# PITHAPUR RAJAH’S GOVT COLLEGE (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)**

**Syllabus**

**Index**

|  |  |  |
| --- | --- | --- |
| **Sl.No** | **Name of the Item** | **Page no.** |
|  | **Proceedings of the BOS** |  |
|  | **Composition of BOS** |  |
|  | **Vision & Mission** |  |
|  | **List of Examiners and Paper setters** |  |
|  | **Vision and Mission of the College** |  |
|  | **Agenda** |  |
|  | **Resolutions** |  |
|  | **Departmental Action Plan** |  |
|  | **Credits for each Paper** |  |
|  | **Programme outcomes** |  |
|  | **Syllabus with CO-PO mapping** |  |
|  | **List of Examiners and Paper setters** |  |
|  | **Changes in the syllabus** |  |

**DEPARTMENT OF COLLEGIATE EDUCATION**

**GOVERNMENTOFANDHRA PRADESH**

**PROCEEDINGS OF THE PRINCIPAL, PITHAPURRAJAH’s GOVT.COLLEGE[A]::KAKINADA**

**Present: Dr.B.V.TIRUPANYAM, Ph.D.**

**Rc.No.1/A.C/BOS/2023-24 Dt.29Aug2023**

**Sub:P.R.G.C[A]– Academic Cell- Conduct of BOS Meetings for the Academic Year 2023-24**

**–Guidelines issued-Regarding.**

**Ref: Resolutionsadoptedin25th Staff Council Meeting held on29Aug2023.**

TheAutonomouscollegesare,asperitsvision,mission,statedobjectivesandcorevalues,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 andtransparentevaluationsystemtomeasuretheirattainmentlevelsbythestudents.

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, courag, 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 to obesides 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,thestudentsshallhavesocialconsciousness,regardforconstitutionalprovisions,rightperspective on environmental protection, awareness on gender equity, health and hygiene, Yogaandwellness,collegesocialresponsibility,cultureandvalues,etc.,tomentionafew.

Further, the Ministry of India, Go I, 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-orienttheiracademicandresearchadministrationintunewiththepoliciesofabovebodies,ourinsitutionisnoexception

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 on31 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 and it 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’sTaxonomy based evaluation system for effective learning out comes 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 ofNAAC,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, enhancingle arning experiences,resource utilization by staff and students,etc.,
* Each Department shall approve and recommend additional credits for additional modules,train in programmes, N.S.S, N.C.C, participation in cultural programs, sports and games, environmental programs, blood donation scamps, 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 28August 2023andexplainthestructureofcurricula, 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 shallpayRs.5,000/-uniformlisasan advance to each Chairman toward seach course(If BOS meetings for multiple courses are held under one Chairman ship, he/she shall be given advance amount equivalent to thenumberofcoursesxRs.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: ItshallincludeATRonthepreviousBOSmeetingfirst,resolutions,etc., later.
5. Table showing the Allocation of Credits in the following table for both the oryand Lab incase of science subjects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Semester** | **TitleoftheCourse(Paper)** | **Hrs./week** | **Max.Marks(SEE)** | **MarksinCIA** | **Credits** |
| 1 | III | Optics | 4 | 50 | 50 | 4 |

1. Resolutions adopted in the meeting with detailed discussion that took place during the meeting (Activities and Bench marking as per Annexure–I)
2. At the end of each theory paper, each to pics hall 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** | **TitleoftheCourse(Paper)** | **Topic** | **Parameter asper Bloomstaxonomy**  **(Knowledge/Application/Creativity/**  **Innovation** | **Experientiallearningcomponent** | **Scope(Skill/employability/entreprenuership)** |
| 1 | Zoology | I | Introduction to Classical Biology | Animal cell | Knowledge | Shall be shown  Microscope |  |
|  |  |  |  |  |  |  |  |

1. 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.
2. Attendance of Member spresent with signatures in the tabular form.
3. List of Examiners & Paper setters
4. 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.
5. 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 **4units** For I mid examination to be conducted in offline mode,Question paper is to be given as per the following structure for the courses with **5 units**
* The remaining 25 marks for CIA are allocated as per the following structure.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **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 | 2 | 1 |
| 4 | IV | 0 | 2 | 1+ one question from any unit with more syllabus  weightage |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No | UnitNo | Long AnswerQuestion(10M) | Short AnswerQuestion (5M) | ObjectiveQuestions(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+onequestionfromany  unit(III or IV or V) withmoresyllabusweightage | 1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Project-10M | Vivaon  theory-3M | Assignment-5M | Seminar-5M | Clean&greenand  Attendance-2M |

**CIAstructurefor3Majorsystem**

* + 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 midexamination 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.

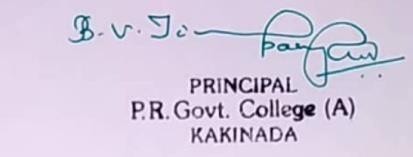
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Project-10M | Vivaon  theory-3M | Assignment-5M | Seminar-5M | Clean&greenand  Attendance-2M |

**CIAstructurefor3MajorsystemforHonorsprograms (2020-21AB)**

* + Out of 40 marks for CIA, 20 marks are allocated for Mid examinations. In each semestertwomidexaminationstobeconductedandtheaverageofthetwowillbeconsidered.
  + ImidexaminationistobeconductedinofflinemodeatcollegelevelandIImidexaminationis 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.
* Theremaining20marksforCIAareallocatedasperthefollowingstructure.

|  |  |  |
| --- | --- | --- |
| Assignment-10M | Seminar-5M | Quiz-5M |

1. Percentage of syllabus changes in eachpaper
2. MeasureoutcomeattainmentlearninglevelsofstudentsthroughdirectandindirectmethodologyandmappingCOsandPOs
3. Text & Reference Books
4. 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 |
| 18 |  | 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. Government College(A), Kakinada

## 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 |
| 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 |
| 18 | V Ramya | Student Member |

Date: 31-08-2023 Signature of the Chairperson

**BOS Meetings 2023-2024**

**Guidelines for Departments**

PleaseensurethatthefollowingparametersarereflectedwhileadoptingresolutionsintheBOSminutes.

* Theresolutionsshallbeintunewiththevision&missionofthecollege.VISION,MISSION&OBJECTIVESFROM2023-24

## VISION:

*To contribute its might for holistic and quality human capital formation for modern economy with focus on developing employment opportunity–enhancing skill in gecosystem,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 Governmen

t and Private agencies, for personal growth and enhanced productivity andeconomicgrowth.

*Tocollaboratewithcoachingcentersorskilldevelopmentinstitutionsforskilldevelopment.

*TodevelopsystemsforqualityenhancementinlearningbystudentthroughpromotionofICTintegrationintolearning,deploymentoflearningresourcesatthedoorstepsofstudentsforoptimumutilization.

*Designing and implementing student-centric, inquisitive, practical-rich, and research-based curricula,includingprojectworks,problem-solving&applicationsorientedTLPs,fieldtrips,etc.,thatfacilitateexperientialandparticipativelearning.

*To strengthen research and development and create new research knowledgethroughintenseresearch,collaborations, knowledgeandtechnology transfer

*Tofoster innovation among students throughtrainings and forging collaborationswithoutsideorganizations

*To turn each student into a wholesome personalitythrough initiativesin CommunityService,Genderequityinitiatives,Environmentprotection,personalitydevelopment,transferableskills,understandingconstitutionanditsspiritandtheirrolein nationbuilding.

*Tomouldthecharacterofeachconstitutionalprovisions-abidingandinquisition-arous

**The activities and plans of actions for AY2023-24 and BOS resolutions shall be in tune with vision & Mission of the college.**

**OBJECTIVES:**

1. To prepare and introducestudents to the world of work through development of cognitiveskills,discipline-specificskills,technicalandprofessionalskills,informationprocessingsills,problem-solvingskills,socialengagementandemotionalskills.
2. Toforgecollaborationswithindustry,Governmentandthirdsectororganizations
3. Topromoteintuitionamongstudents
4. Todeviseplansforrollingoutsociallyconscious,culturallysynchronizingandenvironmentalfriendlystudents.
5. TomakestudentsaccesstoICTinfrastructureforenhancedqualityhighereducation
6. Tomakestudentsfindinnovativesolutionstosocietalproblemsandadaptthemselvesto

* Thechangesinthesyllabusmadeshallbeatleast20%andtabulatethechanges(No.oftopicsadded)/(TotalNo.oftopics)x100=20%

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name of theDepartment | Semester,Program,PaperNumber &Title of thePaper, | Titles ofTopicsdeleted | Topicsaddedduring BOSmeetingAugust2023 | Percentageof changesmade insyllabus | Justificationper eachtopicdeleted/added |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

* The changes in theory for sciences shall be in tune with the local & global level industryrequiredskilldevelopmentandemploymentopportunities.
* The Practicals shall be according to theoretical concepts. If required, new nee & innovativepracticals shall be proposed and approved keeping the futuristic and advanced technologiesinfuture.
* Each Department shall approve at least two expert/guest lectures per semester per facultymemberwithtentative monthsand dates
* EachDepartmentshallplanandapproveat leastonestudent-centricNationallevelconference/seminar/ conclave/workshop,etc.,eitheroffline/ webinar-basedperyear.
* Each Department shall plan& approve one faculty- centric National level conference/seminar/conclave/workshop,etc.,eitheroffline/webinar-basedperyear.
* EachDepartmentshallplan&approveat leastoneindustrial/Educationaltourperyearwithspecificmonthandtentativedates.
* EachDepartmentshallplan&approveat leasttwo–communityextension/outreachprogrammespersemester.
* EachDepartmentshallplan&approveat leastonecertificatecoursepersemester,oneMOOCsbyeachfacultyperyear
* Eachdepartmentshallresolvetopublishthenumberofresearchpapersequivalenttotheno.offacultyinthedepartmentper year.
* Mandatorypublicationofatleastonebookbyeachfacultymember.
* Eachdepartmentshalldiscuss,plan&approveatleasttwobestpracticesfor2023-24.
* Each department shall conduct at least two career guidance programmes for AY 2023-24 intunewiththevision&mission.
* Each department shall resolve the attendance requirements for students to allow themappearformidtermexaminationsandSEE.1.60% attendanceforImid-term examination2.75%attendanceforIImidandSEEtheory&90%attendanceforpracticalexaminations
* Minimumof60%integrationofICTintotransactionofcurriculum
* Remedial coachingfor slow learners and project works, research, Conferences, etc., foradvancedlearners.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No | Parameter | UnitofTime | Benchmarking  (Number/quantity) | Remarks |
| 1 | Certificatecourses | Semester | 1 |  |
| 2 | Value addedcourses | Semester | 1 |  |
| 3 | MOOCs for student | Year | 1 |  |
| 4 | MOOCs for faculty | Semester | 1 |  |
| 5 | LMSbyfaculty | Semester | 1 | Eachfacultyshallpreparetopicwise/chapterwiseLMS(4-quadrantapproach) |
| 6 | Field/industrial/Educationaltrips | Year | 1 | Department level– Eachdept shallconduct |
| 7 | Researchpapers | Year | 1 | Minimumoneresearchpublicationperyearperlecturer |
| 8 | Conferences/Workshops/ –Nationallevel | Year | 1 | Offline  (Preferablyonemonthaftercommencementofodd/evensemester) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 9 | Conferences/Workshops/ –Statelevel | Year | 1 | Webinar  (Preferablytwomonthsaftercommencementofodd/evensemester) |
| 10 | Bookpublications | Year | \*\* | Eachfacultyshallpublishatleastonebookper year |
| 11 | Career GuidanceProgrammes | Semester | 2 | 1Departmentlevel&1byfaculty |
| 2 | Parent-teachermeetings | Semester | 1 |  |
| 13 | Meeting withemployers oncurriculumdesign&feedback | Semester | 1 | At least one week before thebeginningofBOSmeetings |
| 14 | Meeting withAlumniforfeedback on  curriculumdesign | Semester | 1 | At least one week before thebeginningofBOSmeetings |
| 15 | Reviewmeetingson syllabuscompletion byeach |  |  |  |
| 16 | Mentoring (Faculty) | Semester | 3 times percandidate | 1. In first week aftercommencementofsemester 2. In sixth week aftercommencementofsemester 3. In Tenth week aftercommencementofsemester   4. |
| 17 | Frequencyoftests | Attheendofeverychapter |  | ItsbesidesCIA |
| 18 | GroupDiscussions,Quizprograms,etc | Monthly/faculty | 1GD  1Quiz  1 Extracurricularactivity  1 Career Guidanceactivity (sports/ cultural) |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 19 | Participation of  students inseminars/workshopa | Semester | At least 50%ofadvancedlearnersshallparticipate&presentpapersinconferences/workshos |  |
| 20 | Feedback byDepartmentontheDepartmentalperformanceandthatoffacultyperformance(SelfAssessmentoftheDepartment) | Semester | 2 | 1. 15 days after   commencement ofinstruction   1. 10daysbeforetheclosureoftheinstructionforthesemester |
| 21 | DepartmentwiseSlowanadvancedlearneridentification(Class-wise | Semester | 1 | OneweekimmediatelyaftercommencementofinstructionbasingonpreviousSEEexamination(from IIsemesteronwards) or through test result (forIsemesterstudents) |
| 22 | Participation of  faculty in  Conferences/workshops andpaperpresentation | Semester | 1 | Everyfacultyshall invariably takepart and present at leastin 2conferences,etc.,inothercolleges@at least1/eachsemesteronlineoroffline. |
| 23 | Participationinshortterm/FDP/Orientation/Refreshercoursebyfaculty | Year | 1 | Eachfacultyshall invariablytaketrainingthroughmentionedprogramsannually |
| 24 | Departmentaltrainings/FDPs | Semester | 1 | Eachdepartmentshallinvariablyconducttraininginpedagogy/departmentalinitiativessuchasOTLM/FRS/researchpaperwriting,preparationandmaintenanceofacademicdocumentssuch asCSP, DS,dailyetc., |
| 25 | Research Boardmeetings | Monthly | 1 | EachDepartmentshallconstituteResearch Board(RB) for it withHoD as Chairman and one of thefacultymembersasDirector.  It shall prepare Plan of Action peryearwithNo.ofpublications, |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | researchactivitytobedone.Reviewofprogressofresearchbyscholarsandguidesofthedepartment. |
| 26 | Collaborations | Yearly | 5-10 |  |
| 27 | Consultancyservices | Yearly | Minimum Rs.25000/-generation | Its mandatory on the part of eachdepartment to offer consultancyinitsareasofstudy/researchaffiliatedareasandgeneratefundingthrough Govt/ Non-Govtorganizations. |
| 28 | Libraryusagebyfaculty members | Monthly | 15Hours | Eachfacultymembershalloptimally utilize libraryresources,updateknowledgethroughphysicalandN-LISTresources.  Daily Utilization of e-content of N-LISTisrecommended. |
| 29 | MeritscholarshipsbyDepartments | Yearly | Atleastfor10studentsofthedept. | Eachdeptshallmobilizemeritscholarshipsforitsstudentsthroughdonors/philanthropists. |
| 30 | StudentGrievanceredressal | Weekly/wheneverrequired | 1 | Eachdepartmentshallevolveamechanismforredressinggrievancesofstudents.  Itshallconstituteacommitteewithatleastonwomanfaculty andtwomaleandtwofemalestudentseach.  It shallarrange a grievance box intheHoDroomfordroppinggrievancerelatedletters  Thecommitteeshallmeetat3:00  P.MoneveryMondayinthedepartment and open the box inthepresenceofcommitteeandstudents.  The grievances shall be tabulatedandaddressedwithin3days.  ThegrievancespertainingtocollegelevelshallbesenttothePrincipal. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 31 | Departmentalinitiative for  progression toHigherEducation | Semester | 15classes | Each faculty member shall engageone class per week for coachingfor P.Gentranceexaminations |
| 32 | Coaching forEmployment./SkillDevelopment | Semester | 1course | IncollaborationwithJKC/Centrefor 21stcentury skills/ on its own,eachdepartmentshalloffervalueaddition courseslikeindian polity/ Technical skills/ Analyticalskills/ Communications skills, etc.,foranedgeincompetitiveexaminations |
| 33 | Environmentalsustainability | Weekly | 1 | Eachfacultymembershallinatleastonedayinaweekattend thecollegewithout personal vehicle(Car/Bike ) andrather use publictransportation/bicycle,theenvironmentally friendly modes |

# 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. Deliver of guest lectures and conduct of field visits, assigning of project works.

8. Additional inputs and changes in the curriculum.

9. Introducing Certificate course entitled **Certificate Course on Water Quality Assessmen**

10. Implementation of Community Service Project and Internship Programmes introduced from

2020-2021 admitted batch.

11. Continuous Internal Assessment pattern (CIA) introduced by APCCE from 2021-2022 admitted

batch onwards

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. Any other proposal with the permission of the Chair.

Discussion:

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

# PITHAPUR RAJAH’S GOVT COLLGE (A), KAKINADA

## DEPARTMENT OF ZOOLOGY

**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

* 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.

## 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 three internships.

**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 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.

Date: 31-08-2023 Signature of the Chairperson

Members:

****

**The following BOS board members made corrections**

**1.M.Phanendra.**

* **He suggested that the Poultry Farming course better to conduct.**
* **He suggested that the culture of ornamental fish is better than mariculture**
* **He raised a problem on sem1,paper1 of botany&chemistry new syllabus**
* **He is also discussed on sem2,paper2 syllabus.**

**2.P. Ram mohan.**

* **He suggested that on sem2,paper2 syllabus, lecturers better to take training programme on the new syllabus.**

**3.M.Vasantha lakshmi.**

* **Suggested that in sem 2 syllabus better to remove botany & chemistry common inroductary part**

**4.Dr. B.V.Tirupanyam**

* **Suggested that accepted to conduct consultancty , poultry management sevices ,aquaculture consultancy services,Animal husbandry ,campus placements planning from 4to6pm on everyday**
* **Resolute that fish tank construction in our campus**
* **Suggested that better to MOU with poultry farmers.**

**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**

**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 |
| CO4 | Classify | L3 | 4 | Sessional Test –1.5  Quiz-1  Assignment–0.5 | 3 | 7 | 10 | Apply- 1 | 1/3 = 33.3 | M2 Q2 | 1, 2, 11 PSO1 | 3 |
| Analyse -0.5 | 16.6 | M2 Q2 | 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 or not 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

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**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course** | **Regd. No** | **Q1aM1** | **Q1bM1** | **Q1M1** | **Q2aM1** | **Q2bM1** | **Q2M1** | **Q3aM1** | **Q3bM1** | **Q3M1** | **Q1aM2** | **Q1bM2** | **Q1M2** | **Q2M2** | **Q3M2** | **A1** | **A2** | **Q1** | **Q2** |
| **Maximum** | | **5** | **5** | **10** | **5** | **5** | **9** | **3** | **4** | **7** | **5** | **5** | **10** | **10** | **10** | **5** | **5** | **5** | **5** |
| CO | 21123 | 5 | 4 | 9 | 5 | 4 | 9 | 3 | 4 | 7 | 5 | 5 | 10 | 8 | 8 | 5 | 5 | 5 | 2 |
| CO | 21124 | 5 | 4 | 9 | 5 | 4 | 9 | 3 | 4 | 7 | 5 | 5 | 10 | 8 | 8 | 5 | 5 | 4 | 2 |
| CO | 21125 | 5 | 4 | 9 | 5 | 4 | 7 | 3 | 4 | 7 | 5 | 3 | 8 | 8 | 8 | 4 | 4 | 4 | 1 |
| CO | 21126 | 3 | 4 | 7 | 3 | 4 | 9 | 3 | 4 | 7 | 5 | 3 | 8 | 8 | 8 | 4 | 4 | 5 | 1 |
| **Average Marks of all students** | | 3.91 | 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 | 4.49 | 4.49 | 3.43 | 1.56 |
| **Number of students Not attempted** | | 2 | 12 | 1 | 2 | 12 | 1 | 13 | 5 | 5 | 2 | 4 | 2 | 4 | 4 | 0 | 0 | 0 | 0 |
| **Number of Students attempted** | | 66 | 56 | 67 | 66 | 56 | 67 | 55 | 63 | 63 | 66 | 64 | 66 | 64 | 64 | 68 | 68 | 68 | 68 |
| **Number of Students attained CO** | | 37 | 55 | 60 | 37 | 55 | 59 | 17 | 29 | 59 | 63 | 44 | 65 | 62 | 62 | 63 | 63 | 40 | 38 |
| **Percentage of Students attained CO** | | 56.06 | 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 | 92.65 | 92.65 | 58.82 | 55.88 |
| **Attainment Level** | | **2** | **3** | **3** | **2** | **3** | **3** | **0** | **1** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **2** | **2** |

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 the knowledge on double entry accounting system?. | 48 | 28 | 27 | 8 | 1 | 450 | 270 | 2.38 |
| **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** | **Final Exam(35)** |
| **Obs.& Viva(5)** | **Record(5)** | **Obs.& Viva(5)** | **Record(5)** | **Obs.& Viva(5)** | **Record(5)** | **Obs.& Viva(5)** | **Record(5)** | **Internal(15)** |
| 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

1. Direct Assessment
2. Indirect Assessment
3. **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

1. CO-PO Mapping
2. CO Attainment
3. 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** | **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** |  |

**Table18: CO Attainment**

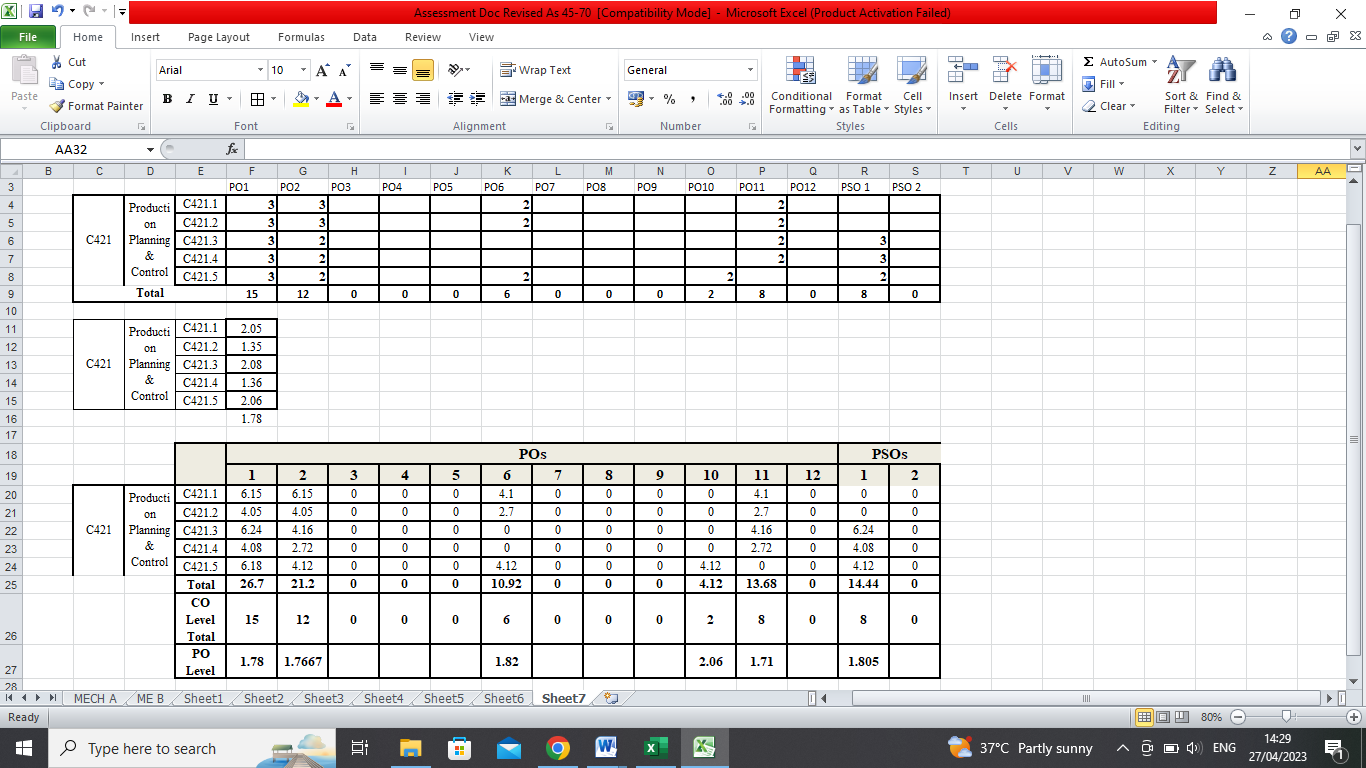
|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **Course Name** | **CO No.** | **Co Attainment** |
| 3101 | Auditing | C424.1 | 2.05 |
| C424.2 | 1.35 |
| C424.3 | 2.08 |
| C424.4 | 1.36 |
| C424.5 | 2.06 |

**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** |  |

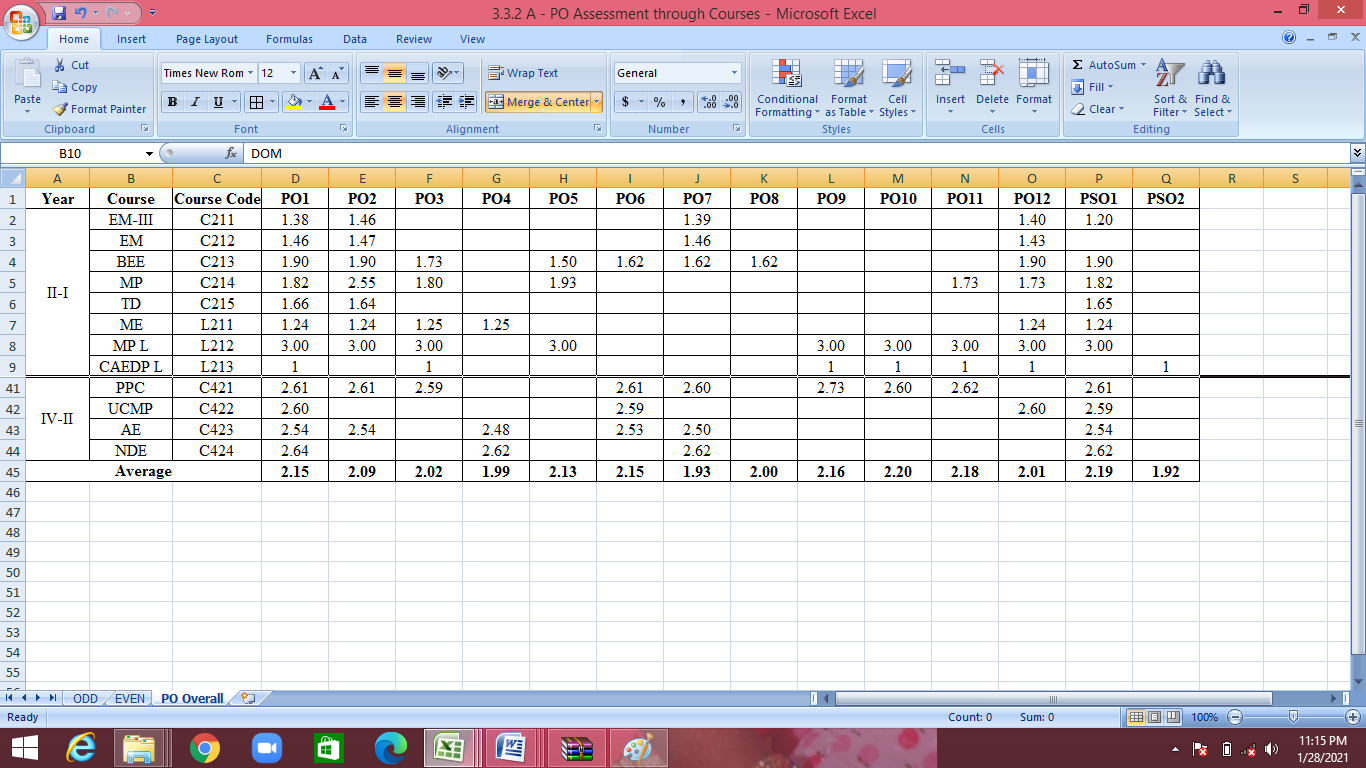
**Sample Assessment Sheet**

The sheet shows the attainment of PO for one course



**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



**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 ofCo-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

**T5.** No. of collaborative projects with professional societies

**Rubric for Assessment**

**Table22: Rubrics for tools for Assessing PSAC**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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 | |

**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

**P.R. GOVT COLEGE (A), KAKINADA**

**ACTION PLAN 2023-24**

**DEPARTMENT OF ZOOLOGY & Aquaculture**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 11 | 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 |  |
|  | September2023 | 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 Mangrove Fauna  Certificate course on Water quality Assessment | First week of October  October 2023  October 2023 |  |
|  | November2023 | 1. Extension activity in Rural high Schools 2. Guest Lecture by Fisheries experts | 3rd Week of November  4th Week of November |  |
|  | December2023 | One day Faculty Development Programme (FDP) for High school teachers | 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

**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 | I  I | I |  | Animal Diversity–I |  | | | 50 | 50 | 04 |
| Biology of Non- Chordates | | | | |
| Practical-I | | | | |  | 50 | 01 |
| II  II | II |  | Animal Diversity– II | | |  | 50 | 50 | 04 |
| Biology of Chordates | |  | |
|  | | | | |
| Practical-II | | | | |  | 50 | 01 |
| II | III | III | Cell biology, Genetics, Molecular Biology&Evolution | | | | | 50 | 50 | 04 |
| Practical-III | | | | |  | 50 | 01 |
| IV | IV | Physiology, Cellular Metabolism&Embryology | | | | | 50 | 50 | 04 |
| Practical-IV | | | | |  | 50 | 01 |
| V | Immunology & Animal Biotechnology | | | | | 50 | 50 | 04 |
| Practical-V | | | | |  | 50 | 01 |
|  |  | 6A | Sustainable Aquaculture  Management | | | | | 60 | 40 | 04 |
| III | V |  | 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**



**ANDHRA PRADESH STATE COUNCIL OF HIGHEREDUCATION**

**Programme:B.Sc.Honoursin Zoology(Major)**

w.e.f.AY2023-24

**COURSESTRUCTURE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Semester** | **Course** | **Titleof theCourse** | **No. ofHrs**  **/Week** | **No. ofCredits** |
| I | I | 1 | IntroductiontoClassicalBiology | 3+2 | 4 |
| I | 2 | IntroductiontoAppliedBiology | 3+2 | 4 |
| II | 3 | AnimalDiversity-I BiologyofNon-  Chordates | 3 | 3 |
| Animal Diversity-IBiologyofNon-  ChordatesPracticalCourse | 2 | 1 |
| II | 4 | CellandMolecularBiology | 3 | 3 |
| CellandMolecularBiologyPractical  Course | 2 | 1 |
| II | III | 5 | AnimalDiversity-IIBiologyof  Chordates | 3 | 3 |
| AnimalDiversity-IIBiologyof  ChordatesPracticalCourse | 2 | 1 |
| 6 | PrinciplesofGenetics | 3 | 3 |
| PrinciplesofGeneticsPracticalCourse | 2 | 1 |
| 7 | AnimalBiotechnology | 3 | 3 |
| AnimalBiotechnologyPracticalCourse | 2 | 1 |
| 8 | EvolutionandZoogeography | 3 | 3 |
| EvolutionandZoogeographyPractical  course | 2 | 1 |
| IV | 9 | Embryology | 3 | 3 |
| EmbryologyPractical Course | 2 | 1 |
| 10 | AnimalPhysiology: LifeSustaining  Systems | 3 | 3 |
| AnimalPhysiology: LifeSustaining  SystemsPracticalCourse | 2 | 1 |
| 11 | Immunology | 3 | 3 |
| ImmunologyPracticalCourse | 2 | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Semester** | **Course** | **Titleof theCourse** | **No. ofHrs**  **/Week** | **No. ofCredits** |
| III | V | 12 | PoultryManagement-I(PoultryFarming) | 3 | 3 |
| PoultryManagement-I(PoultryFarming)  PracticalCourse | 2 | 1 |
| 13 | PoultryManagement-II(Poultry  ProductionandManagement) | 3 | 3 |
| Poultry Management-II (PoultryProductionandManagement) Practical  Course | 2 | 1 |
| 14A | SustainableAquaculture Management | 3 | 3 |
| SustainableAquacultureManagement  PracticalCourse | 2 | 1 |
| **OR** | | | |
| 14 B | LiveStockManagement-I(Biologyof  DairyAnimals) | 3 | 3 |
| LiveStockManagement-I(Biologyof  DairyAnimals)PracticalCourse | 2 | 1 |
| 15A | Post-HarvestTechnologyofFishand  Fisheries | 3 | 3 |
| Post-HarvestTechnologyofFishand  FisheriesPracticalCourse | 2 | 1 |
| **OR** | | | |
| 15 B | LiveStock Management-II(Dairy  ProductionandManagement) | 3 | 3 |
| LiveStock Management-II(Dairy  ProductionandManagement)PracticalCourse | 2 | 1 |
|  |  |  |  |  |  |
|  | VI | Internship | | | |
|  | VII |  | Courseswillbeavailable induecourse  of time |  |  |
|  | VIII |  | Courseswillbeavailable induecourse  of time |  |  |
|  |  |  |  |  |  |

PROGRAMME OUTCOMES

* 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.**

**Programme:B.Sc. HonoursinZoology (Major)**

**w.e.f. AY2023-24**

# COURSESTRUCTURE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Semester | Course | Titleofthe Course | No. of Hrs  /Week | No. of Credits |
| I | I | 1 | IntroductiontoClassicalBiology | 3+2 | 4 |
| I | 2 | IntroductiontoAppliedBiology | 3+2 | 4 |
| II | 3 | Animal Diversity-I  Biology ofNon-Chordates | 3 | 3 |
| Animal Diversity-IBiologyofNon-ChordatesPractical Course | 2 | 1 |
| II | 4 | CellandMolecular Biology | 3 | 3 |
| CellandMolecular BiologyPracticalCourse | 2 | 1 |

**APSTATECOUNCILOFHIGHEREDUCATIONREVISEDUG SYLLABUS UNDERCBCS**

**(Implemented from Academic Year 2020-21)PROGRAMME:FOURYEARB.Sc.(Hons)**

**DomainSubject:ZOOLOGY**

***CoursesforSemesters VII& VIII***

*(SyllabuswithLearningOutcomes, References,&Co-curricularActivities)*

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

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

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



SEMESTER-I

Introduction to Classical biology

Introduction to Applied biology

**CourseObjectives:**

Thestudentwillbeabletolearnthediversityandclassificationoflivingorganismsand

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  Semester-I | | | |
| CourseCode | **TITLE OF THE COURSE**  **COURSE 1: INTRODUCTIONTOCLASSICALBIOLOGY** |
| Teaching | Hours Allocated: 60 (**THEORY**) | L | T | P | C |
| Pre-requisites: | Basics of Zoology | 3 | 1 | - | 3 |

understand their chemical,cytological, evolutionaryandgenetic principles.

**CourseOutcomes:**

|  |  |
| --- | --- |
| OnCompletion of thecourse, the students willbeable to- | |
| CO1 | 1. Learntheprinciplesofclassificationandpreservationofbiodiversity |
| CO2 | 1. Understandtheplant anatomical, physiologicalandreproductiveprocesses. |
| CO3 | 1. Knowledgeonanimalclassification,physiology,embryonicdevelopmentandtheireconomicimportance. |
| CO4 | 1. Outlinethecellcomponents,cellprocesseslikecelldivision,heredityandmolecularprocesses. |
| CO5 | 1. Comprehendthechemicalprinciplesinshapinganddrivingthemacromoleculesandlifeprocesses. |

**Course with focus on employability / entrepreneurship / Skill Development modules**

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

**Syllabus**

**Unit1**:Introductiontosystematics,taxonomyandecology.

* 1. Systematics–Definitionandconcept,Taxonomy–Definitionandhierarchy.
  2. Nomenclature–ICBN andICZN, Binomialand trinomial nomenclature.
  3. Ecology– Conceptof ecosystem,Biodiversityand conservation.
  4. Pollutionandclimatechange.**Unit2:**EssentialsofBotany.
  5. Theclassification ofplant kingdom.
  6. Plant physiological processes (Photosynthesis, Respiration, Transpiration,phytohormones).
  7. Structureofflower–Microandmacrosporogenesis,pollination,fertilizationandstructureofmono and dicot embryos.

2.4Mushroomcultivation,floricultureandlandscaping.**Unit3:**Essentials ofZoology

3.1.Theclassification of KingdomAnimaliaandChordata.

* 1. AnimalPhysiology–BasicsofOrganSystems&theirfunctions,HormonesandDisorders
  2. DevelopmentalBiology–Basicprocessofdevelopment(Gametogenesis,Fertilization,Cleavage andOrganogenesis)
  3. EconomicZoology– Sericulture,Apiculture,Aquaculture

**Activities:**

* VisittoZoologyLabandobservedifferenttypesofpreservationofspecimens
* Listoutdifferenthormonal,geneticandphysiologicaldisordersfromthesociety

**Unit4:**Cellbiology,GeneticsandEvolution

* 1. Celltheory,Ultrastructureofprokaryoticandeukaryoticcell,cellcycle.
  2. Chromosomesand heredity– Structureofchromosomes, concept of gene.
  3. CentralDogmaofMolecularBiology.
  4. Origin oflife

**Activities:**

* Drawthe UltrastructureofProkaryoticandEukaryoticCell.
* Hands-onexperienceofvariousequipment–Microscopes
* VisittoZoo/Sericulture/Apiculture/Aquacultureunit

**Unit5:**Essentialsofchemistry

* 1. Definitionandscopeofchemistry,applicationsofchemistryindailylife.
  2. Branchesofchemistry
  3. Chemicalbonds–ionic,covalent,noncovalent–VanderWaals,hydrophobic,hydrogenbond
  4. Greenchemistry

1. **Referencebooks:**
2. SharmaO.P.,1993.Planttaxonomy.2ndEdition.McGrawHillpublishers.
3. PandeyB.P.,2001.ThetextbookofbotanyAngiosperms.4thedition.S.Chandpublishers,NewDelhi,India.
4. JordanE.L.,VermaP.S.,2018.ChordateZoology.S.Chandpublishers,NewDelhi,India.
5. Rastogi,S.C.,2019.Essentialsofanimalphysiology.4th Edition.NewAgeInternationalPublishers.
6. VermaP.S.,AgarwalV.K.,2006.Cellbiology,genetics,MolecularBiology,EvolutionandEcology. S. Chandpublishers,NewDelhi,India.
7. SathyanarayanaU.,Chakrapani,U.,2013.Biochemistry. 4thEdition.Elsevierpublishers.
8. JainJ.L.,SunjayJain,NitinJain,2000.FundamentalsofBiochemistry.S.Chandpublishers,NewDelhi,India.
9. KarenTimberlake,WilliamTimberlake,2019.Basicchemistry.5thEdition.Pearson

publishers.

1. SubrataSenGupta,2014.Organic chemistry.1stEdition.Oxfordpublishers.

**WebLinks:**

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-POMapping:**

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  Semester-I | | | |
| CourseCode | **TITLE OF THE COURSE**  **COURSE 2: INTRODUCTIONTOAPPLIEDBIOLOGY** |
| Teaching | Hours Allocated: 60 (**THEORY**) | L | T | P | C |
| Pre-requisites: | Basics of Zoology | 3 | 1 | - | 3 |

**CourseObjectives:**

Thestudentwillbeabletolearnthefoundationsandprinciplesofmicrobiology,immunology,biochemistry,biotechnology,analytical tools,quantitativemethods,andbioinformatics.

|  |  |
| --- | --- |
| OnCompletion of thecourse, the students willbeable to- | |
| CO1 | Learnthehistory,ultrastructure,diversityandimportanceofmicroorganisms. |
| CO2 | Understandthestructureandfunctionsof macromolecules. |
| CO3 | Knowledgeon biotechnologyprinciplesand itsapplications infood andmedicine. |
| CO4 | Outlinethetechniques,toolsandtheirusesindiagnosisandtherapy. |
| CO5 | Demonstratethebioinformaticsandstatisticaltoolsincomprehendingthecomplexbiologicaldata. |

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

**Syllabus**

**Unit1:**EssentialsofMicrobiologyandImmunology

* 1. HistoryandMajorMilestones of Microbiology; Contributions of EdwardJenner,LouisPasteur,RobertKochand JosephLister.
  2. GroupsofMicroorganisms–StructureandcharacteristicsofBacteria,Fungi,ArchaeaandVirus.
  3. Applications ofmicroorganismsin– Food,Agriculture,Environment,andIndustry.
  4. Immunesystem–Immunity,typesofimmunity,cellsandorgansofimmunesystem.**Unit2:**EssentialsofBiochemistry
  5. Biomolecules I– Carbohydrates,Lipids.
  6. Biomolecules II–Aminoacids&Proteins.
  7. BiomoleculesIII– Nucleicacids -DNAandRNA.
  8. BasicsofMetabolism–Anabolismand catabolism.

**Activities: Biomolecules charts preparation**

**Unit3:**EssentialsofBiotechnology

* 1. History,scope,andsignificanceofbiotechnology.ApplicationsofbiotechnologyinPlant,Animal, Industrial and Pharmaceuticalsciences.
  2. EnvironmentalBiotechnology–BioremediationandBiofuels,BiofertilizersandBiopesticides.
  3. Geneticengineering–Genemanipulationusingrestrictionenzymesandcloningvectors;Physical,chemical, and biologicalmethodsofgene transfer.
  4. Transgenicplants–Stresstolerantplants(bioticstress–BTcotton,abioticstress–salttolerance).Transgenicanimals–Animal anddisease models.

**Unit4:**Analytical Tools andtechniquesinbiology –Applications

* 1. Applicationsinforensics –PCRandDNAfingerprinting
  2. Immunologicaltechniques–ImmunoblottingandELISA.
  3. Monoclonalantibodies –Applications in diagnosisandtherapy.
  4. Eugenicsand Genetherapy

**Activities :**

**Unit5:**BiostatisticsandBioinformatics

* 1. Datacollectionandsampling.Measuresof central tendency–Mean, Median,Mode.
  2. Measuresofdispersion–range,standarddeviationandvariance.Probabilityandtestsofsignificance.
  3. Introduction,Genomics,Proteomics,typesofBiologicaldata,biologicaldatabases-NCBI,EBI,GenBank;Protein3D structures,Sequencealignment
  4. **Accessi**ngNucleicAcidandProteindatabases,NCBIGenomeWorkbench

**Referencebooks:**

1. GerardJ.,Tortora,BerdellR.Funke,ChristineL.Case.,2016.Microbiology:AnIntroduction. 11thEdition.Pearsonpublications,London,England.
2. Micale,J.PelczarJr.,E.C.S.Chan.,NoelR.Kraig.,2002.PelczarMicrobiology.5thEdition.McGrawEducation, NewYork, USA.
3. SathyanarayanaU.,Chakrapani,U.,2013.Biochemistry.4thEdition.Elsevierpublishers.
4. JainJ.L.,SunjayJain,NitinJain,2000.FundamentalsofBiochemistry.S.Chandpublishers,NewDelhi,India.
5. R.C.Dubey, 2014.AdvancedBiotechnology. S. ChandPublishers,New Delhi,India.
6. ColinRatledge,Bjorn,Kristiansen,2008.BasicBiotechnology.3rdEdition.CambridgePublishers.
7. U. Sathyanarayana, 2005. Biotechnology. 1stEdition. BooksandAllied Publishers pvt. ltd.,Kolkata.
8. Upadhyay,UpadhyayandNath.2016.BiophysicalChemistry,PrinciplesandTechniques.Himalaya PublishingHouse.
9. ArthurM. Lesk.IntroductiontoBioinformatics.5thEdition.Oxfordpublishers.
10. *APKulkarni, 2020*.Basicsof Biostatistics.2ndEdition.CBSpublishers.

**WebLinks:**

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

**CO-POMapping:**

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

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

SEMESTER-II

Course 3: Animal diversity-I Biology of Non-chordates

Course 4: Cell & Molecular Biology

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  Semester-II | | | |
| CourseCode | **TITLE OF THE COURSE**  **COURSE 3:ANIMAL DIVERSITY-I BIOLOGY OFNON-CHORDATES** |
| Teaching | Hours Allocated: 60 (**THEORY**) | L | T | P | C |
| Pre-requisites: | Basics of Zoology | 3 | 1 | - | 3 |

**CourseObjectives:**

* Tounderstand the taxonomicpositionof protozoato helminthes.
* To understand thegeneralcharacteristics ofanimals belongingto protozoatohemichordata.
* To understand the structuralorganization ofanimals phylumfrom protozoato hemi chordata.
* Tounderstandtheoriginandevolutionaryrelationshipofdifferentphylafromprotozoatohemichordata.
* Tounderstandtheoriginandevolutionaryrelationshipofdifferentphylumfrom annelidstohemichordates.

|  |  |
| --- | --- |
| OnCompletion of thecourse, the students willbeable to- | |
| CO1 | * Describeconcept ofanimalkingdomclassification and generalcharactersofProtozoa |
| CO2 | * ClassifyPorifera and Coelenteratawith taxonomickeys |
| CO3 | * ClassifyPhylum Platy&Nemathelminthes usingexamples, parasiticadaptation |
| CO4 | * DescribePhylumAnnelida&Arthropodausing examplesandeconomicimportance ofvermicomposting&economicimportanceofinsects. |
| CO5 | * DescribeMollusca,Echinodermata&Hemichordatawithsuitableexamplesinrelationtothephylogeny |

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

# SYLLABS:UNIT-I

* 1. WhittakersfivekingdomconceptandclassificationofAnimalKingdom.
  2. Protozoa GeneralCharactersandclassification up to classeswith suitableexamples
  3. ProtozoaLocomotion&nutrition
  4. Protozoa reproduction

## Activity:Assignment/Seminar onthe above

***Evaluation: Marks to beawarded for written andoral presentations***

**UNIT –II**

* 1. PoriferaGeneralcharactersandclassificationup toclasses withsuitableexamples
  2. Canalsystemin sponges
  3. CoelenterataGeneralcharactersandclassification uptoclasses withsuitableexamples
  4. Polymorphismincoelenterates&Coralsandcoralreefs

## Activity:Assignment/Seminar/Quiz/Project onthe above

***Evaluation: Evaluationof Writtenpart + Evaluation oforal Presentation,Assessment ofstudentsinQuizparticipationandRanking-EvaluationofProjectReportandoralpresentation***

**UNIT– III**

* 1. PlatyhelminthesGeneralcharactersandclassificationuptoclasses withsuitableexamples
  2. ParasiticAdaptationsin helminthes
  3. NemathelminthesGeneralcharactersandclassification uptoclasses withsuitableexamples
  4. Lifecycle and pathogenicityof*Ascarislumbricoides*

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

***Evaluation:InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheaboveactivity***

**UNIT– IV**

* 1. Annelida Generalcharacters andclassification up toclasses withsuitableexamples
  2. Vermiculture-Scope,significance,earthwormspecies,processing,Vermicompost,economicimportanceofvermicompost
  3. ArthropodaGeneral charactersandclassification uptoclasses withsuitableexamples
  4. *Peripatus*-Structureandaffinities

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

***Evaluation:InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheaboveactivity***

**UNIT– V**

* 1. MolluscaGeneralcharactersandclassification uptoclasses withsuitableexamples
  2. Pearlformation in Pelecypoda
  3. EchinodermataGeneralcharactersandclassification up toclasses withsuitableexamplesWatervascularsysteminstarfish
  4. HemichordataGeneralcharactersandclassification uptoclasses withsuitableexamples

*Balanoglossus* -Structureandaffinities

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

***Evaluation:InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheaboveactivity***

***Co-curricularactivities(suggested)***

* Preparation of chart/model of phylogenictreeoflife,5-kingdomclassification
* Visit toZoologyMuseumorCoralIslandaspartof Zoological tour
* Chartsonpolymorphism
* Claymodels of canal systemin sponges
* Plaster-of-parismodelof*Peripatus*
* Constructionof a vermicompost in eachcollege,manufactureof manure bystudents anddonatingto localfarmers
* Chart on pearl forminglayers usingclay
* Visit toapearl culturerearingindustry/institute
* Livemodelofwatervascularsystem
* Observation ofBalanoglossus forits tubicoloushabit
* **Referencebooks:**
* L.H.Hyman„*TheInvertebrates’VolI,IIandV*.– M.C.GrawHillCompanyLtd.
* Kotpal,R.L.1988-1992Protozoa,Porifera,Coelenterata,Helminthes,Arthropoda,Mollusca,Echinodermata. RastogiPublications,Meerut.
* E.L.JordanandP.S.Verma„*InvertebrateZoology’*S.ChandandCompany.
* R.D.Barnes„*InvertebrateZoology’*by: W.B.SaundersCO.,1986.
* Barrington.E.J.W.,„*InvertebratestructureandFunction’*byELBS.
* P.S.DhamiandJ.K. Dhami.InvertebrateZoology.S.ChandandCo. NewDelhi.
* Parker,T.J.andHaswell„*AtextbookofZoology’*by,W.A.,MacMillanCo.London.
* Barnes, R.D. (1982).*Invertebrate Zoology*, VEdition”

**WebLinks:**

1. [Elphidium: Structure and Life History (With Diagram) (notesonzoology.com)](https://www.notesonzoology.com/protozoa/elphidium-structure-and-life-history-with-diagram/5642).pdf
2. [WATER VASCULAR SYSTEM IN STARFISH (bioscience.com.pk)](https://www.bioscience.com.pk/topics/zoology/item/561-water-vascular-system-in-starfish)

**CO-POMapping:**

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 |
| CO1 | 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 OFZOOLOGY**

**MODEL PAPERFORII SEMESTERZOOLOGY -PAPER- I**

**COURSE 3:ANIMAL DIVERSITY-I BIOLOGY OFNON-CHORDATES**

**Time:21/2 hrs Max.Marks:50**

1. **Answerany THREE of thefollowing. Choosing at least one from each part.**

**Drawlabeled diagramswherever 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. DescribetheCanalsystem insponges
3. ExplainParasiticAdaptations inhelminthes

**PART- II**

1. Explain Vermicompost,economic importanceofvermicompost
2. Describethe Pearl formation in Pelecypoda
3. DescribetheWatervascular system in star fish

**SECTION - B**

1. **Answerany FOURofthefollowing:**

**Drawlabeled diagramswherever necessary 4x5=20**

1. Amoeboid Movement
2. Ascon type canal System
3. Trematoda
4. Pathogenisity of Ascaris
5. Nephredia
6. Gastropoda
7. Affinities of Balanoglossus

BLUEPRINT

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  Semester-II | | | |
| CourseCode | **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:**

* Tounderstand theimportanceof preservation ofmuseum specimens
* To identifyanimals basedon specialidentifyingcharacters
* Tounderstand differentorgansystemsthrough demoorvirtualdissections
* Tomaintainaneat, labelledrecord ofidentified museum specimens

# SYLLABUS:

Studyofmuseumslides/specimens/ models(Classificationofanimalsuptoorders)

* Protozoa:Amoeba*,Paramoecium,ParamoeciumBinary fission and Conjugation,Vorticella,Entamoeba histolytica, Plasmodiumvivax*
* Porifera:*Sycon, Spongilla, Euspongia, Sycon*- T.S&L.S,Spicules, Gemmule
* Coelenterata:*Obelia – Colony&Medusa, Aurelia, Physalia,Velella, Corallium,Gorgonia,Pennatula*
* Platyhelminthes:*Planaria, Fasciolahepatica,Fasciola*larvalforms – Miracidium,Redia,Cercaria,*Echinococcusgranulosus, 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,Mouthpartsofmale*&*female*Anopheles*and*Culex,*MouthpartsofHouseflyandButterfly.

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

Glochidiumlarva

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

Bipinnarialarva

* Hemichordata:*Balanoglossus,*Tornarialarva

# Dissections:

Computer-aidedtechniquesshouldbeadoptedorshowvirtualdissectionsDissectionofedible(Prawn/Pila)invertebrateasperUGCguidelines

An“Animalalbum”containingphotographs,cutouts,withappropriatewriteupabouttheabove-mentionedtaxa. Different taxa/topicsmaybe given todifferent setsofstudents forthis purpose

**Referencebooks:**

* PracticalZoology-InvertebratesS.S.Lal
* Practical Zoology- InvertebratesP.S.Verma
* Practical Zoology-InvertebratesK.P.Kurl
* Ruppert and Barnes (2006) Invertebrate Zoology,8th Edition, Holt SaundersInternational Edition
* **Virtual LabLinks:**

# RFERENCE WEBLINKS:

* 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>

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

|  |  |  |
| --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  **Semester-II** |
| CourseCode | **TITLE OF THE COURSE**  **COURSE 3:ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES**  **Model question paper** |
| Max marks :50 |  | Time 3hrs |

1. **Identifythe followingspecimensorspotters& slides, draw neat labeleddiagrams.Write notes on------------------------------------------------------------------ 7x5=35M**
   1. Paramecium
   2. Euspongia
   3. Physalia
   4. Fasciolahepatica
   5. Ascaris
   6. Hirudinaria

7-Octopus

1. Dissectanddrawthelabeled diagramofPrawnNervous system 1x5=05M
2. PracticalRecord 1x10=10M

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  Semester-II | | | |
| CourseCode | **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 |

**CourseObjectives:**

* Tounderstandthecell and distinguishbetween prokaryotic andeukaryotic cell
* Tounderstandtheroleofdifferent cellorganellesin maintenance oflifeactivities
* To acquaint the students with the concept s ofcell division and cellcycle
* Toacquaintstudent withbasic conceptsofmolecularbiologyasto howcharacters are expressedwith acoordinatedfunctioningof replication,transcriptionandtranslation in alllivingbeings
* To acquaint the studentson the biological importanceof biomolecules.

|  |  |
| --- | --- |
| Theoverallcourseoutcome is that thestudent shall developdeeperunderstandingofwhat lifeisand how it functions at cellularlevel. This coursewill providestudents withadeep knowledgeinCellandmolecularbiologybythe completion ofthe coursethegraduate shall able to– | |
| CO1 | * Understand the basic unit of thelivingorganisms and to differentiate theorganisms bytheircellstructure. |
| CO2 | * Describe finestructureand function ofplasma membrane anddifferentcellorganellesofeukaryotic cell. |
| CO3 | * Explain the cellcycle and bioenergetics of thecell |
| CO4 | * Understand thecentraldogma ofmolecularbiologyandflowofgenetic informationfromDNAto proteins |

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

# SYLLABUS:

**UNIT– I Cell Biology-I**

* 1. Definition,history,prokaryoticandeukaryoticcells,virus,viroids,mycoplasma
  2. Electronmicroscopicstructureofanimalcell.
  3. Plasmamembrane–Models andFluidmosaicmodel
  4. Transport functionsofplasmamembrane-Active – passive- facilitated.

## Activity:Modelpreparationofcell/Assignment/StudentsSeminar/Quiz/Project/Peerteachingon the above

***Evaluation:InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheaboveactivity***

**UNIT– II Cell Biology-II**

* 1. StructureandfunctionsofGolgicomplex&Endoplasmic Reticulum
  2. StructureandfunctionsofLysosomes&Ribosomes
  3. Structureandfunctionsof Mitochondria&Centriole
  4. Structureandfunctionsof Nucleus&Chromosomes

## Activity: Model preparation of cell organelles/Assignment /Students Seminar

***/Quiz/Project/Peerteaching onthe above***

***Evaluation:InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheaboveactivity***

**UNIT– IIICell Biology-III**

* 1. Cell Division- mitosis, meiosis
  2. Cellcycle – stages-check points- regulation
  3. Abnormalcellgrowth- cancer-apoptosis
  4. Bioenergetics- Glycolysis-Krebscycle-ETS

## Activity:Modelpreparationcelldivision/Assignment/StudentsSeminar/Quiz/Project/Peerteaching/Reportwritingafter watching any video on the above

***Evaluation:InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheaboveactivity***

**UNITIV:MolecularBiology-I**

* 1. CentralDogma ofMolecularBiology
  2. Basicconceptsof-DNAreplication– Overview(Semi-conservativemechanism,Semi-discontinuous mode,Origin&Propagation ofreplication fork)
  3. Transcriptioninprokaryotes–Initiation,ElongationandTermination,Post-transcriptionalmodifications(basics)
  4. Translation –Initiation,ElongationandTermination

## Activity:Modelpreparationof DNA/Assignment/StudentsSeminar/Quiz/Project/Peerteaching/Reportwritingafter watching any video on the above

***Evaluation:InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheaboveactivity***

**UNITV: MolecularBiology-II**

* 1. GeneExpression inprokaryotes(LacOperon);GeneExpressionin eukaryotes
  2. Biomolecules- Carbohydrates (Glucose- structure-properties- biologicalimportance only)
  3. Biomolecules- Protein (Amino acid- structure-properties- biologicalimportance only)
  4. Biomolecules-Lipids(Fattyacid-structure- properties- biologicalimportance only)

## Activity:Assignment/StudentsSeminar/Quiz/Project/Peerteaching/Reportwritingafterwatching any video on the above

***Evaluation:InstructorsupposedtoprepareadetailedRubricsfortheevaluationoftheaboveactivity***

***Co-curricularactivities(Suggested)***

* Modelofanimalcell
* Workingmodel ofmitochondria to encouragecreativityamongstudents
* Photo album of scientistsofcell biology
* Chartson plasma membranemodels/cellorganelles
* Chartsoncentraldogma/lacoperon/genetic code
* Modelofsemi-conservativemodel ofDNA replication
* Powerpoint presentationofanyof the above topics bystudents
* **Referencebooks:**
* Lodish,Berk,Zipursky,Matsudaria,Baltimore,Darnell„MolecularCellBiology‟W.H.Freemanand companyNewYork.
* Cell BiologybyDeRobertis
* BruceAlberts, Molecular BiologyoftheCell
* Rastogi,Cytology
* Varma&Aggarwal,CellBiology
* C.B.Pawar,CellBiology
* Molecular BiologybyFrei fielder
* Instant Notes in Molecular BiologybyBios scientific publishersand VivaBooksPrivateLimited
* JamesD.Watson,NancyH.Hopkins„MolecularBiologyoftheGene‟

**WebLinks:**

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-POMapping:**

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

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

\*\*\*

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

**DEPARTMENT OFZOOLOGY**

**MODEL PAPERFORII SEMESTERZOOLOGY -PAPER- II**

**COURSE 4:CELL& MOLECULAR BIOLOGY**

**Time:21/2 hrs Max.Marks:50**

**Answerany THREE of thefollowing. Choosing at least one from each part.**

**Drawlabeled diagramswherever necessary 3x10=30**

**SECTION - A**

**PART- I**

* 1. Fluidmosaicmodel of Plasma Membrane.
  2. Structureandfunctionsof Mitochondria
  3. Mechanism of Apoptosis

**PART- II**

* 1. CentralDogma ofMolecularBiology
  2. GeneExpressionin eukaryotes
  3. Structure and Properties of Fatty Acids

**SECTION - B**

**Answerany FOURofthefollowing:**

**Drawlabeled diagramswherever necessary 4x5=20**

**7.** Virus

8. Ribosomes

9. Meiosis

10**.** Glycolysis

11. Initiation

12. GeneExpression

13. Amino acid- structure

BLUEPRINT

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  Semester-II | | | |
| CourseCode | **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:**
* Acquaintingand skillenhancement in theusageof laboratorymicroscope
* Hands-onexperienceof different phasesofcell division byexperimentation
* Developskillsonhumankaryotypingandidentificationofchromosomaldisorders
* To applythebasic conceptofinheritanceforapplied research
* Togetfamiliarwithphylogenyadgeologicalhistoryoforigin&evolutionofanimals

# SYLLABUS:

1. Preparation oftemporaryslides of Mitotic divisions with onion root tips
2. Observation ofvarious stages of Mitosis with prepared slides
3. Observation ofvarious stages of Meiosis with preparedslides
4. Mountingof salivarygland chromosomes ofChironomus
5. Test for carbohydrate ingiven biological sample(Benedictstest)
6. Test for Protein in givenbiological sample(Nitricacidtest-whitering)
7. Test forlipid in the givenbiological sample(Saponification test)

# RFERENCE WEB LINKS:

* https://cbi-au.vlabs.ac.in/
* https:/[/www](http://www.youtube.com/watch?v=xhnUZAyNdQk).[youtube.com/watch?v=xhnUZAyNdQk](http://www.youtube.com/watch?v=xhnUZAyNdQk)
* https:/[/www](http://www.youtube.com/watch?v=l8LXQq5_VL0).[youtube.com/watch?v=l8LXQq5\_VL0](http://www.youtube.com/watch?v=l8LXQq5_VL0)
* https:/[/www.labster.com/simulations](http://www.labster.com/simulations)
* https:/[/www.scienc](http://www.sciencecourseware.org/BiologyLabsOnline/protected/TranslationLab/index.php)e[courseware.org/BiologyLabsOnline/protected/TranslationLab/index.php](http://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>

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

|  |  |  |
| --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  Semester-II |
| CourseCode | **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”

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C:\Users\dell\Desktop\P.R LOGO.png | **Pithapur Rajah’s Govt. Degree College (A) Kakinada.** | **Program & Semester**  B.Sc. HonoursinZoology (Major)  Semester-I | | | |
| CourseCode | **TITLE OF THE COURSE**  **MultidisciplinaryCourses** PRINCIPLESOFBIOLOGICALSCIENCES |
| Teaching | Hours Allocated: 30 (**THEORY**) | L | T | P | C |
| Pre-requisites: | Basics of Zoology | 3 | 1 | - | 3 |

**MultidisciplinaryCourses**

**e.f. w.AY 202324**

**SEMESTE**

# PRINCIPLESOFBIOLOGICALSCIENCES

2hrs/week

**LearningObjectives:** Bythe endofthiscoursethelearner can:

1. Acquirelogictoevaluatefundamentalbiologicalconceptsatvariouslevelsofbiologicalorganisationincludingthemolecular,cellular,organismal andsystems levels.
2. Communicatefundamentalbiologicalknowledgebetweentiersofbiologicalorganisation.
3. Applycommonbiologicalprinciplesacrossalllevelsofbiologicalorganization.

**LearningOutcomes:** Oncompletionofthiscoursestudentswill beableto:

1. Understandthe relationshipbetweenstructureandfunctionatalllevels.
2. Recognise the mechanisms underlying biological evolution, its patterns, and itssignificance as biology'soverarchingunifyingprinciple.
3. Understand the contributions of biology to the resolution of medical, ethical, social, andenvironmentalconcerns in human affairs.

# UNIT-IDiversityof Life

* 1. IntroductiontoBiology, Branches of Biology,BasicPrinciplesofBiology
  2. Biological Classification-Two kingdom and Five kingdom classification, Viruses, Viroid’sandLichens
  3. Diversityin thelivingworld, Taxonomiccategories, Taxonomicaids
  4. Plant organization-The form, structure and function of plant vegetative and reproductiveorgans,ClassificationofPlant Kingdom,
  5. BasisofAnimalClassification,ClassificationofAnimalKingdom

# UNIT-IIBiomoleculesandmetabolisim

* 1. Ultra structure of cell and Cell organelles (Structure and Functions), Plant cell vs Animalcell
  2. Plant Physiology: Photosynthesis, Respiration, Transportation, Mechanisms of Nitrogenfixation.
  3. Plantgrowthanddevelopment,physiologyofflowering.
  4. HumanPhysiology: Digestion,Respiration,Circulation
  5. Maleandfemalereproductiveorgans,gametogenesis,fertilization.

# UNIT-IIIPrinciplesofBiology

* 1. Genetics: Mendel’s laws of inheritance, Genetic disorders- Colour blindness, Sickle cellanaemia.
  2. Evolution: Geological time scale for evolution of plants and vertebrates, Origin andevolutionof plants and man
  3. Common Human Diseases: causing organism, prevention and treatment- malaria, dengue,AIDS,cancer,corona.
  4. Common Plant Diseases: causing organism, prevention and treatment- Black spot, Leafspots,Powderymildew,Blight, Canker.
  5. Biotechnology: Tools and process of recombinant DNA technology, Applications ofbiotechnologyin agriculture, foodindustry,medicineand transgenicanimals.

# TextBooks

* + 1. Pandey, B.P.(2013)CollegeBotany,Volume-I,S. ChandPublishing,New Delhi.
    2. Kotpal,R.L.2022.Moderntextbookofzoology,Vertebrates.(RastogiPubl.,Meerut).
    3. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, EvolutionandEcology. S. Chand publishers, NewDelhi,India.

# ReferenceBooks

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

**SEMESTER – III**

**Old Pattern**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **P.R. Government College (Autonomous)**  **Kakinada** | **Program&**  **Semester**  II BZC - III | | | |
| 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   2. Multiple alleles  3.Geological time scale | 1. Provides conceptual understanding about structure of Plasma membrane  2. One of the important deviations from Mendelian Genetics  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 | 2 | 30 |
| 3. Genetics II | 1 | 2 | 20 |
| 4.Evolution | 2 | 2 | 30 |
| 5.Total | 6  Of which 3 to be  answered | 8  Of which 4 to be  answered | 100 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. Neo Darwinism

**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

1. **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
2. **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)
3. **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.
8. Stahl FW. 1965. Mechanics of Inheritance. Prentice-Hall.
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 onionroottips 10M

2. Identification of 6 spotters/Genetic Problems6X5=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/  UNDERSTANDING |
| 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.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Knowledge** |  | **Skill** |  | **Employability** |  | **Entrepreneurship** |  |

**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 | 03 | 25 |
| **4. Embryology** | 2 | 01 | 25 |
| **5.Total** | 06  Of which 3 to be answered | 8  Of which 4 to be answered | 100 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**

1. Explain mechanism of enzyme action
2. Describe the process of spermatogenesis
3. Describe in detail the development of frog up to gastrulation level?

**PART-II**

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

1. Oxygen transport
2. Cardiac cycle
3. Digestion in stomach
4. Action Potential
5. Thyroid gland
6. Classification of proteins
7. Lipid structure
8. Glucose structure
9. 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

1. Test for Ammonia 08 Marks
2. Embryology slides 2 x 5 10 Marks

a.

b.

4. Physiology Slides: 2x5 10 Marks

a.

b.

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 | 03 | 25 |
| **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 | 8  Of which 4 to be answered | 100 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**

1. Explain media preparation in detail
2. Describe the Restriction endonucleases
3. What is the application of transgenic animals and give examples?

**PART-II**

Answer any six of the following 6 x 5 = 30 Marks

1. Adaptive immunity
2. Thymus gland
3. Spleen
4. Epitope
5. Paratope
6. Tissue culture media
7. Primary cell culture
8. MABs
9. Plasmid vector

**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 V 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

1. Record 05 Marks
2. Viva Voce 05 Marks

Total 50 Marks

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

**Course Outcomes:**

|  |  |
| --- | --- |
| On Completion of the course, the students will be able to- | |
| CO1 | Students at the successful completion of this course will be able to |
| CO2 | Evaluate the present status of aquaculture attheGloballevel and National level |
| CO3 | Classifydifferenttypesofpondsused in aquaculture |
| CO4 | Demonstrate induced breedingofcarps |
| CO5 | Acquirecriticalknowledge oncommercialimportance of shrimps |

**Course with focus on employability / entrepreneurship / Skill Development modules**

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

**Syllabus:**

**Syllabus**: (Total Hours: 90 including Teaching, Lab, FieldSkillsTraining,Unit tests etc.)

**Unit: 1**

* 1. Present status of Aquaculture – Global and National scenario
  2. Major cultivable species foraquaculture:freshwater,brackish waterand marine.
  3. Traditional, extensive, modified extensive, semi-intensiveandintensiveculturesoffishandshrimp.
  4. Design and construction of fish and shrimp farms

**Unit: 2**

* 1. Functional classification of ponds– head pond, hatchery, nursery ponds
  2. Functional classification of ponds-rearing, production, stocking, and quarantine ponds
  3. Need of fertilizer in aquaculture
  4. Physio-chemicalconditions of soil and water optimum for culture
  5. (Temperature, depth, turbidity,light,water,PH, BOD, CO2andnutrients)

**Unit: 3**

* 1. Induced breedinginfishes
  2. Culture of Indian major carps: Pre-stocking management

(Dewatering, drying, ploughing/desilting; Predators, weedsandalgal blooms and theircontrol,Limingand fertilization)

* 1. Culture of Indian major carps –Stocking management
  2. CultureofIndian major carps-post-stocking management

**Unit: 4**

* 1. Commercial importanceof shrimp and prawn
  2. Macro brachiumrosenbergii-Biology, seed production.
  3. Culture ofL.vannamei– hatchery technology and culturepractices
  4. Mixed culture offish and prawns

**Unit: 5**

* 1. Viral diseases of Finfish&shell fish
  2. Fungal diseases of Fin &Shell fish
  3. Bacterial diseases of Finfish&Shell fish
  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

**WebLinks:**

1. <http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x670>8e06.htm
2. <http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf>
3. https:/[/www.notesonzoolog](http://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control-)y[.com/india/fishery/fish-diseases-symptoms-and-control-](http://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. |

|  |  |  |  |
| --- | --- | --- | --- |
| UNIT I | 2 | 01 | 15 |
| UNIT II | 1 | 02 | 20 |
| UNIT III | 1 | 03 | 25 |
| UNIT IV | 1 | 02 | 20 |
| UNIT V | 1 | 02 | 20 |
| 5.Total | 06  Of which 3 to be answered | 10  Of which 6 to be answered | 110 Marks including choice.  Of which 60 Marks to be answered |

Blue Print

|  |  |  |  |
| --- | --- | --- | --- |
| Module Name | PART I  Essay Type Questions  10 marks each | Part II Short Answer Questions  5 marks each | Marks Allotted to the Chapter |

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. Freshwater cultivable species

8. Nurserypond

9. Turbidity

10. Fertilizer in culture pond

11. Algal bloom

12. Quarantine pond

13. Vannamei

14. Macrobrachium

15. White Spot Disease

16. Dropsy

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| prgc logo png.png | **P.R Government College (Autonomous) Kakinada** | **Program & Semester**  B. Sc, BZC  Sem V  Paper VII A | | | |
|  |  |
| Course Code | **TITLE OF THE COURSE**  **Domain Subject: ZOOLOGY Semester –V**  **Course7A**:  **POSTHARVESTTECHNOLOGY OF FISH ANDFISHERIES** |
| 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 andPrinciples of fishPreservation**

1. 1 Handlingoffreshfish, storage and transport of fresh fish, postmortemchanges (rigor mortisandspoilage), 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,

fishmanure.

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

andfish 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 afterprocessing.

**UNIT V**: Quality Assurance, Management and Certification

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

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

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:

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

1. Lakshmi Prasad’s, Fish Processing Technology 2012, Arjun PublishingHouse
2. Dr Sunitha Rai, Fish Processing Technology, 2015, RandomPublications
3. [Safety and Quality Issues in Fish Processing (Woodhead Publishing Series in FoodScience,Technology and Nutrition)](https://www.amazon.in/Processing-Woodhead-Publishing-Technology-Nutrition/dp/1855735520/ref%3Dsr_1_14?dchild=1&keywords=Fish%2BProcessing%2BTechnology&qid=1625469096&s=books&sr=1-14)by H ABremner
4. 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 | PARTI  Essay TypeQuestions10marks each | PartIIShortAnswerQuestions  5markseach | Marks Allotted to  The Chapter |
| 1.Handling andPrinciples of fishPreservation | 1 | 02 | 20 |
| 2.Methodsoffish  Preservation | 1 | 02 | 20 |
| 3.Processing and preservation of fish and fish by-products | 2 | 02 | 30 |
| 4. Sanitation and Quality control | 1 | 02 | 20 |
| 5. Quality Assurance, Managementand Certification  Certification | 1 | 02 | 20 |
| Total | 06  Ofwhich3tobeanswered | 10  Ofwhich6tobeanswered | 110 Marks  Including choice.  Ofwhich60  Marksto beanswered |

**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**

1. Write an essay on various fish by-products
2. Write an essay on Seafood Quality Assurance Systems.
3. Explain various environmental hygiene practices followed in processing plants

**Part–II**

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

1. Handling of fresh fish
2. Postmortem Changes
3. Reasons for spoilage of fishes
4. Canning
5. Smoking offish
6. Fish Oils
7. Good Laboratory Practices
8. Seaweeds
9. Preprocessing control of quality
10. 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

3. Collection of web resources on the Quality assurance, quality control measures in Aqua Industries- cross checking the standards during the visit to any processing units.

4. Assignments, Seminar, Group discussion. Quiz, Collection of Material, invited lecture, Video preparation etc.of above listed practicals)

**Part – II**

### REFERENCES:

1. Dr Sunitha Rai, Fish Processing Technology, 2015, RandomPublications
2. <https://ecourses.icar.gov.in/e-Leaarningdownload3_new.aspx?Degree_Id=03>
3. <https://vikaspedia.in/agriculture/fisheries/post-harvest-and-marketing/processing-in-fisheries/fermented-products>
4. <https://krishi.icar.gov.in/jspui/bitstream/123456789/20500/1/Fermentation%20technology%20for%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](https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf)
7. [%20drying%20and%20packing%20of%20fish.pdf](https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf)
8. [https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual\_Hygienic](https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf)
9. [%20drying%20and%20packing%20of%20fish.pdf](https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf)
10. <https://agritech.tnau.ac.in/fishery/fish_byproducts.html>
11. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5352841/>
12. <http://www.fao.org/3/i1136e/i1136e.pdf>
13. <http://www.fao.org/3/x5989e/X5989e01.htm#What%20is%20sensory%20assessment>)

Web resources suggested by the teacher concerned and the college librarian including reading material.

### Co-Curricular Activities

1. **Mandatory:** *(Lab/field training of students by teacher (lab 10 + field05):*
2. For Teacher: Training of students by the teacher in laboratory/field for notlessthan15hourson 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 aquaproducts.
3. 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.
4. Max marks for Fieldwork/Project work Report:05.
5. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations made, findings andacknowledgements*
6. (IE): Unittests,

### Suggested Co-CurricularActivities

1. Observation of fish/shrimp processing plants – visit web sites ofprocessing companies and recordthe details of thatUnit
2. Interaction with local fishermen to know the method of preservation and details with the available traditionaltechnology
3. Collection of web resources on the Quality assurance, quality control measures in Aqua Industries- cross checking the standards during the visit to any processingunits.
4. Assignments, Seminar, Group discussion. Quiz, Collection of Material, invited lecture, Videopreparationetc

**LIST OF EXAMINERS**

|  |  |  |  |
| --- | --- | --- | --- |
| S. No | NameoftheExaminers | Subject | Nameofthe College |
| 1 | Dr. PJOHNKIRAN | ZOOLOGY | GDCPERUMALLAPURAM |
| 02 | M.VASANTHA LAKSHMI | ZOOLOGY | ASDCOLLEGE, KAKINADA |
| 03 | Dr. M. VIJAYAKUMAR | ZOOLOGY | SRRGDCVIJAYAWADA |
| 04 | P. JAYA | ZOOLOGY | VSKCOLLEGE,VIZAG |
| 05 | K.USHARANI | ZOOLOGY | ARTSCOLLLGERAJAHMUNDRY |
| 06 | N.SUNEETHA | ZOOLOGY | SRRGDC,VIJAYAWADA |
| 07 | Dr. R. INDIRA | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 08 | V. SANDHYA | ZOOLOGY | GDC,KAIKALURU |
| 09 | V.V. PADMAVATHI | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 10 | K.BABU | ZOOLOGY | GOVERNEMTNARTSCOLLEGERAJAHMUNDRY |
| 11 | DR.R.P.DATTU | ZOOLOGY | GDCTIRUVURU |
| 12 | DR.I SCHAKRAPANI | ZOOLOGY | GDCVIDAVALURU |
| 13 | DR.GSRINIVAS | ZOOLOGY | GDCKARNOOL |
| 14 | MADHAVIRANI | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 15 | S. MADHAVI | ZOOLOGY | ASDCOLLEGEKAKINADA |
| 16 | K. RAMARAO | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 17 | Dr.T.SAMUELDAVIDRAJ | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 18 | P.R.VANI | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 19 | K. SAMBASIVARAO | ZOOLOGY | GDCMYLAVARM |
| 20 | G.VANI | ZOOLOGY | GDCTADEPALLIGUDEM |

**DEPARTMENTOFZOOLOGY**

**Lecturerincharge-DeptofZoology**

***LISTOFQUESTIONPAPERSETTERS***

|  |  |  |  |
| --- | --- | --- | --- |
| S.N  o | NameoftheExaminers | Subject | Nameofthe College |
| 1 | P. JOHNKIRAN | ZOOLOGY | GDCPERUMALLAPURAM |
| 02 | MVASANTHA LAKSHMI | ZOOLOGY | ASDCOLLEGE, KAKINADA |
| 03 | M.VIJAYAKUMAR | ZOOLOGY | SRRGDCVIJAYAWADA |
| 04 | P.JAYA | ZOOLOGY | VSKCOLLEGE,VIZAG |
| 05 | K.USHARANI | ZOOLOGY | ARTSCOLLLGERAJAHMUNDRY |
| 06 | N.SUNEETHA | ZOOLOGY | SRRGDC,VIJAYAWADA |
| 07 | R.INDIRA | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 08 | V. SANDHYA | ZOOLOGY | GDC,KAIKALURU |
| 09 | V.V. PADMAVATHI | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 10 | KBABU | ZOOLOGY | GOVERNEMTNARTSCOLLEGERAJAHMUNDRY |
| 11 | DRRPDATTU | ZOOLOGY | GDCTIRUVURU |
| 12 | DR.ISCHAKRAPANI | ZOOLOGY | GDCVIDAVALURU |
| 13 | DR.GSRINIVAS | ZOOLOGY | GDCKARNOOL |
| 14 | MADHAVIRANI | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 15 | S. MADHAVI | ZOOLOGY | ASDCOLLEGEKAKINADA |
| 16 | K RAMARAO | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 17 | TSAMUELDAVIDRAJ | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 18 | PRVANI | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 19 | K SAMBASIVARAO | ZOOLOGY | GDCMYLAVARM |
| 20 | GVANI | ZOOLOGY | GDCTADEPALLIGUDEM |

**Lecturer in charge**

**Department of Zoology & Aquacultur**

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 | Percentage 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 heart 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

Syllabus for

ENVIRONMENTAL EDUCATION



# ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

(A Statutory body of the Government of Andhra Pradesh)

3rd, 4th and 5thfloors, Neeladri Towers, Sri Ram Nagar, 6th Battalion Road, Atmakur (V), Mangalagiri (M), Guntur-522 503, Andhra Pradesh

**Web**: [www.apsche.org](http://www.apsche.org/) **Email**: [acapsche@gmail.com](mailto:acapsche@gmail.com)

## SYLLABUS OF

ENVIRONMENTAL EDUCATION

## AS PART OF LIFE SKILLS COURSES

**UNDER CBCS FRAMEWORK WITH EFFECT FROM2020-21**

**PROGRAMME: FOUR-YEAR UG HONOURSPROGRAMME**

**AP State Council of HigherEducation**

**Revised Syllabus under CBCSPattern**

(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 integralpart ofnature.
2. Realize the importance of environment, the goods and services of a healthy biodiversity, dependence of humans onenvironment.
3. Evaluate the ways and ill effects of destruction of environment, population explosion on ecosystems and global problems consequent to anthropogenicactivities.
4. Discuss the laws/ acts made by government to prevent pollution, to protect biodiversity and environment as awhole.
5. Acquaint with international agreements and national movements, and realize citizen’s role in protecting environment andnature.

## Unit 1: Environmentand NaturalResources 06Hrs.

1. Multidisciplinary nature of environmental education; scope andimportance.
2. Man as an integral product and part of theNature.
3. A brief account of land, forest and waterresources in India and theirimportance.
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 degradationandimpacts 10Hrs

1. Human population growth and its impacts on environment; land use change, land degradation, soil erosion anddesertification.
2. Use and over-exploitation of surface and ground water, construction of dams, floods, conflicts over water (withinIndia).
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 andinfluences.
5. A brief account of air, water, soil and noise pollutions; Biological, industrial and solid wastes in urban areas. Human health and economicrisks.
6. Green house effect - global warming; ocean acidification, ozone layer depletion, acid rains and impacts on human communities andagriculture.
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: Conservationof 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 sourcesof energy.
3. Solid waste management: Control measures of urban and industrialwaste.
4. Conservation of biodiversity: In-situ and ex-situ conservation ofbiodiversity.
5. Environment Laws: Environment Protection Act; Act; Wildlife Protection Act;Forest ConservationAct.
6. International agreements: Montreal and Kyoto protocols; Environmental movements: Bishnois of Rajasthan, Chipko, Silentvalley.

## 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/Agriculturalsite.
  3. Study of common plants, insects, birds and basic principles ofidentification.
  4. Study of simple ecosystems‐forest, tank, pond, lake,mangrovesetc.
  5. Case study of a Forest ecosystem or a pondecosystem.

## Suggested text book :

* ErachBarucha (2004) *Text book of Environmental Studies for Undergraduatecourses*

(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*. AcademicPress.
* 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 Scienceand Conservation.* S. Chand Publishing, NewDelhi.
* Sengupta, R. (2003) Ecology and economics: An approach to sustainabledevelopment. 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=20Marks)

(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 **10marks**

(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 information.

**POULTRY FARMING**



## ANDHRAPRADESHSTATECOUNCILOFHIGHEREDUCATION

(AStatutorybodyoftheGovernment ofAndhraPradesh)

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

**Web**:[www.apsche.org](http://www.apsche.org/)**Email**:[acapsche@gmail.com](mailto:acapsche@gmail.com)

**SYLLABUSOF**

# POULTRYFARMING

### AS PART OF SKILL DEVELOPMENT COURSESUNDERCBCSFRAMEWORKWITHEFFECTFROM2020-2021

**PROGRAMME:FOUR-YEARUGHONOURS PROGRAMME**

**A.P.STATECOUNCILOFHIGHEREDUCATION**

BA,B Com&B ScProgrammes

RevisedCBCSw.e.f.2020-21

## SKILLDEVELOPMENTCOURSES

To beOfferedfromSemestersItoIV

## ZOOLOGYSTREAM

Syllabusof

# POULRYFARMING

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

### LearningOutcomes:

Bysuccessful completion of thecourse,students will beable to;

1. Understandthefieldlevelstructureandfunctioningofinsurancesectorand it’sroleinprotectingtherisks
2. Comprehendpertainingskills andtheirapplicationforpromotinginsurance coverage
3. PreparebetterfortheInsurance AgentexaminationconductedbyIRDA
4. Plan‘promotinginsurancecoveragepractice’ asoneofthecareeroptions.

### SYLLABUS:

**SectionI (IntroductiontoPoultry Farming):10Hrs**

* 1. General introduction to poultry farming -Definition of Poultry; Past and present scenario ofpoultryindustryin India.
  2. Principlesofpoultryhousing. Poultryhouses. Systemsofpoultryfarming.
  3. Managementofchicks,growersandlayers.ManagementofBroilers.
  4. Preparationofprojectreportforbankingandinsurance

### SectionII(FeedandLivestockHealthManagement):10Hrs

* 1. Poultryfeedmanagement–Principlesoffeeding,Nutrientrequirementsfordifferentstagesoflayersand broilers.Feed formulationandMethodsoffeeding.
  2. Poultrydiseases–viral,bacterial,fungalandparasitic(twoeach);symptoms,controlandmanagement;Vaccinationprogramme.

### SectionIII(Harvestingof EggsandSanitation):10Hrs

* 1. Selection,careandhandlingofhatchingeggs.Eggtesting.Methodsofhatching.
  2. Broodingandrearing.Sexingofchicks.
  3. FarmandWaterHygiene,Recyclingofpoultrywaste.

### Co-curricularActivities Suggested:(4hrs)

1. Groupdiscussion&SWOTanalysis
2. Visit to apoultryfarm
3. Invited Lectures byConcernedofficersofgovernmentorprivatefarms
4. CheapandHealthyFeedpreparationbystudentsbasedongovernmentstandards
5. Market studyand Survey(Monitoringofdailypricehike in poultrymarket and analysis)
6. OnlineSwayamMoocs courseon poultryfarming (seereference9 below)

### Referencebooks:

1. Sreenivasaiah.,P. V.,2015. Textbookof PoultryScience. 1st Edition.Write &PrintPublications,New Delhi
2. 2.JullA.Morley,2007.SuccessfulPoultryManagement.2ndEdition.BiotechBooks,New Delhi"
3. HurdM. Louis,2003.ModernPoultryFarming.1stEdition.International BookDistributingCompany,Lucknow."
4. LifeandGeneralInsuranceManagement,"
5. Financialservices,TataMcGrawhill
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>

**MODELQUESTIONPAPER&PATTERN**

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

**SECTIONA**(Total: 4x5=20Marks)

(Answer any **four questions**. Each answer carries **5 marks(Atleast1question shouldbegivenfromeachUnit)**

|  |  |
| --- | --- |
| 1. | Poultryhouse |
| 2. | Broilers |
| 3. | Anytwo viral diseases ofpoultry |
| 4. | Anytwo bacterialdiseases ofpoultry |
| 5. | Anytwofungaldiseases of poultry |
| 6. | Eggtesting |
| 7. | Brooding |
| 8. | Sexingchicks |

**SECTIONB** (Total:3x10=30Marks)(Answer any**threequestions**.Each answercarries**10marks**

**(Atleast1questionshouldbegivenfromeachUnit)**

|  |  |
| --- | --- |
| 1. | Discussbrieflythe past,presentand futurescenario ofpoultryfarmingindustryinIndia. |
| 2. | Explain principles ofpoultryhousingin detail, with examples. |
| 3. | Writean essayonviral diseases of poultry. |
| 4. | Givean account of fungal and bacterial diseases (anytwo each)ofpoultry |
| 5. | Writean essayon selection, handlingandhatchingofeggs. |

@@@@@

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.*

3. Dairy Technology



## ANDHRAPRADESHSTATECOUNCILOFHIGHEREDUCATION

(AStatutorybodyoftheGovernment ofAndhraPradesh)

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

**Web**:[www.apsche.org](http://www.apsche.org/)**Email**:[acapsche@gmail.com](mailto:acapsche@gmail.com)

**SYLLABUSOF**

# DAIRYTECHNOLOGY

### AS PART OF SKILL DEVELOPMENT COURSES

### UNDER CBCS FRAME WORK WITH EFFECT FROM 2020-2021

**PROGRAMME:FOUR-YEAR UG HONOURS PROGRAMME**

**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

### LearningOutcomes:

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

1. Understandthepre-requisites forstartingaDairyfarm
2. Recognizedifferent breedsof Cows&buffaloes followingsafetyprecautions.
3. Prepareandgiverecommendedfeedandwaterforlivestock
4. Maintain health of livestock alongwith productivity
5. Vaccinationofcattle,nutrientsrequirements
6. Entrepreneurship i.e.,Effectivelymarket dairyproducts
7. Ensure safe and clean dairy farm and Standard safety measures to be taken in establishingam industry
8. Efficientlystart and manageto establish or develop aDairyIndustry

### SYLLABUS:

**SectionI (Introduction and Establishment of a Dairy Farm): 05 Hrs**

* 1. Dairydevelopment inIndia–DairyCooperatives(NDRI,NDDB,TCMPF)(1hr)
  2. ConstraintsofPresent DairyFarmingandFutureScopeof DairyFarmer.(1 hr)
  3. Selectionofsitefordairyfarm;Systemsofhousing–Loosehousingsystem,ConventionalDairyFarm;Recordstobemaintainedin a dairyfarm.(2 hrs)

### SectionII(LivestockIdentification andManagement):13Hrs

* 1. BreedsofDairyCattleandBuffaloes–IdentificationofIndiancattleandbuffalobreedsandExoticbreeds; MethodsofselectionofDairyanimals. (5 hrs)
  2. Systemsofinbreedingandcrossbreeding.(2hrs)
  3. Weaningofcalf,Castration,Dehorning,DewormingandVaccinationprogramme(3hrs)
  4. Careandmanagementofcalf,heifer,milkanimal,dryandpregnantanimal,bullsandbullocks. (3hrs)

### SectionIII(FeedManagement, DairyManagement,CleaningandSanitation):8Hrs

* 1. Basic Principles of Feed, Important Feed Ingredients, Feed formulation and FeedMixing(2hrs)
  2. OperationFlood–DefinitionofMilkandNutritivevalueofmilkandICMRrecommendation of nutrients–Per Capita Milk production and availability inIndiaandAndhraPradesh-MethodsofCollectionandStorageofMilk–LabellingandStorageof milk products(4 hrs)
  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>

### ModelFormatforQuestionPaper:

**MODELQUESTIONPAPER&PATTERN**

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

**SECTIONA**(Total: 4x5=20Marks)

(Answer any **four questions**. Each answer carries **5 marks(Atleast1question shouldbegivenfromeachUnit)**

|  |  |
| --- | --- |
| 1. | ConventionalDairyFarm |
| 2. | AnimalInbreeding |
| 3. | Sanitation of DairyFarm |
| 4. | Dairy development tinIndia |
| 5. | Feed Mixing |
| 6. | Deworming |
| 7. | Milk Storage Methods |
| 8. | Identification ofcharacters of any Two Dairy cattle |

**SECTIONB** (Total:3x10=30Marks)(Answer any**threequestions**.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,Atmakur (V), Mangalagiri(M), Guntur-522 503, AndhraPradesh

**Web**:[www.apsche.org](http://www.apsche.org/)**Email**:[acapsche@gmail.com](mailto:acapsche@gmail.com)

**SYLLABUSOF**

**HEALTHANDHYGIENE**

**ASPARTOFLIFESKILLSCOURSES**

**UNDERCBCSFRAMEWORKWITHEFFECT FROM2020-21**

**APSCHE/LifeSkill Course/HEALTH&HYGIENE IVSemester/ Optional**

(Totalteachinghours–30 Hrs.@ 02Hrs. perWeek)

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. Attheend ofthe coursethestudent shall be able to understand–

* theimportanceofhealthandhygieneinlife
* the importanceof nutrition forahealthylife
* 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, mental status andphysicalactivities on health
* To introduce different community-based mobile apps on health to student and therebyto thecommunity

**Learning/CourseOutcomes:**On completionofthiscourse, thestudentswillbeabletounderstand-

* Whatis a healthydiet
* 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 mediaviz.,mobileapps

**UnitI:BasicsofNutrition 10 Hrs.**

1. Nutrition–definition,importance,Goodnutritionandmalnutrition;BalancedDiet:BasicsofMeal Planning
2. Carbohydrates–functions,dietarysources, effectsofdeficiency.
3. Lipids–functions, dietary sources, effects of deficiency.
4. Proteins–functions,dietarysources,effectsofdeficiency.
5. Brief account of Vitamins**-**functions, food sources, effects of deficiency,
6. Macro and micro minerals **–**functions, effects of deficiency; food sources of Calcium,Potassiumand Sodium;foodsources ofIron,IodineandZinc
7. Importance of water–functions, sources, requirement and effects of deficiency.

**UnitII:Health 10 Hrs.**

1. Health - Determinants of health, Key Health Indicators, Environment health & Publichealth;Health-Education: Principles and Strategies
2. 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
3. NationalHealthMission:NationalRuralHealthMission(NRHM)Framework,NationalUrbanHealthMission(NUHM) Framework
4. 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)
5. DisasterManagement–Containment,ControlandPreventionofEpidemicsandPandemics– Acts, Guidelines andRoleofGovernment and Public

**UnitIII:Hygiene 10 Hrs.**

1. Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH(**WA**ter,**S**anitation and**H**ygiene) programme
2. Rural Community Health:Village health sanitation & Nutritional committee (Roles& Responsibilities);AboutAccreditedSocialHealthActivist(ASHA); VillageHealthNutrition Day, Rogi Kalyan Samitis
3. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Publicplaces
4. 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](http://www.euro.who.int/__data/assets/pdf_file/0011/261929/Health-in-Impact-Assessments-final-version.pdf?ua=1)

* + WASH<https://www.unicef.org/wash/>and<https://www.unicef.org/wash/files/UNICEF_Strategy_for_WASH_2016_2030.PDF>
  + HealthyLiving<https://www.nhp.gov.in/healthylivingViewall>

**LIST OF EXAMINERS**

|  |  |  |  |
| --- | --- | --- | --- |
| S. No | NameoftheExaminers | Subject | Nameofthe College |
| 1 | Dr. P JOHNKIRAN | ZOOLOGY | GDCPERUMALLAPURAM |
| 02 | M.VASANTHA LAKSHMI | ZOOLOGY | ASDCOLLEGE, KAKINADA |
| 03 | Dr. M. VIJAYAKUMAR | ZOOLOGY | SRRGDCVIJAYAWADA |
| 04 | P. JAYA | ZOOLOGY | VSKCOLLEGE,VIZAG |
| 05 | K.USHARANI | ZOOLOGY | ARTSCOLLLGERAJAHMUNDRY |
| 06 | N.SUNEETHA | ZOOLOGY | SRRGDC,VIJAYAWADA |
| 07 | Dr. R. INDIRA | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 08 | V. SANDHYA | ZOOLOGY | GDC,KAIKALURU |
| 09 | V.V. PADMAVATHI | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 10 | K.BABU | ZOOLOGY | GOVERNEMTNARTSCOLLEGERAJAHMUNDRY |
| 11 | DR.R.P.DATTU | ZOOLOGY | GDCTIRUVURU |
| 12 | DR.I SCHAKRAPANI | ZOOLOGY | GDCVIDAVALURU |
| 13 | DR.GSRINIVAS | ZOOLOGY | GDCKARNOOL |
| 14 | MADHAVIRANI | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 15 | S. MADHAVI | ZOOLOGY | ASDCOLLEGEKAKINADA |
| 16 | K. RAMARAO | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 17 | Dr.T.SAMUELDAVIDRAJ | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 18 | P.R.VANI | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 19 | K. SAMBASIVARAO | ZOOLOGY | GDCMYLAVARM |
| 20 | G.VANI | ZOOLOGY | GDCTADEPALLIGUDEM |

**DEPARTMENTOFZOOLOGY**

**Lecturerincharge-DeptofZoology**

***LIST OF QUESTIONPAPER SETTERS***

|  |  |  |  |
| --- | --- | --- | --- |
| S.N  o | NameoftheExaminers | Subject | Nameofthe College |
| 1 | P. JOHNKIRAN | ZOOLOGY | GDCPERUMALLAPURAM |
| 02 | MVASANTHA LAKSHMI | ZOOLOGY | ASDCOLLEGE, KAKINADA |
| 03 | M.VIJAYAKUMAR | ZOOLOGY | SRRGDCVIJAYAWADA |
| 04 | P.JAYA | ZOOLOGY | VSKCOLLEGE,VIZAG |
| 05 | K.USHARANI | ZOOLOGY | ARTSCOLLLGERAJAHMUNDRY |
| 06 | N.SUNEETHA | ZOOLOGY | SRRGDC,VIJAYAWADA |
| 07 | R.INDIRA | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 08 | V. SANDHYA | ZOOLOGY | GDC,KAIKALURU |
| 09 | V.V. PADMAVATHI | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 10 | KBABU | ZOOLOGY | GOVERNEMTNARTSCOLLEGERAJAHMUNDRY |
| 11 | DRRPDATTU | ZOOLOGY | GDCTIRUVURU |
| 12 | DR.ISCHAKRAPANI | ZOOLOGY | GDCVIDAVALURU |
| 13 | DR.GSRINIVAS | ZOOLOGY | GDCKARNOOL |
| 14 | MADHAVIRANI | ZOOLOGY | ST. THERESSACOLLEGE,ELURU |
| 15 | S. MADHAVI | ZOOLOGY | ASDCOLLEGEKAKINADA |
| 16 | K RAMARAO | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 17 | TSAMUELDAVIDRAJ | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 18 | PRVANI | ZOOLOGY | VSKCOLLEGE,VISHAKAPATNAM |
| 19 | K SAMBASIVARAO | ZOOLOGY | GDCMYLAVARM |
| 20 | GVANI | ZOOLOGY | GDCTADEPALLIGUDEM |

**Lecturer in charge**

**Department of Zoology & Aquacul**

**Thank you**