to External.

Internal Assessment:

Internal assessment is conducted to assess the student whether he is successful in attaining the course outcome and in what performance level. This process is conducted by designing tools helpful for conducting the assessment. The student achievement is calculated based on marks attained in the respective tool. Average mark of the total marks achieved by the students is taken as the benchmark for the assessing the tool. The detailed information about the tools and their process is given in the table below.

Table 6: Internal Assessment Tools

S. No.	Course Type	Assessment Method	Description
1	Theory	Mid Examinations	As per the GB regulations, two mid exams will be conducted in every course in a semester. Each mid exam will be conducted with a two-month duration and will be useful to

			assess the student's performance. The mid examination Questions cover the entire COs. Students performance in mid examinations is analysed to determine the attainment of each course outcome separately.
2		Assignments	The assignment is a qualitative performance assessment tool designed to assess student's knowledge of engineering practices, framework, and problem solving. As per regulation, a total of 6 assignments will be given to the students covering first two and half units for the first 3 assignment and the remaining 3 assignments from the remaining two and half units. Assignments are given by the faculty to cover the all COs. Students performance in assignments is analysed to determine the attainment of each course outcome separately.
3		Online (MCQ) Examinations	Multiple Choice Questions (MCQ) based examination system that provides an easy-to-use environment for both Test assessors and Students appearing for Examination. It is conducted by each faculty member and department will have access only to the marks obtained by each student in the course. As the information on performance in online examination on each student in individual COs is not available, the Department has to take that attainment separately for the overall course.

- Level of attainment for each CO is determined separately from every assessment tool.
- Attainment for each CO is calculated by taking the average of the attainments obtained in the relevant tools mapped to that CO.

External assessment is determined based on the performance of the students in the exams conducted by the institute. External assessment is carried out based on

- Semester End Examination is conducted and evaluated by the institute.
- Assessment is done for individual course outcome based on the performance of the student in the semester end examination.

Table7:External Assessment Tools

S. No.	Course Type	Assessment Method	Description
1	Theory	External Examinations	The external examination is conducted for 50 marks for UG programs and for 75 marks for P.G programs. The questions are mapped to the unit wise prescribed COs There is an internal choice given for the questions related to each CO.

For the detailed assessment division, table 3 indicates the subdivision of assessment tools that are related to the individual CO.

Table 8: Subdivision of assessment components

Course Outcome	Mid 1	Mid2	Assignments	Quiz	Semester End Exam
CO1	Q1a,Q1b or Q2a,Q2b		A1	Q1	Q1a,Q1b or Q2a,Q2b

CO2	Q3a,Q3b or Q4a,Q4b		A1	Q1	Q3a,Q3b or Q4a,Q4b
CO3	Q5a,Q5b	Q1a,Q1b	A1/ A2	Q1 / Q2	Q5a,Q5bor Q6a,Q6b
CO4		Q2a,Q2b or Q3a,Q3b	A2	Q2	Q7a,Q7bor Q8a,Q8b
CO5		Q4a,Q4b or Q5a,Q5b	A2	Q2	Q9a,Q9b or Q10a,Q10b

Mid Examinations: As indicated in the Table 3 for Mid-1 there are five questions with subdivision among the questions. Q1a, Q1b or Q2a, Q2b are based on course content related to CO1, Q3a, Q3b or Q4a, Q4b are related to CO2 and Q5a, Q5b are related to CO3. Similarly Questions in Mid-2 Q1a, Q1b related to CO3, Q2a, Q2b or Q3a, Q3b are based on course content related to CO4 Q4a, Q4b or Q5a, Q5b are related to CO5.The marks obtained by the students are used to asses CO's.

Assignments: Assignments are the tools to identify whether the student is really capable of applying the concepts learned in the class hours. Total of 6 assignments are to be given to the students consisting a set of 3 questions, one from each unit. Assignment-1 consists of question related to CO1, Assignment 2 related to CO2 and Assignment 3 to CO3 so on and assignment 5 to CO5.

Multiple Choice Questions/Quiz Examination:

MCQs/ Quiz exams are conducted along with mid examinations. A set of 5 objective type questions are asked consisting of questions related to CO1, CO2 and CO3 in Q-1 and questions related to CO3, CO4 and CO5 in Q-2. Viva questions can also be MCQs that can realize learning outcomes vis-à-vis Course Outcomes.

The marks obtained in each tool are assessed based on the benchmark set for the respective tool.

Rubrics for CO Assessment: Question-wise bench marking

- Average of the marks attained by the students is taken as the benchmark for assessing that question.
- Percentage of marks obtained by each student in each assessment tool is calculated by dividing the number of students able to achieve the benchmark to the total number of students attempted the question
- Likewise, the benchmark is set for all the questions considered in mid,assignments and quiz examinations.
- Course Outcome will be achieved by the student if he/she scores more than benchmark for that corresponding question and assessment tool related to that CO.
- Level is determined for each CO from each tool after measuring the percentage of students scoring more than set benchmark based on rubrics as shown in table1.4.

Table 9: Rubrics for CO Attainment level

S. No.	Level	Description
1	3	If the attained percentage is >=60%
2	2	If the attained percentage is >=50% and up to 59%
3	1	If the attained percentage is >=40% and up to 49%
4	0	If the attained percentage is < 40%

- The overall CO level is determined by the average of levels of attainment corresponding to that CO from all the internal and external assessment tools

Q1bM1	Q1M1	Q2aM1	Q2bM1	Q2M1	Q3aM1	Q3bM1	Q3M1	Q1aM2	Q1bM2	Q1M2	Q2M2	Q3M2	A1
5	**10**	**5**	**5**	**9**	**3**	**4**	**7**	**5**	**5**	**10**	**10**	**10**	**5**
4	9	5	4	9	3	4	7	5	5	10	8	8	5
4	9	5	4	9	3	4	7	5	5	10	8	8	5
4	9	5	4	7	3	4	7	5	3	8	8	8	4
4	7	3	4	9	3	4	7	5	3	8	8	8	4
3.53	7.44	3.91	3.53	7.34	2.93	2.81	5.74	4.66	4.00	8.66	7.31	7.31	4.
12	1	2	12	1	13	5	5	2	4	2	4	4	0
56	67	66	56	67	55	63	63	66	64	66	64	64	6
55	60	37	55	59	17	29	59	63	44	65	62	62	6
98.21	89.55	56.06	98.21	88.06	30.91	46.03	93.65	95.45	68.75	98.48	96.88	96.88	9
3	**3**	**2**	**3**	**3**	**0**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

The CO attainment levels for all the courses in the program are to be determined using the same procedure as described above.

Procedure for Assessment:

Internal Assessment is done based on the marks achieved by the students in the respective questions in Mid, Quiz, Assignments and External exams. The below table shows the internal assessment process (Sample Assessment)

Internal Assessment

Table 10: Sample table of Internal CO Assessment Form

External assessment is carried out based on the marks obtained by the student in the external end examination. The below table shows the external assessment process

External Assessment

Table 11: Sample table of External CO Assessment Form

Course	**Regd. No**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
		14	**14**	**14**	**14**	**14**
CO	21K61A0301	7	6	3	11	8
CO	21K61A0302	9	7	6	11	7
CO	22K65A0506	7	9	9	0	0
CO	22K65A0507	10	8	10	8	10
Average Marks of all students		**6.28**	**6.07**	**4.09**	**9.15**	**8**
Number of students Not attempted		6	3	14	1	1
Number of Students attempted		62	65	54	67	67
Number of Students attained CO		32	30	27	32	39
Percentage of Students attained CO		51.61	46.15	50.00	47.76	58.21
Attainment Level		**2**	**1**	**2**	**1**	**2**

Direct Assessment: Overall assessments through direct methods are carried out by taking the weighted average for the internal and external assessment values. The weightage for the internal and external assessment methods are taken as 30% and &70% respectively. The overall assessment value by taking the weighted average for internal and external methods is shown in the table below.

Table 11: Sample table of CO Final Assessment Form

COs	**Direct Assessment**			**Overall Attainment**
	Internal Assessment	**External Assessment**	**Overall Assessment (0.5*IA+0.5*EA)**	
CO1	2.17	2	2.05	1.78
CO2	2.17	1	1.35	
CO3	2.25	2	2.08	
CO4	2.2	1	1.36	

CO5	2.2	2	2.06	

Indirect Assessment of COs:

Indirect assessment is based on surveys conducted. The survey is performed by Course End Survey.

Course End Survey (COAF - Course Outcome Assessment Feedback): Feedback shall be taken from the graduates at the end of the semester on each course. Feedback will be taken through online mode as Course outcome assessment feedback form and will be analyzed. Sample questioner for course end survey for a course is given below.

Advanced Accounting and auditing

1. Are you able to analyze various types of accounting procedures?.
2. Have you acquired the knowledge on double entry accounting system?.
3. Are you able to explain the accounting methodology in detail.
4. Have you gained enough knowledge in auditing accounts ?
5. Are you able to explain procedure of auditing?

Assessment of Course End Survey

The assessment of the course end feedback is performed by considering the course outcome

CO. No.	Question	Responses					Level to 5	Level to 3	CO Attainment
		Excellent	Very Good	Good	Satisfactory	Not Satisfactory			
CO1	1. Are you able to analyze various types of accounting procedures?.	47	35	20	9	1	454	272.4	2.34
		0.42	**0.31**	**0.18**	**0.08**	**0.01**	4.05	2.43	
CO2	2.Have you acquired	48	28	27	8	1	450	270	2.38

	the knowledge on double entry accounting system?.	**0.43**	**0.25**	**0.24**	**0.07**	**0.01**	4.02	2.41	
CO3	3.Are you able to explain the accounting methodology in detail .	50.00	32.00	21.00	8.00	1.00	458	274.8	2.44
		0.45	**0.29**	**0.19**	**0.07**	**0.01**	4.09	2.45	
CO4	4.Have you gained enough knowledge in auditing accounts ?	49.00	33.00	20.00	8.00	2.00	455	273	2.38
		0.44	**0.29**	**0.18**	**0.07**	**0.02**	4.06	2.44	
CO5	5.Are you able to explain procedure of auditing?	51.00	30.00	22.00	8.00	1.00	458	274.8	2.38
		0.46	**0.27**	**0.20**	**0.07**	**0.01**	4.09	2.45	

Table 12: Sample table of COAF Assessment Form.

Attainment of Course Outcomes through Course End Feedback

The below table shows the course outcome attainment through the course end feedback after the completion of the course

Table 13: Sample table of CO Assessment through COAF

COs	**In-direct Assessment**
	COAF
CO1	2.34
CO2	2.38
CO3	2.44
CO4	2.38
CO5	2.38

Overall Assessment

The overall attainment of outcome is calculated by taking the weighted average of the levels of attainment of that outcome from all the direct and indirect assessment tools.

Overall CO Level = (0.5* Direct) + (0.5* indirect)

The below table indicates the overall attainment of the course outcome and the course

Table 14: Overall CO Assessment Form

COs	Direct Assessment			In-direct Assessment	Final CO Attainment (0.7*DA+0.3*In-A)	Final Course Attainment
	Internal Assessment	External Assessment	Overall Assessment (0.5IA+0.5*EA)	COAF		
CO1	2.17	2	2.05	2.34	2.14	**1.96**
CO2	2.17	1	1.35	2.38	1.66	
CO3	2.25	2	2.08	2.44	2.18	
CO4	2.2	1	1.36	2.38	1.67	
CO5	2.2	2	2.06	2.38	2.16	

Overall CO Assessment:

Overall attainment of CO is calculated using below formula.

Overall CO Attainment = (0.7 * Direct Course Attainment) + (0.3 * Indirect Course Attainment)

Sample of Assessments for Course is shown in the below table

Table 15: Overall Course Outcome Attainments for Theory and Lab Courses

Year	Course	Course Code	CO Attainment		Weighted Average
			Direct	Indirect	
I B.Sc (MPC). - I Semester	English-I	C211	1.38	1.90	**1.54**
	Maths-1	C212	1.45	2.12	**1.65**
	Physics-I	C213	1.9	1.91	**1.90**
	Chemistry-I	C214	1.82	2.09	**1.90**
	Sanskrit-I	C215	1.64	1.91	**1.72**
	LSCI	C216	1.24	2.01	**1.47**
II B.Sc (MPC). - II Semester	Sanskrit-II	C221	1.24	1.94	**1.45**
	LSCII	C222	1.31	1.90	**1.49**
	Maths-II	C223	1.79	1.99	**1.85**

	Physics-II	C224	1.54	2.04	**1.69**
	Chemistry-II	C225	1.79	2.10	**1.88**
***					
III B. Sc (MPC)- III Semester	Sanskrit-III	C421	2.58	2.52	**2.56**
	SDC III	C422	2.6	2.01	**2.42**
	Maths-III	C423	2.54	2.55	**2.54**
	Physics-III	C424	2.63	2.33	**2.54**

Laboratory Assessment

Laboratories are most important for the engineering graduates where they can practically experience how to operate, test, validate and document the related information. The theoretical knowledge gained through courses is used in performing the experiment.Course outcomes for the laboratory are to be written based on the experiments conducted for that respective lab.These outcomes are to be mapped to the PO according to the strength, the level of mapping is to be given. Laboratory assessment is done to assess the student knowledge in performing the experiment. Day to day evaluation is performed for each student during the practical sessions. The assessment for laboratory is done by taking the following tools in to consideration.

Day to day evaluation

- Observation for 5 marks
- Record for 5 marks

Internal Examination

- Internal exam for 5 marks

Internal Assessment

- Marks obtained by each student for each experiment are entered in laboratory assessment form category wise.
- Average of the marks attained by the students is taken as the benchmark for assessing that question.
- Likewise the target is set for all the questions considered in mid, assignments and quiz examinations.
- Course Outcome will be achieved by the student if he/she scores more than benchmark for that corresponding questionand assessment tool related to that CO.

External Assessment

External assessment is performed based on the marks obtained by the student in the end practical examinations. This exam is conducted by the Institute under the supervision of the external examiner . The following procedure is used for external assessment,

- The exam is conducted for 50 marks and the student is considered to have attained if he/she scores 80% of marks in the exam.
- The information of the student who got the respective experiment are noted and the assessment is conducted for the relative CO
- Percentage of attainment is calculated by considering the attained students and the total students

  The attained percentage is mapped to all the outcomes

Table 16: Sample table of Lab Assessment Form

S.No.	Regd. No.	Exp-1		Exp-2		Exp-12		Exp-13		Internal(5)	Overall Internal(15)	Final Exam (35)
		Obs.& Viva(5)	Record(5)	Obs.& Viva(5)	Record(5)	Obs.& Viva(5)	Record(5)	Obs.& Viva(5)	Record(5)			
1	211230	5	5	5	5	5	5	5	5	4	14	32
2	211231	5	5	5	5	5	5	5	5	5	15	32
3	211232	5	5	5	5	5	5	5	5	4	14	28
4	211233	5	5	5	5	5	5	5	5	4	14	30
5	211234	4	4	4	4	4	4	4	4	4	12	23
5	211235	3	4	3	4	3	4	3	4	4	11	21
Average mark		4.58	4.91	4.58	4.91	4.58	4.91	4.58	4.91	4.23	13.64	27.43
No. of Students above		36	48	36	48	36	48	36	48	12	38	28
Total No. of Students		53	53	53	53	53	53	53	53	53	53	53
Percentage of students attained CO		**67.92**	**90.57**	**67.92**	**90.57**	**67.92**	**90.57**	**67.92**	**90.57**	**22.64**	**71.70**	**52.83**

Attainment Level	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**0**	**3**	**3**

Program Outcomes (POs) Assessment Process

Program outcomes assessment refers to the measurement of students' achievement of program-level expected learning outcomes and the use of the results of these assessments to improve the program.

Program assessment:

Program assessment is performed in two methods, they are

I. Direct Assessment

II. Indirect Assessment

I. Direct Assessment

Direct attainment of POs is carried out by

- Results of Course Outcome Assessment
- Performance of Students in Laboratory tests
- Student participation in Co-curricular and extracurricular activities
- Performance of Students in Projects

A. PO Attainment from Course Outcome Assessment

There are three steps in getting the PO attainment from the CO attainment. They are

i. CO-PO Mapping

ii. CO Attainment

iii. Attainment of PO from CO attainment using weighted average of CO-PO Mapping and CO Attainment

PO Attainment through Courses

Attainment of every PO is determined from every CO by considering the strength of the mapping of a particular CO to that PO and the level of attainment of that CO. PO attainment value is obtained by taking the weighted average of the CO-PO mapping and CO attainment. Same procedure is followed for all the courses to get PO attainment levels. After finding the course wise PO levels, overall PO levels will be obtained by taking the average of the levels of each PO of all the courses that are attaining particular PO.From CO-PO mapping table sum of the weights of each PO for all COs is calculated and sample is shown in below table 3.24,3.25 and 3.26

Table17: PO Mapping Table

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	**3**	**3**				**2**					**2**			
CO2	**3**	**3**				**2**					**2**			

CO3	**3**	**2**									**2**		**3**	
CO4	**3**	**2**									**2**		**3**	
CO5	**3**	**2**				**2**				**2**			**2**	
Average CO	**3**	**2.4**				**2**				**2**	**2**		**2.66**	

Table18: CO Attainment

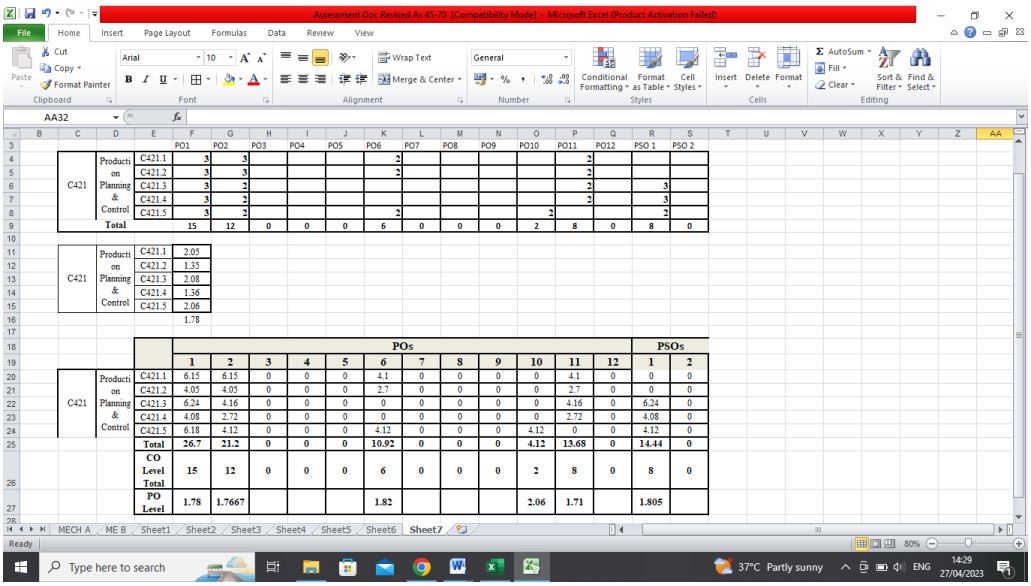
Course Code	Course Name	CO No.	Co Attainment
3101	Auditing	C424.1	2.05
		C424.2	1.35
		C424.3	2.08
		C424.4	1.36
		C424.5	2.06

Table 19: PO Attainment from Course Outcomes

Course Code	Course Name	COs	POs												PSOs	
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
3101	Auditing	Audit 1.1	6.15	6.15	0	0	0	4.1	0	0	0	0	4.1	0	0	0
		Audit 1.2	4.05	4.05	0	0	0	2.7	0	0	0	0	2.7	0	0	0
		Audit 1.3	6.24	4.16	0	0	0	0	0	0	0	0	4.16	0	6.24	0
		Audit 1.4	4.08	2.72	0	0	0	0	0	0	0	0	2.72	0	4.08	0
		Audit 1.5	6.18	4.12	0	0	0	4.12	0	0	0	4.12	0	0	4.12	0
Total			**26.7**	**21.2**	**0**	**0**	**0**	**10.92**	**0**	**0**	**0**	**4.12**	**13.68**	**0**	**14.44**	**0**
CO Level Total			**15**	**12**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**2**	**8**	**0**	**8**	**0**
POLevel			**1.78**	**1.77**				**1.82**				**2.06**	**1.71**		**1.81**	

Sample Assessment Sheet

The sheet shows the attainment of PO for one course



				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
C421	Production Planning & Control	C421.1		3	3				2					2			
		C421.2		3	3				2					2			
		C421.3		3	2									2		3	
		C421.4		3	2									2		3	
		C421.5		3	2				2				2			2	
		Total		15	12	0	0	0	6	0	0	0	2	8	0	8	0

C421	Production Planning & Control	C421.1	2.05
		C421.2	1.35
		C421.3	2.08
		C421.4	1.36
		C421.5	2.06
			1.78

			POs												PSOs	
			1	2	3	4	5	6	7	8	9	10	11	12	1	2
C421	Production Planning & Control	C421.1	6.15	6.15	0	0	0	4.1	0	0	0	0	4.1	0	0	0
		C421.2	4.05	4.05	0	0	0	2.7	0	0	0	0	2.7	0	0	0
		C421.3	6.24	4.16	0	0	0	0	0	0	0	0	4.16	0	6.24	0
		C421.4	4.08	2.72	0	0	0	0	0	0	0	0	2.72	0	4.08	0
		C421.5	6.18	4.12	0	0	0	4.12	0	0	0	4.12	0	0	4.12	0
		Total	26.7	21.2	0	0	0	10.92	0	0	0	4.12	13.68	0	14.44	0
		CO Level Total	15	12	0	0	0	6	0	0	0	2	8	0	8	0
		PO Level	1.78	1.7667				1.82				2.06	1.71		1.805	

Fig. 1: Sheet including Weighted average procedure

Using the same procedure PO values is calculated for all the courses. The average of all the course is considered as the attainment for that corresponding PO

Year	Course	Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
II-I	EM-III	C211	1.38	1.46					1.39					1.40	1.20	
	EM	C212	1.46	1.47					1.46					1.43		
	BEE	C213	1.90	1.90	1.73		1.50	1.62	1.62	1.62				1.90	1.90	
	MP	C214	1.82	2.55	1.80		1.93						1.73	1.73	1.82	
	TD	C215	1.66	1.64											1.65	
	ME	L211	1.24	1.24	1.25	1.25								1.24	1.24	
	MP L	L212	3.00	3.00	3.00		3.00				3.00	3.00	3.00	3.00	3.00	
	CAEDP L	L213	1		1						1	1	1	1		1
IV-II	PPC	C421	2.61	2.61	2.59			2.61	2.60		2.73	2.60	2.62		2.61	
	UCMP	C422	2.60					2.59						2.60	2.59	
	AE	C423	2.54	2.54		2.48		2.53	2.50						2.54	
	NDE	C424	2.64			2.62			2.62						2.62	
Average			2.15	2.09	2.02	1.99	2.13	2.15	1.93	2.00	2.16	2.20	2.18	2.01	2.19	1.92

Fig. 2: Sheet including PO Attainments of Courses

B. Co-Curricular and Extra-curricular activities conducted in the program

PO Attainment is measured using Co-Curricular and Extra-curricular activities participated by the students of the program. These activities help students to gain knowledge on various aspects apart from curriculum. The level of attainment of PO is calculated by the committee coordinator representing that activity. There are different committees namely

- Community Outreach activities Committee (COAC)
- Academic Coordinator (DAC)
- Research & Development Committee (R&D)
- National Service Scheme (NSS)
- Entrepreneurship Development Cell (EDC)
- Library Committee (LAC)
- Career Guidance, Training & Placement Committee (CGTP)
- Student Counseling Grievances and Redressel Committee (SCGR)

- Centre for performing Arts/Cultural/Literary & Hobby Club
- Industry Institute Partnership Committee
- Sports Committee
- Website/ICT/Self (or) E-Learning Committee
- Clean and Green Committee
- Student Forum

Assessment of Co-Curricular and Extra-curricular activities

The committee coordinator frames the functions and tools for assessing of their respective committee attainment. The tools for assessment are mapped with the functions of the committee and in turn the functions are mapped with POs. The level of attainment for a specific function depends on the rubric specified for the corresponding tool. Overall attainment of PO is calculated by taking the average attainment of all the tools. The assessment of PSAC is shown below as an example.

Functions of SPORTS Committee

The following are the functions of sports committee

Table 20: Functions of PSAC

Function No.	Functions
F1	Creating awareness among the students/faculty about benefits of benefits
F2	Enrolling students/faculty members as members who play Sports and Games
F3	Enriching the knowledge of the students/faculty members in sports and games
F4	Encouraging the students/faculty members to participate in the activities and competitions organized by the sports committee
F5	Organizing inter University, state level competitions
F6	Guiding the students to enhance reach higher levels in sports and games

Mapping of Functions with Program Outcomes:

Below table shows the mapping of the committee functions and program Outcomes

Table21: Mapping of Functions of PSAC to POs

Function No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
F1							3							
F2						2	2							
F3						3	3				3		3	3
F4						2	2			3	3			
F5								2		3				
F6						2				2	1	2	1	1

Tools for Assessment

T1. No of awareness programs conducted

T2. Percentage of students/faculty members enrolled in Sports and Games events

T3. No. of technical events organized

T4. No. of Student participations in technical events within and outside the institutes

Tool	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**
Level	**T1**	**T2 (%)**	**T3**	**T4 (%)**	**T5**	**T5**
3	> 3	> 75	> 5 Programs	> 75	> 3 Programs	
2	2-3	30-75	2-5Programs	50-75	2-3 Programs	
1	1	< 30	< 2 Programs	< 50	< 2 Program	

T5. No. of collaborative projects with professional societies

Rubric for Assessment

Table22: Rubrics for tools for Assessing PSAC

Assessment of Professional Activities

Table23: Attainment level of each Tool

Tools	**Value**	**%**	**Level**
Tool 1	3		**3**
Tool 2	99	59.28	**2**
Tool 3	9		**3**
Tool 4	350	93.95	**3**
Tool 5	5		**3**

Attainment of Functions with Program Outcomes

Table24: Attainment level of each PO

Function No.	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
F1		3							
F2	2	2							
F3	3	3				3		3	3
F4	3	3			3	3			
F5			3		3				
F6	3				3	3	3	3	3
PSAC Overall	**2.75**	**2.75**	**3**		**3**	**3**	**3**	**3**	**3**

After obtaining the PO Attainment level from each committee the overall PO attainments for co-curricular and extracurricular activities are calculated by taking the average of all the committees.

C. Project Outcome Assessment:

Project Outcomes are framed as below

Table25: Study Project Outcomes

CO	**Description**
CO1	Able to build coordination among project supervisor (mentor) and respective students in problem formulation and idea preparation
CO2	Able to survey existing and previous literature on the proposed project idea and proposed title.
CO3	Able to develop designated methodology and design procedure for intended solution
CO4	Able to identify the challenges faced in providing intended solution and apply necessary modifications
CO5	Able to enhance team work, presentation, and communication skills for the live demonstration of proposed project idea

Project assessment is performed using following tools

1. Internal Assessment
2. External Assessment

1. Internal Assessment Tools

Project internal assessment is based on the marks obtained by the students in internal reviews conducted by the department. Total 3 reviews are conducted during the semester. This assessment is done considering the average marks obtained by the batch of students.

Initially project allotment and guide selection are done as per the details provided in the project manual. After the assignment of project, PO Mapping will be done. Sample is shown below.

Table26: Project PO Mapping

S.No.	Batch No.	Regd. No.	Name of the Student	% of Marks	Title	POs & PSOs
1	B.Sc IOT II	16K61A0348	Krishna Rao Addepalli	100	Remote controlling Agricultural Motor	1, 2, 3, 6, 7, 8, 9, 10, 11,12&1, 2
2		16K61A0309	Sandeep Katrevula	100		
3		16K61A0331	Srinivas Badugu	100		

After the beginning of the project work in the final year, three reviews will be conducted internally within the duration of the project. Marks obtained by the students in those internal reviews are used to assess the project. This assessment is based on the marks obtained in the internal reviews and mapping project outcomes to internal reviews. Mapping of internal reviews with project outcomes is as shown below

Table27: Project outcome mapping with reviews

CO	Review 1	Review 2	Review 3
CO1	√	√	√
CO2	√		√
CO3	√		√
CO4		√	√
CO5		√	√

Initially average percentage marks of the batch of students obtained in each review is calculated as follows

Table28: Internal Reviews percentage

S.NO.	Regd. No.	Review 1	Review 2	Review 3
1	2101	53.7	52.0	51.2
2	2102	52.2	46.8	47.7
3	2103	48.0	46.8	47.0
	Average	51.28	48.56	48.61
	% Mark	85%	81%	81%

Based on the mapping of reviews with project outcomes attainment, percentage for each CO

is calculated as follows

Table29: Internal Attainment

CO	Review 1 (%)	Review 2 (%)	Review 3 (%)	Internal Attainment (%)
CO1	85%	81%	81%	82%
CO2	85%		86%	86%
CO3	85%			85%
CO4		77%		77%
CO5		81%	81%	81%

2. External Assessment

External assessment is based on the performance of the students in the final project viva-voce conducted by the external examiner assigned by the University

Initially average percentage marks of the batch of students obtained in end examinations is calculated as follows

Table 30: Project end exam percentage

S.No.	Regd. No.	SEE
1	2101	140
2	2102	140
3	2103	140
Average		**140**
% Marks		**100%**

As the end examination covers all the project outcomes and as the information on outcome wise evaluation is not available, average percentage obtained in above procedure is allotted to all the outcomes.

Table 31: External Attainment

CO	SEE
CO1	100%
CO2	100%
CO3	100%
CO4	100%
CO5	100%

Overall Attainment

Overall attainment is calculated by taking weighted average of internal and external

assessments. 30% weightage is given for internal assessment and 70% weightage is given for external assessment. More weightage is given for external assessment as it is conducted by the University whereas internal assessment is done within the program.

Table 32: Overall Attainment

CO	Internal Attainment (%)	External Attainment (%)	Overall Attainment (%)
CO1	82%	100%	95%
CO2	86%	100%	96%
CO3	85%	100%	96%
CO4	77%	100%	93%
CO5	81%	100%	94%

Rubrics for Project Assessment

Based on the final average percentage achieved attainment level is given based on the following rubrics

Table 33 Rubrics for Project Assessment

S. No.	Level	Description
1	3	If final attainment percentage is more than 80%
2	2	If final attainment percentage is between 75% and 80%
3	1	If final attainment percentage is less than 75%

Level of Attainment
Table 34 Project Attainment Levels

CO	Overall Attainment (%)	Level of Attainment
CO1	95%	3
CO2	96%	3
CO3	96%	3
CO4	93%	3
CO5	94%	3

3. Overall Performance of students in projects

Projects plays major role in getting practical exposure to the learnt theoretical concepts. Average marks obtained for each project is used as tool for assessing program outcomes.

PO attainment is calculated from the projects in following steps

- Project mapping to POs

- Average marks obtained by the students of a project batch

POs related to each project will be submitted to the project coordinator before start of the project work. After getting the results, average marks obtained by each batch are calculated and based on the mapped POs, attainment is calculated by taking the average batch marks related to that PO. Sample formats are given below

Fig. 3: Project Assessment Sheet
To be tabulated
Fig. 4: Project Attainment Sheet
To be tabulated
Indirect Assessment of POs and PSOs:

Indirect assessment is based on surveys conducted. It mainly involves

1. Course End Survey
2. Exit Student Survey

Course End Survey: Feedback is taken from the graduates at the end of the semester on each course. Online feedback is taken using Course outcome assessment form and results are analyzed. Sample questionnaire for course end survey is given in the following table
Assessment of Course End Survey

The assessment of the course end survey is performed by considering the mapping of each course to the program outcomes. The attained values of all the courses are placed at the corresponding mapped PO of the course. Average value for the corresponding PO for all the courses is calculated by taking the average of all the POs and the same is considered as the attainment of that PO. Sample Course end survey is **tabulated**

Fig. 5: PO Attainment through Course End Feedback

Exit Student Feedback: Online feedback is taken from the graduates at the end of the program every year. Feedback is taken using 'Exit Student Feedback Form' and results are analyzed. Sample form for exit student survey is given below
Sample Form for Exit Survey

Fig.6: Exit student Survey Form

Attainment of POs and PSO through Exit Student Survey:
Exit student survey is conducted on the program outcome to assess to which level the student is able to attain. This survey is conducted through Online platform. Sample Course end survey is shown in the below table

Fig. 7: PO Attainment from Exit Student Feedback
Final PO Attainment

Final PO attainment from all the tools is calculated based on the following weightages

- 70% for Direct
- 30% for Indirect

PO attainment for individual POs and PSOs are calculated by considering the attainment values obtained though different tools like Courses, labs, projects, other activities, course end feedback

and exit student feedback. Sample sheet is shown as an example for a PO.

Table 35: Overall PO Assessment

PO No.	Direct				Indirect			Overall	Target	Deviation	Status
	Courses	Project	Committees	Average	COAF	Exit Student	Average				
PO 1	2.11	2.16	2.50	**2.26**	2.30	2.48	**2.39**	**2.30**	2.72	0.42	Not Attained
PO 2	2.03	2.14	2.33	**2.17**	2.27	2.45	**2.36**	**2.23**	2.15	-0.08	Attained
PO 3	2.02	2.26	2.00	**2.09**	2.30	2.45	**2.37**	**2.18**	2.03	-0.15	Attained
PO 4	1.84	2.23	2.00	**2.02**	2.35	2.48	**2.41**	**2.14**	1.65	-0.49	Attained
PO 5	2.13	2.08	2.40	**2.20**	2.28	2.44	**2.36**	**2.25**	1.70	-0.55	Attained
PO 6	2.09	2.15	2.28	**2.17**	2.33	2.46	**2.40**	**2.24**	1.97	-0.27	Attained
PO 7	1.79	2.16	2.44	**2.13**	2.19	2.40	**2.29**	**2.18**	1.85	-0.33	Attained
PO 8	2.00	2.32	2.11	**2.14**	2.28	2.36	**2.32**	**2.19**	2.28	0.09	Not Attained
PO 9	2.16	2.19	2.35	**2.23**	2.27	2.38	**2.32**	**2.26**	2.15	-0.11	Attained
PO 10	2.20	2.28	2.11	**2.19**	2.30	2.38	**2.34**	**2.24**	2.35	0.11	Not Attained
PO 11	2.18	2.24	1.99	**2.14**	2.27	2.41	**2.34**	**2.20**	2.06	-0.14	Attained
PO 12	2.01	2.18	2.32	**2.17**	2.18	2.46	**2.32**	**2.21**	1.93	-0.28	Attained

Table 36: Overall PSO Assessment

PO No.	Direct				Indirect			Overall	Target	Deviation	Status
	Courses	Project	Committees	Average	COAF	Exit Student	Average				
PSO 1	2.14	2.14	2.58	**2.29**	2.25	2.35	**2.30**	**2.29**	2.34	0.05	Not Attained
PSO 2	1.92	2.32	2.50	**2.25**	2.23	2.41	**2.32**	**2.27**	2.21	-0.06	Attained

Based on the level of attainment the observations are made and necessary action plans will be made for the improvement of the POs and PS

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Annexure III

ANDHRA PRADESH STATE COUNCIL OFHIGHER EDUCATION

Assessment methodology for Internships / On the Job Training /Apprenticeship under the revised CBCS (2020 – 21 onwards)

First internship (After 1st year examinations): Community Service Project

To inculcate social responsibility and compassionate commitment among the students, the summer vacation in the intervening 1st and 2nd years of study shall be for Community Service Project.

Learning outcomes:

- To facilitate an understanding of the issues that confronts the vulnerable /marginalized sections of the society.
- To initiate team processes with the student groups for societal change.
- To provide students an opportunity to familiarize themselves with urban / rural community they live in.
- To enable students to engage in the development of the community.
- To plan activities based on the focused groups.
- To know the ways of transforming the society through systematic programme implementation.

Assessment Model:

There will be only internal evaluation for this internship. Each faculty member is to be assigned with 10 t0 15 students depending upon availability of the faculty members. The faculty member will act as a faculty-mentor for the group and is in- charge for the learning activities of the students and also for the comprehensive and continuous assessment of the students.

The assessment is to be conducted for 100 marks. The number of credits assigned is 4. Later as per the present practice the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

Each student is required to maintain an individual logbook, where he/she is supposed to record day to day activities. The project log is assessed on an individual basis, thus allowing for individual members within groups to be assessed this way. The assessment will take into consideration the individual student's involvementin the assigned work.

While grading the student's performance, using the student's project log, the following should be taken into account -

a. The individual student's effort and commitment.
b. The originality and quality of the work produced by the individual student.
c. The student's integration and co-operation with the work assigned.
d. The completeness of the logbook.

The assessment for the **Community Service Project implementation** shall include the following components and based on the entries of Project Log and Project Report:

a. Orientation to the community development
b. Conducting a baseline assessment of development needs
c. Number and Quality of Awareness Programmes organised on beneficiaryprogrammes and improvement in quality of life, environment and social consciousness, motivation and leadership, personality development,etc.
d. Number Quality and Duration of Intervention/service Programmes (Prevention or promotion programs that aim to promote behavioural change in defined community contexts to address social problems) organised.
e. Followup Programmes suggested (Referral Services, Bringing Community Participation)
f. Developing short and mid-term action plans in consultation with local leadership and local government officers.

The **Project Report** should contain

a) Introduction, scope, objectives, and methodology
b) Project specifications (area / background of the work assigned).
c) Problems identified.
d) Analyses of the problems
e) Community awareness programmes conducted w.r.t the problems and their outcomes.
f) Intervention/service programmes taken up
g) Short-term and long term action plan for implementation
h) Recommendations and conclusions.
i) References

The **Project Presentation** is to be made by the student after he/she reports back tothe College. The components for assessment are –

a. assessing the involvement in the project
b. presentation skills
c. Outcome of the project as evinced by the student.

For Example: **II BZC EM**

S.No.	Name of the Student	Class & Year of Study	Register Number	Project Log	Project Implementation	Project Report	Presentation	Total
				(20)	(30)	(25)	(25)	(100)

Signature of Project Mentor **Signature of Nominated faculty** **Signature of HOD/ In-Charge**

ANDHRA PRADESH STATE COUNCIL OF HIGHEREDUCATION

Assessment methodology for Internships / On the Job Training /Apprenticeship under the revised CBCS (2020 – 21 onwards)

Second Internship (After 2nd year examinations): Apprenticeship / Internship / On the job training / In-house Project / Off-site Project

To make the students employable, an Apprenticeship / Internship / On the job training / In-house Project / Off-site Project shall be undertaken by the students in the intervening summer vacation between the 2nd and 3rd years.

Learning outcomes

- Explore career alternatives prior to graduation.
- Integrate theory and practice.
- Assess interests and abilities in their field of study.
- Learn to appreciate work and its function towards future .
- Develop work habits and attitudes necessary for job success.
- Develop communication, interpersonal and other critical skills in the future job.
- Build a record of work experience.
- Acquire employment contacts leading directly to a full-time job followinggraduation from college.
- Acquire additional skills required for world of work.

Assessment Model

There will be only internal evaluation for this internship. Each faculty member is to be assigned with 10 t0 15 students depending upon availability of the faculty members. The faculty member will act as a faculty-mentor for the group and is in-charge for the learning activities of the students and also for the comprehensive and continuous assessment of the students.

The assessment is to be conducted for 100 marks and the credits assigned are 4. Later as per the present practice the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightings shall be:

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

Each student is required to maintain an individual logbook, where he/she is supposed to record day to day activities. The project log is assessed on anindividual basis, thus allowing for individual members within groups to be assessed this way.The assessment will take into consideration the individual student's involvement in the assigned work.

While grading the student's performance, using the student's project log, the following should be taken into account -

a. The individual student's effort and commitment.
b. The originality and quality of the work produced by the individual student.
c. The student's integration and co-operation with the work assigned.
d. The completeness of the logbook.

The assessment for Project Implementation during **second internship / Project Work / On the Job Training / Apprenticeship** shall include the following components and based on the entries of Project Log and Project Report:

a. Involvement in the work assigned
b. Regularity in the work assigned
c. New knowledge acquired
d. New skill acquired

The Project Report should contain

a. Introduction.
b. Project specifications (area / background of the work assigned).
c. Problems taken up.
d. Analysis of the problem.
e. Recommendations and conclusions.

The Project Presentation is to be made by the student after he/she reports back to the College. The components for assessment are –

a. assessing the involvement in the project
b. presentation skills
c. final outcome of the project as evinced by the student.

Score Sheet

S.No.	Name of the Student	Class & Year of Study	Register Number	Project Log	Project Implementation	Project Report	Presentation	Total
				(20)	(30)	(25)	(25)	(100)

Signature of Project Mentor

Signature of Nominated faculty

Signature of HOD/ In-Charge

ANDHRA PRADESH STATE COUNCIL OF HIGHEREDUCATION

Assessment methodology for Internships / On the Job Training /Apprenticeship under the revised CBCS (2020 – 21 onwards)

Third internship/Apprenticeship (5^{th}/6^{th} Semester period):

During the entire 5th /6^{th} Semester, the student shall undergo Apprenticeship / Internship / On the Job Training. This is to ensure that the students develop hands on technical skills which will be of great help in facing the world of work.

Learning outcomes

- Explore career alternatives prior to graduation.
- Integrate theory and practice.
- Assess interests and abilities in their field of study.
- Learn to appreciate work and its function towards future .
- Develop work habits and attitudes necessary for job success.
- Develop communication, interpersonal and other critical skills in the future job.
- Build a record of work experience.
- Acquire employment contacts leading directly to a full-time job followinggraduation from college.
- Acquire additional skills required for world of work.

Assessment model for the semester long apprenticeship / on the job training / internships during the V/VI Semester:

The assessment for the V / VI Semester long apprenticeship is for 200 marks and creditsassigned are 12.

A monthly report is to be submitted to the teacher guide online within 15 days after the completion of the every month upto four months. The last two months of internship period shall be used for preparation of final project report simultaneously undergoing on the job training / internship / apprenticeship.

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 willbe continuous and the assessment by the industry / enterprise / organization where the student does his/her internship will be indicated in grades. This assessment is to be conducted by a responsible person (General Manager / HR Manager / Head of

the Division) in consultation with the supervisor under whom the internship was done.

The components of internal assessment during this **third internship / Project Work / On the Job Training / Apprenticeship** shall include the following components and based on the entries of Project Log and Project Report:

a. Involvement in the work assigned
b. Regularity in the work assigned
c. New knowledge acquired
d. New skill acquired

The Project Report should contain

a. Introduction.
b. Project specifications (area / background of the work assigned).
c. Problems taken up.
d. Analysis of the problem.
e. Recommendations and conclusions.

The Project Presentation is to be made by the student after he/she reports back to the College. The components for assessment are –

a. assessing the involvement in the project
b. presentation skills
c. final outcome of the project as evinced by the student.

There shall be a final evaluation committee comprising of Principal, Teacher Guide, Internal Expert and External Expert nominated by the affiliating University. The final evaluation committee shall consider the following for evaluation –

A. Monthly Reports submitted by the student

B. Final Project Report

C. Grading given by the Company / Business unit / Enterprise where the student has undergone the training. The grades shall be converted into marks on the scale followed by the University.

To evaluate and award marks, the Committee conducts viva voce examination at the college.

Example:

Name of the Student:	
Class & Year of Study	
Registered Number	
Internal Assessment Component	**Max. Marks**
1. Project Log	10
2. Project Implementation	20
3. Project Report	10
4. Presentation	10
TOTAL	**50**
External Assessment Component	**Max. Marks**
Performance Assessment by the Evaluation Committee, converting the grades awarded by the industry, enterprise, etc.	**100**
External Viva Voce	**50**
GRAND TOTAL	**200**

DEPARTMENT OF ZOOLOGY

LIST OF EXAMINERS

S. No	Name of the Examiners	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
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16.	Dr G. Vijay Prathap	Zoology	VSK College, Vizag
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DEPARTMENT OF ZOOLOGY
LIST OF QUESTION PAPER SETTERS

S. No	Name of the Examiners	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
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