# ST.JOSEPH’S COLLEGE FOR WOMEN(A),VISAKHAPATNAM

# IV SEMESTER ZOOLOGY TIME:5HRS/WEEK

Z 4503 (3) **ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY** MARKS:100

w.e.f. 2020-2021 (20AH) **SYLLABUS**

# LEARNINGOBJECTIVES: To enable the students to

* Understand the various aspects of physiological systemsand their functioning inanimals.
* Instill the concept of hormonal regulation of physiology, metabolism andreproductioninanimals.
* Gain insight on thedisordersassociatedwith thedeficiencyofhormones
* Gaininsightfulknowledgeonthestructureandclassificationofcarbohydrates,proteins, lipids andenzymes
* Demonstrate an understanding of fundamental biochemical principles suchas the function of biomolecules, metabolic pathways and the regulation ofbiochemicalprocesses.
* Gain comprehensive knowledge on the concepts of vertebrate embryonic development.

# COURSEOUTCOMES: By the end of the course, students will be able to

**CO1**Understandthefunctionsofimportantanimalphysiologicalsystemsincludingdigestion,cardio-respiratory and renalsystems.

**CO2** Gain insight into the muscular system and the neuro -endocrine regulation of animalgrowth,developmentandmetabolismwithaspecialknowledgeofhormonalcontrolofhumanreproduction.

**CO3**Describethestructure,classificationandchemistryofbiomoleculesandenzymesresponsiblefor sustenanceof lifein living organisms

**CO4**Developbroadunderstandingof thebasicmetabolicactivitiespertainingtothecatabolismand anabolism of variousbiomolecules

**CO5**Describethekeyeventsinearlyembryonicdevelopmentstartingfromthe formationofgametes upto gastrulation and formationofprimary germlayers.

# UNIT- I: ANIMALPHYSIOLOGY -I

* 1. Processofdigestionandassimilation
  2. Respiration - Pulmonary ventilation, transport of oxygen and CO2(Note:Need not study cellularrespirationhere)
  3. Circulation-Structureand functioning of heart, Cardiaccycle
  4. Excretion - Structure and functions of kidney urine formation,countercurrent Mechanism

# UNIT- II: ANIMALPHYSIOLOGY-II

* 1. Nerve impulse transmission –Restingmembranepotential,originandpropagation ofactionpotentialsalongmyelinatedandnon-myelinated nervefibers, Synaptic transmission.
  2. Muscle contraction - Ultra structure of skeletal muscle, molecular and chemicalbasisof musclecontraction.
  3. Endocrine glands - Structure, functions of hormones of pituitary, thyroid,parathyroid,adrenal glands andpancreas
  4. Hormonalcontrolof reproductioninamammal

# UNIT- III: CELLULARMETABOLISM–I(BIOMOLECULES)

* 1. Carbohydrates-Classificationofcarbohydrates.Structureofglucose
  2. Proteins-Classificationofproteins.Generalpropertiesof aminoacids
  3. Lipids-Classificationoflipids
  4. Enzymes:ClassificationandMechanismofAction

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# UNIT- IV: CELLULARMETABOLISM –II

* 1. Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron TransportChain, Glycogen metabolism, Gluconeogenesis
  2. LipidMetabolism–β-oxidationofpalmiticacid
  3. Proteinmetabolism-Transamination,DeaminationandUreaCycle

# UNIT–V: EMBRYOLOGY

* 1. Gametogenesis
  2. Fertilization
  3. Typesofeggs
  4. Typesofcleavages

5.5DevelopmentofFrog uptoformation of primarygermlayers

# CO-CURRICULARACTIVITIES (SUGGESTED):

* Chartoncardiaccycle,humanlung, kidney/nephronstructureetc.
* Workingmodelof human/anymammalianheart.
* Chartofsarcomere/location ofendocrineglands inhumanbody
* Chartaffixingofphotosofpeoplesufferingfromhormonaldisorders
* Student study projects such as identification of incidence of hormonal disorders in thelocalprimaryhealthcentre,studyingthereasonsthereofandmeasurestocurboranyotheras the lecturer feelsgood innurturing health awarenessamongstudents
* Chartonstructuresofbiomolecules/typesofaminoacids(essential landnon-essential)ChartpreparationbystudentsonGlycolysis/kreb‟scycle/ureacycleetc.
* Modelofelectrontransportchain
* Preparationofmodelsof differenttypesofeggsinanimals
* Chartonfrogembryonic development,fatemapof frogblastula,cleavageetc.

**REFERENCEBOOKS:**

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.Saunders

Co.,Philadelphia.

1. Goel KA and Satish KV. 1989. A Text Book of Animal Physiology, RastogiPublications,Meerut, U.P.
2. HoarWS.GeneralandComparative Physiology.Prentice Hall ofIndia,NewDelhi.
3. Lehninger AL. Nelson and Cox. Principles of Biochemistry. Lange MedicalPublications,New Delhi.
4. Prosser CL and Brown FA. Comparative Animal Physiology. W.B. SaundersCompany,Philadelphia.
5. DevelopmentalBiologybyBalinksy
6. DevelopmentalBiologybyGerardKarp
7. ChordateembryologybyVarma andAgarwal
8. EmbryologybyV.B.Rastogi
9. Austen CR and Short RV. 1980. Reproduction in Mammals. Cambridge UniversityPress.
10. Gilbert SF. 2006. Developmental Biology, 8th Edition. Sinauer Associates Inc.,Publishers,Sunderland,USA.
11. LongoFJ.1987.Fertilization.Chapman&Hall,London.
12. Rastogi VB and Jayaraj MS. 1989. Developmental Biology.KedaraNath Ram NathPublishers,Meerut, UttarPradesh.
13. Schatten H and Schatten G. 1989. Molecular Biology of Fertilization. AcademicPress,NewYork.

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ST.JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

IV SEMESTER **ZOOLOGY**  TIME:2HRS/WEEK

Z4553 (2) **ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY** MARKS:50

w.e.f. 2020-2021 (20AH) **PRACTICALS**

**LEARNINGOBJECTIVES:To enable the students to**

* + Develop skill in Identificationofanorgansystemwithhistologicalstructure
  + Identify the various biomolecules of tissues by simple colorimetric methods andalsoquantitative methods.
  + Identify and illustrate the differentstagesofearlyembryonicdevelopmentinanimals
  + Develop basic laboratory skills in the field of Physiology

**COURSE OUTCOMES:**By the end of the course, students will be able to

CO1. Perform physiology experiments following standard protocol.

CO2. Summarize the different developmental stages in frog.

CO3. Develop collaborative working skills.

CO4.Identify and discuss the structure of various organs.

# ANIMALPHYSIOLOGY

* 1. Qualitativetestsforidentification ofcarbohydrates,proteins andfats.
  2. Studyofactivity ofsalivaryamylaseunderoptimumconditions.
  3. T.S.ofduodenum,liver,lung,kidney, spinalcord,boneandcartilage
  4. L.S.of heart

# CELLULARMETABOLISM

* 1. Estimation of total proteinsin given solutionsbyLowry‟smethod.
  2. Estimationoftotal carbohydrateby Anthronemethod.
  3. Qualitativetestsforidentificationofammonia,ureaanduricacid.
  4. Structure of cardiac muscle, smooth muscle.

# EMBRYOLOGY

1. T.S. of testis&ovary ofamammal
2. Study of different stages of cleavages(2,4,8cellstages) of frog.
3. Constructionoffatemapoffrogblastula.

# REFERENCEBOOKS:

* + Harper‟sIllustratedBiochemistry
  + Cellandmolecularbiology:Concepts & experiments.VIEd. John Wiley&sons.Inc.
  + LabManualon BloodAnalysis andMedical Diagnostics,S. ChandandCo.Ltd.
  + LaboratorytechniquesbyPlummer.

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