



Government Degree College Eturnagaram, Dist: Mulugu, Telangana.

Department of Zoology

Kakatiya University framed the syllabus every year for the UG. The syllabus includes theory and practical classes for the Department of Zoology. Rules and Regulations along with the "Credit Points" prepared by University to complete the course.

Academic year 2016-17

1. I Year CBCS System- Semester I – Animal Diversity Invertebrates
Semester II- Ecology and Zoogeography
2. II Year Non – CBCS System- Biology of Chordates, Embryology, Ecology and Zoogeography
3. III Year Non – CBCS System- Animal Physiology, Genetics and Evolution.

Academic year 2017-18

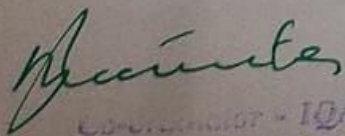
1. I Year CBCS System- Semester- I - Animal Diversity Invertebrates
Semester II- Ecology and Zoogeography
2. II Year CBCS System- Semester III- Animal Diversity Vertebrates
Semester IV- Cell and Molecular Biology, Genetics
3. III Year Non – CBCS System- Animal Physiology, Genetics and Evolution.

Academic year 2018 -19

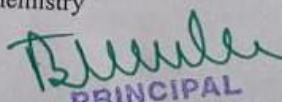
1. I Year CBCS System- Semester I - Animal Diversity Invertebrates
Semester II- Animal Diversity Vertebrates
2. II Year CBCS System- Semester III- Ecology and Zoogeography
Semester IV- Cell and Molecular Biology, Genetics
3. III Year CBCS- System- Semester V-Paper1- Animal Physiology and Biochemistry
Semester V-Paper2- Applied Zoology
Semester VI- Paper1- Immunology and Animal Biotechnology
Semester VI- Paper 2 – Aquatic Biology

Academic year 2019-20

1. I Year CBCS System- Semester I - Animal Diversity Invertebrates
Semester II- Animal Diversity Vertebrates
2. II Year CBCS System- Semester III- Ecology and Zoogeography
Semester IV- Cell and Molecular Biology, Genetics
3. III Year CBCS System- Semester V-Paper1- Animal Physiology and Biochemistry



Govt. Degree College, Eturnagaram
Dist: Mulugu - Telangana State.


PRINCIPAL
Government Degree College
ETURNAGARAM
Mulugu Dist-506165



Semester V-Paper 2- Applied Zoology
Semester VI- Paper1- Immunology and Animal Biotechnology
Semester VI- Paper 2 – Aquatic Biology

Academic year 2020-21

1. I Year CBCS System- Semester I - Animal Diversity Invertebrate
Semester II- Animal Diversity Vertebrates
2. II Year CBCS System- Semester III -- Enzymology and Animal Physiology
Semester IV- Cell and Molecular Biology, Genetics
3. III Year CBCS System- Semester V- Paper 1- Animal Physiology and Biochemistry
Semester V-Paper 2- Fisheries
Semester VI Paper 1- Immunology and Animal Biotechnology
Semester VI Paper 1- Aquatic Biology

Academic year 2021-22

1. I Year CBCS System- Semester I - Animal Diversity Invertebrate
Semester II- Animal Diversity Vertebrates
2. II Year CBCS System- Semester III -- Enzymology and Animal Physiology
Semester IV- Cell and Molecular Biology, Genetics

SEC (Skill Enhancement Course)- Any 2 papers in III & 2 papers in IV semester

- i. Sericulture
 - ii. Apiculture
 - iii. Public Health and Hygiene
 - iv. Medical Diagnosis
 - v. Poultry and Animal Husbandry
 - vi. Vermiculture
 - vii. Vector Biology
 - viii. Biomaterial from Animal Sources
 - ix. Aquaculture
 - x. Aquarium Fish Keeping
3. III Year CBCS System- Semester V- Paper 1- Immunology and Animal Biotechnology
Semester V- Integrated pest Management/ preventive Medicine
Semester VI-Paper 2- Ecology and Zoogeography and Evolution
Semester VI Tools and Technique in Biology

Barinder
Co-ordinator - IQAC
Govt. Degree College, Etur Nagaram
Dist: Mulugu - Telangana State,

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PRINCIPAL
Government Degree College
ETURNAGARAM
Mulugu Dist-506165

KAKATIYA UNIVERSITY, WARANGAL - 506 009
B.Sc. PROGRAMME
Under CBCS System
Scheme wef A.Y: 2019-20

FIRST YEAR

SEMESTER - I

Code	Course category	Title of the Paper	No. of Credits	Hrs PW	Max. Marks			Total Marks
					Internal Exam	End Exam	Lab	
BS101	AECC-1	Environmental Science	2	2	10	40	-	50
BS102	FL-1A	English	4	4	20	80	-	100
BS103	SL-1A	Second Language	4	4	20	80	-	100
BS104	DSC-1A	Optional - I	4	4	20	80	25	125
		Optional – I Lab	1	3				
BS105	DSC-2A	Optional– II	4	4	20	80	25	125
		Optional – II LAB	1	3				
BS106	DSC-3A	Optional – III	4	4	20	80	25	125
		Optional – III LAB	1	3				
		TOTAL:	25	-	110	440	75	625

SEMESTER – II

Code	Course category	Title of the Paper	No. of Credits	Hrs PW	Max. Marks			Total Marks
					Internal Exam	End Exam	Lab	
BS201	AECC-2	Basic Computer Skills (Taught by: Computer Science)	2	2	10	40	-	50
BS202	FL-2B	English	4	4	20	80	-	100
BS203	SL-2B	Second Language	4	4	20	80	-	100
BS204	DSC-1B	Optional - I	4	4	20	80	25	125
		Optional – I Lab	1	3				
BS205	DSC-2B	Optional – II	4	4	20	80	25	125
		Optional – II Lab	1	3				
BS206	DSC-3B	Optional – III	4	4	20	80	25	125
		Optional – III LAB	1	3				
		TOTAL :	25	-	110	440	75	625

KAKATIYA UNIVERSITY, WARANGAL - 506 009

**B.Sc. PROGRAMME
Under CBCS System
Scheme wef A.Y: 2020-21**

SECOND YEAR

SEMESTER - III

Code	Course category	Title of the Paper	No. of Credits	Hrs PW	Max. Marks			Total Marks
					Internal Exam	End Exam	Lab	
BS 301	SEC-1	Fundamentals of Nano Technology (Taught by : Physics)	2	2	10	40	-	50
BS 302	SEC-2	Bio Statistics (Taught by : Statistics)	2	2	10	40	-	50
BS 303	FL-3 A	English	3	3	15	60	-	75
BS 304	SL-3 B	Second Language	3	3	15	60	-	75
BS 305	DSC-1C	Optional - I	4	4	20	80	25	125
		Optional – I Lab	1	3				
BS 306	DSC-2C	Optional – II	4	4	20	80	25	125
		Optional– II Lab	1	3				
BS 307	DSC-3C	Optional – III	4	4	20	80	25	125
		Optional – III Lab	1	3				
TOTAL:			25	-	110	440	75	625

SEMESTER - IV

Code	Course category	Title of the Paper	No. of Credits	Hrs PW	Max. Marks			Total Marks
					Internal Exam	End Exam	Lab	
BS401	SEC-3	Fundamentals of Python (Taught by: Computer Science)	2	2	10	40	-	50
BS402	SEC-4	Remedial Methods of Pollution – Drinking Water & Soil Fertility (Taught by: Chemistry)	2	2	10	40	-	50
BS403	FL-4 A	English	3	3	15	60	-	75
BS404	SL-4 B	Second Language	3	3	15	60	-	75
BS405	DSC-1D	Optional - I	4	4	20	80	25	125
		Optional – I Lab	1	3				
BS406	DSC-2D	Optional – II	4	4	20	80	25	125
		Optional – II Lab	1	3				
BS407	DSC-3D	Optional – III	4	4	20	80	25	125
		Optional– III Lab	1	3				
TOTAL :			25	-	110	440	75	625

KAKATIYA UNIVERSITY, WARANGAL - 506 009
B.Sc. PROGRAMME
Under CBCS System
Scheme wef A.Y: 2021-2022

THIRD YEAR

SEMESTER - V

Code	Course Type	Title of the Paper	No. of Credits	Hrs PW	Max. Marks			Total Marks
					Internal Exam	End Exam	Lab	
BS 501	FL-5 A	English	3	3	15	60	-	75
BS 502	SL-5 B	Second Language	3	3	15	60	-	75
BS 503	G.E.	Water Resources Management (Taught by: Any Science Dept.)	4	4	20	80	-	100
BS 504	DSE-1E	Optional – I	4	4	20	80	25	125
		Optional – I Lab	1	3				
BS 505	DSE-2E	Optional – II	4	4	20	80	25	125
		Optional – II Lab	1	3				
BS506	DSE-3E	Optional – III	4	4	20	80	25	125
		Optional – III Lab	1	3				
TOTAL:			25	-	110	440	75	625

SEMESTER - VI

Code	Course Type	Title of the Paper	No. of Credits	Hrs PW	Max. Marks			Total Marks
					Internal Exam	End Exam	Lab	
BS 601	FL-6A	English	3	3	15	60	-	75
BS 602	SL-6 B	Second Language	3	3	15	60	-	75
BS 603	P.W / Optional	Optional: Public Health & Hygiene (Taught by: Zoology / Botany / Biotechnology / Micro Biology)	4	4	20	80	-	100
BS 604	DSE-1F	Optional - I	4	4	20	80	25	125
		Optional – I Lab	1	3				
BS 605	DSE-2F	Optional – II	4	4	20	80	25	125
		Optional – II Lab	1	3				
BS 606	DSE-3F	Optional – III	4	4	20	80	25	125
		Optional – III Lab	1	3				
TOTAL:			25	-	110	440	75	625

NSS/NCC/Sports/Extra Curricular	Credits under Non – CGPA 6	Up to 6 (2 in each Year)	Up to 6 (2 in each Year)	Up to 6 (2 in each Year)
Summer internship	4	Up to 4 (2 in each, after I & II years	Up to 4 (2 in each, after I & II years	Up to 4 (2 in each, after I & II years

F.L : First Language;

S.L : Second Language;

A.E.C.C: Ability Enhancement Compulsory Course;

S.E.C : Skill Enhancement Course;

D.S.C : Discipline Specific Course;

D.S.E : Discipline Specific Effective;

G.E : Generic Elective;

P.W : Project Work;



KAKATIYA UNIVERSITY
UG COURSES
CHOICE BASED CREDIT SYSTEM (CBCS)
2019 - 2020
RULES & REGULATIONS

These Regulations shall be called Kakatiya University regulations governing Undergraduate Programmes under the Choice Based Credit System (CBCS non-professional). The Choice Based Credit System is offered only to the students admitted in Constituent Colleges and Affiliated Colleges of Kakatiya University from the Academic Year 2019-2020.

These Regulations shall come into force from the Academic Year 2019-2020

1. Definitions:

In these Regulations, unless the context otherwise requires:

- a. **“University”** means Kakatiya University
- b. **“Undergraduate programmes”** means UG degree courses in the Faculties of Science, Arts, Social Sciences and Commerce
- c. **“Student”** means student admitted to undergraduate programmes under these Regulations
- d. **“Degree”** means undergraduate three year bachelor’s programme (non professional)
- e. **“Board of Studies”** means undergraduate Board of Studies of the University in the discipline /subjects Concerned (CBCS non-professional)
- f. **“Academic Senate”** means Academic Senate of Kakatiya University
- g. **“Fee”** means the fee prescribed by the University for the Undergraduate Programmes
from time to time
- h. **“Credit”** means the unit by which the course work is measured, in these Regulations one credit means one hour of teaching work or two hours of practical work per week for 15 weeks in a Semester
- i. **“Grade letter”** is an index to indicate the performance of a student in a particular course (Paper). It is the transformation of actual marks secured by a student in a course/paper. Grade letters are 0, A, B, C, D, E, F
- j. **“Grade Point”** is the weightage allotted to each grade letter depending on the range of
marks awarded in a course/paper.
- k. **“Credit Points”** refer to the product of number of credits multiplied by the Grade Point for a given course/paper
- l. **“Semester Grade Point Average”** (SGPA) refers to the performance of the student in a given semester. SGPA is based on the total credit points earned by the student in all the courses and the total number of credits assigned to the courses/papers in a Semester.

- m. “**Cumulative Grade Point Average**” (CGPA) refers to the Cumulative Grade Point Average weighted across all the semesters (6 semesters).

2. **CHOICE BASED CREDIT SYSTEM (CBCS) IN UG COURSES:**

Main features of the Choice Based Credit System (CBCS):

- a. All the UG Departments in the Faculties of Science, Social Sciences, Arts, Commerce of the constituent and affiliated colleges of KU shall participate in this Choice Based Credit System (CBCS) from the academic year 2019-2020.
- b. In the CBCS system continuous evaluation of the students in all the semesters is done through Internal Assessment Examinations, assignments etc.
- c. Course contents of each UG programme are designed to meet the ever changing requirements of the industry/job market/needs of society.
- d. Each paper/course is assigned a specific number of credits and the marks secured by a student are converted into grade points and credit points. The performance of a student in a semester is expressed as Semester Grade Point Average (SGPA) and the combined performance of a student in all the six semesters of the UG programme is expressed as Cumulative Grade Point Average (**CGPA**).

CBCS Course Structure

- a. UG Courses in the CBCS are being offered in Semester pattern
 - b. There shall be six semesters in each UG course. The duration of an Academic year consists of two semesters, each of 15 weeks of teaching.
 - c. The Academic session in each semester will provide 90 teaching days.
 - d. The period of the odd semesters shall be from July to November and the even semesters shall be from December to April.
 - e. There shall be seven categories of courses/papers in the UG programmes:
 - i. DSC (Discipline Specified Course)
 - ii. DSE (Discipline Specified Elective)
 - iii. Language
 - iv. AECC (Ability Enhancement Compulsory Course)
 - v. SEC (Skill Enhancement Course)
 - vi. GE (Generic Elective)
 - vii. Project
 - f. The details of these courses / Papers are given in summary sheet as Annexure - I
- f. Each course/paper shall have a character code which indicates
- i. The Department
 - ii. The Semester
 - iii. The course No. /Paper No.

g. The detailed UG course structure for each Department will be designed by the UG Board of Studies of the Department and finalized by the Faculty and approved by the Standing Committee of the Academic Senate of the University from time to time.

h. Skill Enhancement Course SEC (Choice Based):

Skill Enhancement Course (SEC) the student of B.A. /B.Sc shall choose two SEC papers in each of III and IV semester such that at least one from the SEC papers being offers by three core subjects in B.A and B.Sc whereas total of tone SEC papers out of 12 paper in BBA and B.Com each SEC paper carries two credits.

i. Generic Elective GE:

The student shall choose one GE paper in V Semester from the paper being offered by the other faculty. GE paper carries four credits.

3. Attendance:

- a. 75% of attendance is compulsory for all students. A student shall be considered to have satisfied the requirement of attendance for appearing for the semester end examination, if he/she has attended not less than 75% of the number of classes held upto the end of the semester including tests and practicals etc.
- b. However, there is a provision for condonation of attendance for the students who have attendance between 65% and <75% on Medical Grounds on payment of prescribed fee and production of medical certificate.
- c. If a student represents his/her institution, University, State or Nation in Sports, NCC, NSS or Cultural or any other officially sponsored activities, he/she shall be eligible to claim the attendance for the actual number of days participated subject to a maximum of 20 days in a Semester based on the specific recommendations of the Head of the Department and Principal of the College concerned.
- d. A student who does not satisfy the requirement of attendance shall not be permitted to take internal assessment as well as the Semester end examinations.

4. Medium of Instruction

The medium of instruction shall be English/Telugu/Urdu/Hindi

5. Award of Grades, SGPA, CGPA

Credits, Grade Letter, Grade Points and Credit Points

Credit means the unit by which the course work is measured. In these Regulations one credit means one hour of teaching work or two hours of practical work per week.

Grade Letter is an index to indicate the performance of a student in a particular course (Paper). It is the transformation of actual marks secured by a student in a course/paper. It is indicated by a Grade letter O, A, B, C, D, E, F, There is a **range of marks** for each Grade Letter, In case the student is absent for any exam, Ab is indicated in the memo in place of the Grade Letter.

Grade Point is weightage allotted to each grade letter depending on the marks awarded in a course/paper

Details of Award of Grades Under Choice Based Credit System (CBCS NP)

Award of Grades			Award of Division		
Range of % of Marks	Grade Letter	Grade Point	CGPA Grade	Range of marks (%)	Division
>85to100	O	8.5 - 10	7.00 -10.00	70 -100	First with Distinction
>70to<85	A	7.0 - 8.49	6.00 -6.99	60 - 69	FIRST
>60to<70	B	6.0 - 6.99	5.00 -5.99	50 - 59	SECOND
>55to<60	C	5.5 – 5.99	4.00 -4.99	40 - 49	PASS
>50to<55	D	5.0 – 5.49			
>40to<50	E	4.0 – 4.99			
<40	F	0.0			
Absent	Ab	-			

Semester Grade Point Average (SGPA)

Credit Points for the paper = No. of Credits assigned for the paper x Grade Point secured for that course/Paper

SGPA indicates the performance of a student in a given Semester. SGPA Is based on the total credit points earned by the student in all the courses and the total number of credits assigned to the courses/papers in a Semester.

$$SGPA = \frac{\sum (\text{Letter Grade Points}) \times (\text{Credits})}{\sum (\text{Credits})}$$

$$CGPA = \frac{\sum (SGPA) \times (\text{Credits})}{\sum (\text{Total Credits})}$$

Note: SGPA is computed only if the candidate passes in all the papers (gets a minimum 'E' grade in all the Papers)

The following examples illustrate the calculation of Grade Points, Credit Points and Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA). The percentage of marks shown in column III is the marks secured by the student in the Internal Assessment and Semester End Examination put together.

Example: B.Sc /B.com/BA - Semester - I

Course/paper	Credits	% of Marks	Grade Letter	Grade Point	Credit Points = Credits x Grade Points
Paper - I (Theory)	4	60	B	6.0	4 x 6 = 24
Paper – II (Theory)	4	50	D	5.0	4 x 5= 20
Paper – III (Theory)	4	70	A	7.0	4 x 7 = 28
Paper - IV (Theory)	4	75	A	7.5	4 x 7.5= 30
Paper – V (Practical's)*	4	75	A	7.5	4 x 7.5 = 30
Paper - VI (Practical's)*	4	80	A	8.0	4 x 8 = 32
Total	24				164

Note*: The number of practical papers and the credits assigned may vary from one Course to other.

Total Credit Points obtained for all the papers in the Semester-I = 174
 Total Credits assigned to all the papers in the Semester-I = 25

$$\text{SGPA} = \frac{\text{Total Credit Points in the Semester-I}}{\text{Total Credits in the Semester-I}} = 174/25 = 6.96$$

SGPA for Semester - I = 6.96

Similarly, semester II, III, IV, V and VI should be calculated as per the above procedure.

Cumulative Grade Point Average (CGPA)

CGPA refers to the Cumulative Grade Point Average weighted across all the semesters (6 Semesters). CGPA is obtained by dividing the total number of credit points (CPTs) in all the semesters by the total number of credits in all the Semesters. The final result at the end of all the semesters is declared in the form of CGPA.

Note: CGPA is calculated only when the candidate passes in all the papers of all the semesters.

Example: B.Sc./B.Com./B.A./B.B.A			Credits Under Non- CGPA		
				NSS/NC C/Sports / Extra curricular	Summer Internship
I Semester:	Total CPTs = 200	Total Credits = 25	I Year	2	2
II Semester:	Total CPTs = 212	Total Credits = 25			
III Semester:	Total CPTs = 213	Total Credits = 25	II Year	2	2
IV Semester:	Total CPTs = 218	Total Credits = 25			
V Semester:	Total CPTs = 216	Total Credits = 25	III Year	2	-
VI Semester:	Total CPTs = 210	Total Credits = 25			

$$\text{CGPA} = \frac{\sum \text{Total CPTs of Semester I, II, III, IV, V, VI}}{\sum \text{Total Credits of Semester I, II, III, IV, V, VI}}$$

In the present example

$$\text{CGPA} = \frac{200+212+213+218+216+210}{24+24+25+26+24+22} = 1269/145 = 8.75$$

8. EVALUATION METHOD

1. Semester End Examination of Ability Enhancement Compulsory Course (AECC) Shall be conducted by the University and its marks shall be a part of SGPA and CGPA.
2. AECC has 2 credits and will be evaluated for 50 marks: 10 marks internal assessment (10 MCQs and 10 FIBs of half mark each); 40 marks for Semester End exam (Section A: 10 marks - 2 short answers of 5 marks each, one from each unit: Section B: 30 marks - 2 long answers of 15 marks each, from each unit with internal choice).
(AECC I Course: Environmental Studies - The framing of syllabi, question paper, paper setting, panel of examiners and other confidential related work will be taken up by the Chairperson, BoS in Environmental Studies and AECC - II Course: Gender sensitization- the framing of syllabi, question paper, paper setting, panel of examiners and other confidential related work will be taken up by the Chairperson, BoS in Sociology.)
3. Pattern of internal evaluation in UG Core and Elective papers (4 and 5 credit courses/ papers) is **2 internal assessment tests of 15 marks each to be averaged and 1 assignment of 5 marks for a total of 20 marks**. Each internal assessment question paper consists of 10 MCQs of 1/2 mark each; 10 FIBs of 1/2 mark each; 5 short answers of 1 mark each.
4. No assignments for any 3 credit core/elective course/paper.
5. **NO INTERNAL EXAM for practical courses**. Each I Credit Practical examination is evaluated at the end of the semester for 25 marks. Evaluation by internal examiners for I, III & V Semesters and for II, IV & VI End Semesters by external examiners.
6. Pattern of Semester End Exam for UG Core and Elective papers (4 and 5 credit courses/papers):
 - a. **For ARTS, COMMERCE AND SOCIAL SCIENCES:**
 - i. **5 Credit Course/Paper (80 marks):** Section 'A' (20 marks) consists of 8 Short Answer Questions (at least one from each unit) out of which 5 questions are to be answered. Each question carries 4 marks. Section 'B' (60 marks) - 5 long answer / essay type questions of 12 marks each with internal choice (2 to be set per unit).
 - ii. **4 Credit Course I Paper (80 marks):** Section 'A' (20 marks) consists of 8 Short Answer Questions (two from each unit) out of which 5 questions are to be answered. Each question carries 4 marks. Section 'B' (60 marks) - 4 long question answer/essay type questions with internal choice (2 to be set per unit). Each question carries 15 marks.
 - b. **For SCIENCE:**
 - i. **4 Credit Course/ Paper (80 marks):** Section 'A' (20 marks) consists of 8 Short Answer Questions (two from each unit) out of which 5 questions are to be answered. Each question carries 4 marks. Section 'B' (60 marks) - 4 long question answer/essay type questions with internal choice (2 to be set per unit). Each question carries 15 marks.

- ii. **3 Credit Course/Paper (60 marks):** Section 'A' (15 marks) — consists of 8 Short Answer Questions (at least two from each unit) out of which 5 questions are to be answered. Each question carries 3 marks. Section B' (45 marks) - 3 long answer/essay type questions of 15 marks each with internal choice (2 to be set per unit). . –

The marks secured by the student in the Internal tests, assignments, Seminars, practical's, project work and semester-end examinations are converted into SGPA and CGPA.

9. Improvement of Grades and Completion of the Course:

- i. Candidates who have passed in to the immediate next examination after of all papers are cleared theory paper/papers are allowed to appear again for theory paper/papers only once in order to improve his/her grade, by paying the fee prescribed by the University. If a candidate improves his/her grade, then his/her improved grade will be taken into consideration for the award of SGPA only. Such improved grade will not be counted for the award of prizes/medals, Rank and Distinction. If the candidate does not show improvement in the grade, his/her previous grade will be retained. Candidates will not be allowed to improve marks/grade in the Internal Assessment Seminars and Project Work

10. Promotion, Re-admission Rules & Maximum Time for Completion of Course:

A. Rules of promotion are given below:

Sl. No.	Semester	Conditions to be fulfilled for Promotion	
1.	From Semester – I to Semester – II	Undergone a Regular Course of Study of Semester – I and registered* for the Semester – I examination.	
2.	From Semester – II to Semester – III	a) Undergone a Regular Course of Study of Semester – I & II and b) The number of backlogs if any, of Semester- I & II taken together shall not exceed 50% of the total number of papers/subjects prescribed for semesters -I & II together	
		Number of papers/subjects prescribed for Semesters- I & II	Number of Backlogs permitted
		B.A. 12	6/7
		B. Sc. 18	9
		B.Com. 14	7
3.	From Semester – III to Semester – IV	Undergone a Regular Course of Study of Semester – III and registered* for the Semester – III examination.	
4.	From Semester – IV to Semester – V	a) Undergone a Regular Course of Study of Semester – I, II, II & IV and b) The number of backlogs if any, of Semester- I,II,III & IV taken together, shall not exceed 50% of the total number of papers/subjects prescribed for semesters - I,II,III & IV	
		Number of papers/subjects prescribed for Semesters- I,II,III & IV	Number of Backlogs permitted
		B.A. 24	12/14
		B. Sc. 36	18
		B.Com. 28	14
5.	From Semester – V to Semester – VI	Undergone a Regular Course of Study of Semester – V and registered* for the Semester – V examination.	

* Registration means obtaining a Hall Ticket for the said examination.

The procedure to be followed for granting readmission to the students in the following cases:

- (1) A student, who did not put in the required attendance in a semester/year of a course and thus detained
- (2) A student, who did not pass in the required number of papers and thus detained
- (3) A student, after completing a semester/year did not continue their studies in the next immediate semester/year on personal/health grounds but desired to continue his/her studies after a short break
- (4) A student, who has put in not less than 40% of attendance in a Semester and not registered for the examination, can take re-admission in the same semester.
- (5) Who has taken T.C. to join some other course after completing a semester/year of the course and come back to continue the earlier course

May be permitted for readmission to continue their studies with the approval from the University administration.

All the readmissions including such of those students who took TC and come back, shall be granted by the Principals of the concerned colleges directly subject to the fulfillment of the following conditions stipulated by the University.

- 1) they should have been promoted to next higher class/semester in which they are seeking readmission.
- 2) they should join the course within 4 weeks in case of semester system from the date of commencement of classes
- 3) they should be able to complete the course within Six years from the year of their original admission.
- 4) they should pay the readmission fee as prescribed by the University

NOTE: No readmission shall be made after the cutoff date (4 week in a 15 week semester) under any circumstances. The cutoff date for granting readmission shall be reckoned from the date of commencement of classes for different courses as per the almanac communicated by the University every year.

- 5) In the normal course of time a candidate is expected to complete UG three year Degree course within six years from the date of admission.
- 6) Whenever the syllabus is revised, the candidate shall be allowed reappearing for UG Degree examinations according to the old syllabus two subsequent examinations i.e. supple of semester for End examination

- 7) The six-semester three -year course should be completed by a student within 5 years (3+2) as per the guidelines of UGC approved by Kakatiya University Standing Committee of the Academic Senate on 28-01-2016.
- 8) Any student from earlier year-wise UG programme seeking readmission from the academic year 2017-18 onwards will have to opt for CBCS semester system.
- 9) If a student studied first year in year wise scheme and discontinued, then the student may be given readmission if required, in CBCS pattern by submitting the first year paper into semester papers for compelling the course by the recommendation of chairman BOS and Dean. The student may be awarded degree CBCS pattern after completion of its course.
- 10) If a student studied first year in UG year wise scheme and discontinued. Then the student may be given readmission if requested, in third year in CBCS pattern by completing the V & VI semester papers into equaling year wise papers in year wise scheme. The student may be awarded degree in year wise scheme after completion of the course.

11. Effective Implementation of CBCS system

- i. The University shall issue such orders, instructions, procedures and prescribe such format as it may deem fit to implement the provisions of these Regulations.
- ii. The procedural details/logistics will be given by the University from time to time.
- iii. Any unforeseen problems/difficulties will be resolved by the appropriate 'Bodies of the University, whose decision in the matter shall be final.
- iv. All CBCS programmes including logistics shall be monitored by a Central office established for this purpose and a separate CBCS almanac will be issued by the University.

KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY I Year
SEMESTER – I

ANIMAL DIVERSITY – INVERTEBRATES
(Core Paper –I)

Theory	4 Hours/Week	4 Credit	Internal marks = 20
Practical	3 Hours/Week	1 Credit	External Marks = 80

UNIT – I

1.1 Protozoa

- 1.1.1 General Characters and Classification of Protozoa up to Orders with examples
- 1.1.2 Type Study –*Elphidium*
- 1.1.3 Locomotion and Reproduction
- 1.1.4 Epidemiology of Protozoan diseases – Amoebiasis, Giardiasis, Leishmaniasis, Malaria

1.2 Porifera

- 1.2.1 General characters and Classification of Porifera up to Orders with examples
- 1.2.2 Type study - *Sycon*
- 1.2.3 Canal system in Sponges
- 1.2.4 Types of Cells and Spicules in Porifera.

UNIT – II

2.1 Cnidaria

- 2.1.1 General characters and Classification of Cnidaria up to classes with examples
- 2.1.2 Type study - *Obelia*
- 2.1.3 Polymorphism in Cnidarians with examples
- 2.1.4 Corals and Coral Reef formation

2.2 Helminthes


- 2.2.1 General characters and Classification of **Platyhelminthes** up to classes with examples
- 2.2.2 Type study - *Schistosoma*
- 2.2.3 General characters and Classification of **Nemathelminthes** up to classes with examples
- 2.2.4 Type study – *Dracanculus*; Parasitic Adaptations in Helminthes

UNIT– III

3.1 Annelida

- 3.1.1 General characters and Classification of Annelida up to classes with examples
- 3.1.2 Type study – *Hirudinaria granulosa*
- 3.1.3 Evolutionary significance of Coelome and Coelomoducts and Metamerism
- 3.1.4 Economic Importance of Annelida (Polychaeta, Oligochaeta and Hirudinea)


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University College
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3.2 Arthropoda

- 3.2.1 General characters; Classification of Arthropoda upto classes with examples
- 3.2.2 Type study – *Palaemon* (Prawn)
- 3.2.3 Crustacean Larvae; Insect metamorphosis; Useful and Harmful Insects
- 3.2.4 *Peripatus*- Structure and affinities

UNIT – IV

4.1 Mollusca

- 4.1.1 General characters; Classification of Mollusca upto classes with examples
- 4.1.2 Type study - *Pila* (Snail)
- 4.1.3 Pearl formation; Torsion and Detorsion in Gastropods
- 4.1.4 Molluscs as Bio-indicators, Vectors and Pests; Economic importance

4.2 Echinodermata

- 4.2.1 General characters and Classification of Echinodermata upto classes with examples
- 4.2.2 Type study- *Star Fish*
- 4.2.3 Echinoderm larvae and their evolutionary significance
- 4.2.4 Autotomy, Regeneration and Symmetry of Echinoderms

Suggested Readings:

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



HEAD
Department Of Zoology
University College
Kakatiya University.
WARANGAL.-506009 (T.S)



Dr. G. SHAMITHA
Chairperson
Board of Studies
Department of Zoology & Sericulture Unit
KAKATIYA UNIVERSITY - WGL-506009 (T.S)

KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY I Year
SEMESTER – I

ANIMAL DIVERSITY - INVERTEBRATES
(PRACTICAL)

Instruction: 3 hrs per week
No. of Credits: 1

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

- i) **Protozoa:** *Amoeba, Paramecium, Paramecium Binary fission and Conjugation, Vorticella, Entamoeba histolytica, Plasmodium vivax*
- ii) **Porifera:** *Sycon, Spongilla, Euspongia, Sycon- T.S & L.S, Spicules, Gemmule*
- iii) **Coelenterata:** *Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatula*
- iv) **Platyhelminthes:** *Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium, Redia, Cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium*
- v) **Nemathelminthes:** *Ascaris (Male & Female), Dracunculus, Ancylostoma, Wuchereria*
- vi) **Annelida:** *Nereis, Aphrodite, Chaetopterus, Hirudinaria, Trochophore larva*
- vii) **Arthropoda:** *Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Peripatus, Larvae - Nauplius, Mysis, Zoea, Mouth parts of male & female Anopheles and Culex, Mouthparts of Housefly and Butterfly.*
- viii) **Mollusca:** *Chiton, Pila, Unio, Pterodo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva*
- ix) **Echinodermata:** *Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Bipinnaria larva*

2. Demonstration of dissection / dissected / virtual dissection:

Prawn: Appendages, Digestive system, Nervous system, Mounting of Statocyst


3. Laboratory Record work shall be submitted at the time of practical examination


4. An "Animal album" containing photographs, cut outs, with appropriate write up about the abovementioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

5. Computer aided techniques should be adopted as per UGC guide lines.

Suggested manuals:

1. Practical Zoology- Invertebrates by S.S.Lal
2. Practical Zoology – Invertebrates by P.S.Verma
3. Practical Zoology – Invertebrates by K.P.Kurl


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KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY I Year
SEMESTER – II

ANIMAL DIVERSITY – VERTEBRATES
(Core Paper – II)

Theory	4 Hours/Week	4 Credit	Internal marks = 20
Practical	3 Hours/Week	1 Credit	External Marks = 80

UNIT – I

1.1 Hemichordata

- 1.1.1 General characters and Classification of Hemichordates upto classes with examples
- 1.1.2 *Balanoglossus*- Structure and affinities
- 1.1.3. Larval Significance (Tornaria)

1.2. Protochordata

- 1.2.1 General Characters and Classification of Chordates up to orders with examples
- 1.2.2 Salient features of Urochordata; Retrogressive metamorphosis in Urochordata
- 1.2.3 Salient features and affinities of Cephalochordata
- 1.2.4 General Characters of Cyclostomata; Comparison of *Petromyzon* and *Myxine*

UNIT – II

2.1 Pisces

- 2.1.1 General characters of and Classification of Pisces up to orders with examples
- 2.1.3 *Scoliodon*- Digestive, Respiratory, Circulatory and Nervous system
- 2.1.4 Types of Scales, Types of Fins
- 2.1.5 Migration in Fishes

2.2 Amphibia


- 2.2.1 General characters and Classification of Amphibians up to orders with examples.
- 2.2.2 *Rana tigrina*- Respiratory, Circulatory and Nervous systems
- 2.2.3 Parental care in Amphibians; Neoteny and Paedogenesis
- 2.2.4 Metamorphosis in Amphibians and its hormonal control

Unit – III

3.1 Reptilia

- 3.1.1 General characters and Classification of Reptilia up to orders with examples
- 3.1.2 *Calotes*- Digestive, Respiratory, Circulatory and Nervous systems
- 3.1.3 Temporal fossa in Reptiles and its evolutionary importance
- 3.1.4 Distinguished characters of Poisonous and Non-poisonous snakes


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Chairperson
Board of Studies
Department of Zoology & Sericulture Unit
KAKATIYA UNIVERSITY - WGL-506009 (T.S)


HEAD
Department Of Zoology
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3.2 Aves

- 3.2.1 General characters and Classification of Aves upto orders with examples.
- 3.2.2 *Columba livia*- Digestive, Respiratory, Circulatory and Nervous systems
- 3.2.3 Migration in Birds
- 3.2.4 Flight adaptation in Birds

Unit – IV

4.1 Mammalia

- 4.1.1 General characters and Classification of Mammalia upto orders with examples
- 4.1.2 *Rabbit*- Digestive, Respiratory, Circulatory and Nervous systems
- 4.1.3 Dentition in Mammals
- 4.1.4 Aquatic adaptations in Mammals

Suggested Readings:

1. **E.L. Jordan and P.S. Verma** 'Chordate Zoology' - S. Chand Publications.
2. **Mohan P. Arora**. 'Chordata – I, Himalaya Publishing House Pvt. Ltd.
3. **Marshal, Parker and Haswell** 'Text book of Vertebrates'. ELBS and McMillan, England.
4. **Alfred Sherwood Romer**. Thomas S. Pearson 'The Vertebrate Body, Sixth edition, CBS College Publishing, Saunders College Publishing
5. **George C. Kent, Robert K. Carr**. *Comparative Anatomy of the Vertebrates*, 9th ed. McGrawHill.
6. **Kenneth Kardong** *Vertebrates: Comparative Anatomy, Function and Evolution*, 4th ed, 'McGraw Hill.
7. **J.W. Young**, *The Life of Vertebrates*, 3rd ed, Oxford University press.
8. **Harvey Pough F, Christine M. Janis, B. Heiser**, *Vertebrate Life*, Pearson, 6th ed, Pearson Education Inc. 2002.


HEAD
Department Of Zoology
University College
Kakatiya University,
WARANGAL. -506009 (T.S)


Dr. G. SHAMITHA
Chairperson
Board of Studies
Department of Zoology & Sericulture Unit
KAKATIYA UNIVERSITY - WGL-506009 (T.S)

KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY I Year
SEMESTER – II

ANIMAL DIVERSITY - VERTEBRATES
(PRACTICAL)

Instruction: 3 hrs per week

No. of Credits: 1

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

1. **Hemichordata:** *Balanoglossus, Tornmaria larva*
2. **Protochordata:** *Amphioxus, Amphioxus T.S. through pharynx*
3. **Cyclostomata:** *Petromyzon, Myxine, Ammocoetus larva*
4. **Pisces:** *Sphyrna, Pristis, Torpedo, Channa, Pleuronectes, Hippocampus, Exocoetus, Echieneis, Labeo, Catla, Clarius, Auguilla, Protopterus, Scales: Placoid, Cycloid, Ctenoid*
5. **Amphibia:** *Ichthyophis, Amblystoma, Siren, Hyla, Rachophous, Bufo, Rana, Axolotal larva*
6. **Reptilia :** *Draco, Chamaeleon, Gecko, Uromastix, Vipera russeli, Naja, Bungarus, Enhydrina, Typhlops, Ptyas, Testudo, Trionyx, Crocodilus*
7. **Aves:** *Archaeopteryx, Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo, Collection and study of different types of feathers: Quill, Contour, Filoplume, Down*
8. **Mammalia:** *Ornithorhynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris, Hedgehog;*
9. **Histology:** T.S. of Liver, Pancreas, Kidney, Stomach, Intestine, Lung, Artery, Vein, Bone T.S, Spinal Cord. T.S.

II. Osteology:

Rabbit – Axial Skeleton (Bones of Skull and Vertebral Column),

Varanus, Pigeon and Rabbit - Appendicular skeleton (Bones of Limbs and Girdles)

III. Demonstration of dissection / dissected / virtual dissection: Labeo / Tilapia

1. Digestive system 2. Brain, Weberian Oscicles 3. V, VII, IX, X cranial nerves

IV. Laboratory Record work shall be submitted at the time of practical examination

V. An “Animal album” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.


VI. Computer aided techniques should be adopted as per UGC guide lines.

Suggested manuals:

1. S.S.Lal, Practical Zoology – Vertebrata

2. P.S.Verma, A manual of Practical Zoology– Chordata


HEAD
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University College
Kakatiya University,
WARANGAL.-506009(T.S)


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Chairperson
Board of Studies
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KAKATIYA UNIVERSITY - WGL-506009 (T.S)

KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY II Year
SEMESTER – III

ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR

Theory	4 Hours/Week	4 Credit	Internal marks = 20
Practical	3 Hours/Week	1 Credit	External Marks = 80

UNIT – I

1.1 Digestion

- 1.1.1 **Enzymes:** Definition, Classification, Inhibition, Regulation
- 1.1.2 Digestion of Carbohydrates, Proteins, Lipids and Cellulose
- 1.1.3 Absorption and Assimilation of digested food
- 1.1.4 Role of Gastrointestinal hormones in digestion

1.2 Excretion, Homeostasis and Osmoregulation

- 1.2.1 Classification of Animals on the basis of excretory products: Ammonotelic, Ureotelic, and Uricotelic; Structure and function of Nephron
- 1.2.2 Urine formation and Counter current mechanism
- 1.2.3 Concept and Mechanism of Homeostasis
 - a) Hormone regulation of Blood Glucose levels in Human being
 - b) Water and Ionic Regulation by Marine and Fresh water Animals
 - c) Thermo regulation in Human being
- 1.2.4 Osmoregulation in Marine, Fresh and Brackish water Animals

UNIT – II

2.1 Respiration

- 2.1.1 Definition of Respiration, Respiration mechanism, External, Internal and Cellular Respiration.
- 2.1.2 Respiratory Pigments; Transport of Oxygen, Oxygen dissociation curves, and Bohr's Effect;
- 2.1.3 Transport of Carbon dioxide, Chloride shift
- 2.1.4 Regulation of Respiration; Nervous and Chemical Mechanism

2.2 Circulation

- 2.2.1 Types of Circulation Open and Closed; Structure of Mammalian Heart
- 2.2.2 Types of Hearts: Myogenic and Neurogenic
- 2.2.3 Heart functions - Conduction and Regulation of Heart beat, Regulation of Heart rate; ECG
- 2.2.4 Tachycardia and Bradycardia; Blood Clotting mechanism

UNIT – III

3.1 Muscle Contraction

- 3.1.1 Types of Muscles
- 3.1.2 Ultra structure of skeletal muscle fibre
- 3.1.3 Mechanism and Chemical changes during Muscle Contraction (Sliding filament theory)
- 3.1.4 Twitch Tetanus summation and Treppe fatigue

3.2 Nerve Impulse

3.2.1 Structure of Neuron

3.2.2 Nerve impulse - Resting potential, Threshold potential and Action potential, Conduction of Nerve impulse

3.2.3 Transmission of Nerve impulse

3.2.4 Synapse and Synaptic transmission; Neurotransmitters-EPSP, IPSP

3.3 Endocrine System

3.3.1 Endocrine glands - Structure, secretions and functions of Pituitary gland

3.3.2 Thyroid, Parathyroid, Adrenal glands and Pancreas

3.3.3 Hormone action and Concept of Secondary messengers

3.3.4 Male and Female Hormones; Hormonal control of Menstrual cycle in human beings

UNIT – IV

4.1 Animal Behaviour

4.1.1 Types of Behaviour- Innate and Acquired; Instinctive and Motivated behaviour

4.1.2 Taxes, Reflexes, Tropisms

4.2 Learning and Memory

4.2.1 **Types of Learning:** Trial and Error Learning, Imprinting, Habituation

4.2.2 **Conditioning:** Classical Conditioning; Instrumental conditioning, Examples of Conditioning, Pavlov's Experiment

4.3 Social Behaviour and Communication

4.3.1 Social behaviour of insects (Dance language of honey bees) Colonial Existence of Bees and Termites; Pheromones

4.4 Biological Rhythms

4.4.1 Biological Clocks, Circadian Rhythms; solar and lunar Rhythms; Circannual Rhythms

Suggested Readings:

1. **Gerard J. Tortora and Sandra Reynolds Garbowski** *Principles of Anatomy and Physiology*, Tenth Ed., John Wiley & Sons
2. **Arthur C. Guyton MD**, *A Text Book of Medical Physiology*, Eleventh ed., John E. Hall, Harcourt Asia Ltd.
3. **William F. Ganong**, *A Review of Medical Physiology*, 22 ed, McGraw Hill, 2005
4. **Sherwood, Klandrof, Yanc**, *Animal Physiology*, Thompson Brooks/Coole, 2005.
5. **Sherwood, Klandrof, Yanc**, *Human Physiology*, Thompson Brooks/Coole, 2005.
6. **Knut Schmidt-Nielson**, *Animal Physiology*, 5th edition, Cambridge Low Price Edition.
7. **Roger Eckert and Randal**, *Animal Physiology*, 4th ed, Freeman Co, New York.
8. **Singh. H.R**, *Text Book of Animal Physiology and Biochemistry*
9. **Nagabhushanam**, *Comparative Animal Physiology*
10. **Veer Bal Rastogi**, *Text Book of Animal Physiology*
11. **Dasmann**, "Wild Life Biology"
12. **Reena Mathur**, "Animal Behaviour"
13. **Alocock**, "Animal Behaviour- an Evolutionary Approach"

KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY II Year
SEMESTER – III

ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR
(PRACTICAL)

Instruction: 3 hrs per week

No. of Credits: 1

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Qualitative tests for identification of ammonia, urea and uric acid
(Nitrogenous excretory products)
3. Zonation of gut in Cockroaches
4. Study on effect of pH and Temperature on salivary amylase activity
5. Study of permanent histological sections of mammalian endocrinal glands: Pituitary, Thyroid, Pancreas, Adrenal gland
6. Estimation of Haemoglobin by Sahli's method
7. Estimation of Blood Clotting time
8. Estimation of total protein by Biuret's method
9. Estimation of unit metabolism of fish

- **Laboratory Record work shall be submitted at the time of practical examination**
- **Computer aided techniques should be adopted as per UGC guide lines.**

Suggested manuals:

Tortora, G.J. and Derrickson, B.H. (2009).*Principles of Anatomy and Physiology*, XII Edition, John Wiley & Sons, Inc.

Widmaier, E.P., Raff, H. and Strang, K.T. (2008) *Vander's Human Physiology*, XI Edition., McGraw Hill

Guyton, A.C. and Hall, J.E. (2011). *Textbook of Medical Physiology*, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company

Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006).*Biochemistry*.VI Edition. W.H Freeman and Co.

Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009).*Principles of Biochemistry*. IV Edition. W.H. Freeman and Co.

Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009).

Harper's Illustrated Biochemistry. XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

KAKATIYA UNIVERSITY
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B.Sc. ZOOLOGY II Year
SEMESTER – IV

CELL BIOLOGY, GENETICS & DEVELOPMENTAL BIOLOGY

Theory	4 Hours/Week	4 Credit	Internal marks = 20
Practical	3 Hours/Week	1 Credit	External Marks = 80

UNIT – I

1.1 Cell Biology

- 1.1.1 Ultra structure of Animal cell
- 1.1.2 Structure (Fluid mosaic model) and Functions of Plasma membrane
- 1.1.3 Structure and functions of cell organelles – Endoplasmic reticulum, Golgi complex, Ribosomes, Lysosomes, Mitochondria and Nucleus
- 1.1.4 Chromosomes - Structure, types, Cell Division- Mitosis, Meiosis, Cell Cycle and its regulation.

UNIT – II

2.1 Molecular Biology

- 2.1.1 DNA (Deoxyribo Nucleic Acid) –Structure-RNA (Ribo Nucleic Acid)-Structure, types, DNA Replication
- 2.1.2 Protein Synthesis – Transcription, Translation.
- 2.1.3 Gene Expression - Genetic Code, Operon concept.
- 2.1.4 Molecular Biology Techniques – Polymerase Chain Reaction (PCR), Electrophoresis.

UNIT – III


3.1 Genetics


- 3.1.1 Mendel's laws of Inheritance and Non-Mendelian Inheritance , Linkage and Crossing over.
- 3.1.2 Sex determination and Sex-linked inheritance.
- 3.1.3 Chromosomal Mutations- Deletion, Duplication, Inversion, Translocation; Aneuploidy and Polyploidy; Gene mutations- Induced versus Spontaneous mutations
- 3.1.4 Inborn errors of metabolism.

UNIT – IV

4.1 Developmental Biology

- 4.1.1 Gametogenesis (Spermatogenesis and Oogenesis), Fertilization, Types of eggs, Types of cleavages
- 4.1.2 Development of Frog upto the formation of primary germ layers
- 4.1.3 Formation of Foetal membrane in chick embryo and their functions
- 4.1.4 Types and functions of Placenta in Mammals, Regeneration in Turbellarians and Lizards


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Chairperson
Board of Studies
Department of Zoology & Sericulture Unit
KAKATIYA UNIVERSITY - WGL-506009 (T.S)

Suggested Readings:

1. **Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell** '*Molecular Cell Biology*'
W.H. Free man and company New York.
2. **Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008).** *Principles of Genetics*. VIII Edition.
Wiley India.
- 3 **Snustad, D.P., Simmons, M.J. (2009).** *Principles of Genetics*. V Edition. John Wiley and
Sons Inc.
- 4 **Klug, W.S., Cummings, M.R., Spencer, C.A. (2012).** *Concepts of Genetics*. X Edition.
Benjamin Cummings.
5. **Russell, P. J. (2009).** *Genetics- A Molecular Approach*. III Edition. Benjamin Cummings.
6. **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.
7. **Ridley, M. (2004).** *Evolution*. III Edition. Blackwell Publishing
8. **Campbell, N. A. and Reece J. B. (2011).** *Biology*. IX Edition, Pearson, Benjamin,
Cummings.
9. **James D. Watson, Nancy H. Hopkins** '*Molecular Biology of the Gene*'
10. **Gupta P.K.**, 'Genetics'



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Department Of Zoology
University College
Kakatiya University,
WARANGAL.-506009(T.S)



DR. G. SHAMITHA
Chairperson
Board of Studies
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KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY II Year
SEMESTER – IV

CELL BIOLOGY, GENETICS & DEVELOPMENTAL BIOLOGY
PRACTICAL

Instruction: 3 hrs per week

No. of Credits: 1

I. Cytology

1. Preparation and Identification of slides of Mitotic divisions with onion root tips
2. Preparation and Identification of different stages of Meiosis in Grasshopper Testes
3. Identification and study of the following slides
 - i). Different stages of Mitosis and Meiosis
 - ii) Lamp brush and polytene chromosomes

II. Genetics

1. Problems on Genetics - Mendelian inheritance, Linkage and Crossing over, Sex linked inheritance

III. Embryology

1. Study of T.S. of Testis and Ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8, 16 cell stages); Morula, Blastula
3. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation


IV. Laboratory Record work shall be submitted at the time of practical examination


V. An "Album" containing photographs, cut outs, with appropriate write-up about Genetics and Embryology

- **Computer aided techniques should be adopted as per UGC guide lines.**

Suggested manuals:

1. Manual of laboratory experiments in Cell Biology by **Edward, G.**
2. Freeman and Bracegirdle – An Atlas of Embryology.


HEAD
Department Of Zoology
University College
Kakatiya University,
WARANGAL.-506009(T.S)


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KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY III Year
SEMESTER – V

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Theory	4 Hours/Week	4 Credit	Internal marks = 20
Practical	3 Hours/Week	1 Credit	External Marks = 80

UNIT – I

1.1 Basics of Immune system

- 1.1.1 Cells of the Immune system and the Lymphoid organs (Primary and Secondary)
- 1.1.2 First line of defences-physical and chemical barriers; second line of defences – inflammation and phagocytosis.
- 1.1.3 Types of Immunity- Inherent (Active and Passive) and Acquired Immunity (Active and Passive) Humoral and Cell mediated immunity.
- 1.1.4 Major Histocompatibility complex (MHC)- structure and function of class I and Class II proteins. Significance of MHC in organ transplantation; MHC restriction

UNIT – II

2.1 Antibodies and Antigens and Immune system diseases

- 2.1.1 Antibodies(Immunoglobulins) – Structure, functions and classification, antibody diversity, Monoclonal antibodies and applications
- 2.1.2 Antigens structure, antigenic determinants/epitopes, haptens, adjuvants and antigenicity.
- 2.1.3 Antigen-antibody reactions; Agglutination; Precipitation, Opsonization, Cytotoxicity
- 2.1.4 Hypersensitivity reactions.
Autoimmunity and Immunodeficiency diseases.

Unit – III

3.1 Animal Biotechnology and Genetically modified organisms

- 3.1.1 Concept and Scope of Animal Biotechnology
- 3.1.2 Recombinant DNA Technology and its applications.
- 3.1.3 Cloning Vectors- Plasmids, Cosmids and shuttle vectors, Cloning methods(Cell, Animal and Gene cloning); Restriction enzymes and Ligases
- 3.1.4 Transgenesis – Methods of Transgenesis
Production of Transgenic animals- Sheep and Fish

Unit – IV

4.1 Applications of Biotechnology

- 4.1.1 In vitro fertilization and embryo transfer
- 4.1.2 Hybridoma technology – concepts and applications
- 4.1.3 Stem cells- Types and their applications
- 4.1.4 Recombinant insulin and human growth hormone; Polymerase Chain Reaction (PCR)
Animal Bioreactors- Concepts and Applications.


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Department Of Zoology
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KAKATIYA UNIVERSITY - WGL-506009 (T.S)

Suggested Readings:

1. Text Book of Immunology – Ivan Riott
2. Text Book of Immunology – C.V.Rao
3. Text Book of Immunology – Nandinin Shetty
4. Text Book of Immunology – Kubey
5. Culture of Animal Cells – R. Ian Freshney, Wiley Liss
6. Biotechnology – S. Mitra
7. Animal Cell Culture - Practical Approach – Ed. John. RW. Masters, Oxford
8. Biotechnology – B.D.Singh
9. Brown, T.A. (1998). *Molecular Biology Labfax II: Gene Cloning and DNA Analysis*. II Edition, Academic Press, California, USA.
10. Glick, B.R. and Pasternak, J.J. (2009). *Molecular Biotechnology - Principles and Applications of Recombinant DNA*. IV Edition, ASM press, Washington, USA.


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Kakatiya University.
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KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY III Year
SEMESTER – V

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY
PRACTICAL

Instruction: 3 hrs per week

No. of Credits: 1

I. Immunology

1. Identification of Blood grouping (Demonstration of Agglutination) using kit.
2. Demonstration of Precipitation (VDRL/RPR) using kit.
3. Histological study of Lymphoid organs -Spleen, Thymus, Lymph node, Bone marrow (through prepared slides).
4. Enumeration of Total RBC from a given blood sample.
5. Enumeration of Total WBC from a given blood sample.
6. Enumeration of Differential count of WBC from a given blood sample.

II. Animal Biotechnology

1. Study the following techniques through Photographs / Virtual Lab

- a) Identification of Vectors
- b) Identification of Transgenic animals
- c) DNA sequencing (Sanger's method)
- d) DNA finger printing
- e) Southern blotting
- f) Western blotting

2. PCR (demonstration) on site or of site demonstration.

- **Laboratory Record work shall be submitted at the time of practical examination**
- **Computer aided techniques should be adopted as per UGC guide lines.**

Suggested manuals:

1. A Hand Book of Practical Immunology – **Ivan Riott**
2. Animal Biotechnology – **P.K. Gupta.**
3. Immunology, VI Edition. W.H. Freeman and Company **Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006).**
4. Immunology, VII Edition, Mosby, Elsevier Publication **David, M., Jonathan, B., David, R. B. and Ivan R. (2006).**
5. Cellular and Molecular Immunology. V Edition. Saunders Publication, **Abbas, K. Abul and Lechtman H. Andrew (2003.)**


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KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY III Year
SEMESTER – VI

ECOLOGY, ZOOGEOGRAPHY AND EVOLUTION

Theory	4 Hours/Week	4 Credit	Internal marks = 20
Practical	3 Hours/Week	1 Credit	External Marks = 80

UNIT – I

1.1 Ecology- I

- 1.1.1 Ecosystem Structure and Functions; Types of Ecosystems – Aquatic and Terrestrial
- 1.1.2 Bio-geo chemical nutrient cycles - Nitrogen, Carbon, Phosphorus and Water
- 1.1.3 Energy flow in ecosystem
- 1.1.4 Food chain, food web and ecological pyramids
- 1.1.5 Animal Associations-Mutualism; Commensalism; Parasitism; Competition, Predation

UNIT – II

2.1 Ecology – II

- 2.1.1 Concept of Species, Population dynamics and Growth curves
- 2.1.2 Community Structure and dynamics and Ecological Succession
- 2.1.3 Ecological Adaptations
- 2.1.4 Environmental Pollution- Sources, Effect and Control measures of Air, Water, Soil and Noise Pollution
- 2.1.5 Wildlife conservation - National Parks and Sanctuaries of India, Endangered species; Biodiversity and Hotspots of Biodiversity in India.

UNIT – III

3.1 Zoogeography


- 3.1.1 Zoogeographical regions
- 3.1.2 Climatic and faunal peculiarities of Palaearctic, Nearctic, Neotropical, Oriental, Australian and Ethiopian regions
- 3.1.3 Wallace line, Discontinuous distribution
- 3.1.4 Continental Drift

Unit – IV

4.1. Evolution

- 4.1.1 Theories of Evolution – Lamarckism, Neo-Lamarckism, Darwinism, Neo-Darwinism, Modern synthetic theory, Evidences of Evolution.
- 4.1.2 Forces of Evolution–Natural Selection, Genetic drift, Gene flow, Genetic load, Organic variations, Hardy Weinberg Equilibrium.
- 4.1.3 Isolation –Premating and post mating isolating mechanisms.
- 4.1.4 Speciation: Methods of Speciation - Allopatric and Sympatric; Causes and Role of Extinction in Evolution.



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Suggested Readings:

1. Ecology – Himalaya Publishing company – M.P Arora
2. Environmental Biology – P.D. Sharma
3. Environmental Ecology – P.R. Trivedi and Gurdeep Raj
4. Indian Wildlife Threats and Prervation – Buddhadev Sharma and Te Kumar
5. Ecology-Principles and Application II Edn. Cambridge Univ Press, London, Champan. JL and Re.iss MJ.
6. Environmental Studies, TATA McGraw Hill Com. New Delhi, Benny Joseph.
7. Fundamentals of Ecology Third Edn., Nataraj Publishers, Dehradun, Eugene.P. Odum.
8. Ecology and Animal Distribution, Veea Bala Rastogi.
9. Text Book of Ecology and Environment, P.K. Gupta.
10. Ecology and Wildlife Biology, Bhatnagar and Bansal.
11. Evolution 3rd Edn. Blackwell Publishing, Ridley, M (2004).
12. Evolutionary Biology, Addison –Wesley; Minkoff,E(1983).
13. *Evolution*. Cold Spring, Harbour Laboratory Press Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007).
14. *Evolution*. IV Edition. Jones and Bartlett Publishers; Hall, B. K. and Hallgrimsson, B. (2008).
15. *Evolution*, 2nd Edn, Oxford and IBH Publishing Co., New Delhi, Jan M. Savage.


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KAKATIYA UNIVERSITY
Under Graduate Courses (Under CBCS 2019 - 2022)
B.Sc. ZOOLOGY III Year
SEMESTER – VI

**ECOLOGY, ZOOGEOGRAPHY AND EVOLUTION
PRACTICAL**

Instruction: 3 hrs per week
No. of Credits: 1

Ecology

1. Determination of pH of Soil and Water.
2. Estimation of Salinity (Chlorides) of water in given samples.
3. Estimation of Carbonates and Bicarbonates in the given water samples.
4. Estimation of dissolved Oxygen of Pond water, sewage, effluents.
5. Identification of Zooplankton from different water bodies.
6. Study of Pond Ecosystem / Local polluted site – Report submission.

Zoogeography


1. Study of at least 3 endangered or threatened wild animals of India through photographs/specimens/models
2. Field visit to Zoo Park to study the management, behavior and enumeration of wild animals.
3. Identification of Zoogeographical realms from the Map and identify specific fauna of respective regions.

Evolution

1. Museum Study of fossil animals: **Peripatus; Coelacanth fish, Dipnoi fishes; Sphenodon; Archaeopteryx.**
 2. Study of homology and analogy from suitable specimens and pictures
 3. Problems on Hardy-Weinberg Law
 4. Macroevolution using Darwin finches (pictures)
- **Laboratory Record work shall be submitted at the time of practical examination**
 - **Computer aided techniques should be adopted as per UGC guide lines.**

Suggested manuals:

1. Ecology Student Lab Manual, Biology Labs – Robert Desharnais, Jeffrey Bell.
2. Ecology Lab manual – Darrell S Vodopich.


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KAKATIYA UNIVERSITY
B.SC I YEAR SEMESTER-I - CBCS
Ability Enhancement Compulsory Course (AECC)

ENVIRONMENTAL STUDIES

(2 hrs./week)

Credits – 2

UNIT - I : Ecosystem, Biodiversity & Natural Resources

(15 hrs.)

1. Definition, Scope & Importance of Environmental Studies.
2. Structure of Ecosystem – Abiotic & Biotic components Producers, Consumers, Decomposers, Food chains, Food webs, Ecological pyramids)
3. Function of an Ecosystem :Energy flow in the Ecosystem (Single channel energy flow model)
4. Definition of Biodiversity , Genetic,Species & Ecosystem diversity , Hot-spots of Biodiversity, Threats to Biodiversity , Conservation of Biodiversity (Insitu & Exsitu)
5. Renewable & Non – renewable resources, Brief account of Forest , Mineral & Energy (Solar Energy & Geothermal Energy) resources
6. Water Conservation , Rain water harvesting & Watershed management.

UNIT – II: Environmental Pollution , Global Issues & Legislation

(15 hrs.)

1. Causes, Effects & Control measures of Air Pollution, Water Pollution
2. Solid Waste Management
3. Global Warming & Ozone layer depletion.
4. Ill – effects of Fire- works
5. Disaster management – floods, earthquakes & cyclones
6. Environmental legislation :-
(a) Wild life Protection Act (b) Forest Act (c) Water Act (d) Air Act
7. Human Rights
8. Women and Child welfare
9. Role of Information technology in environment and human health

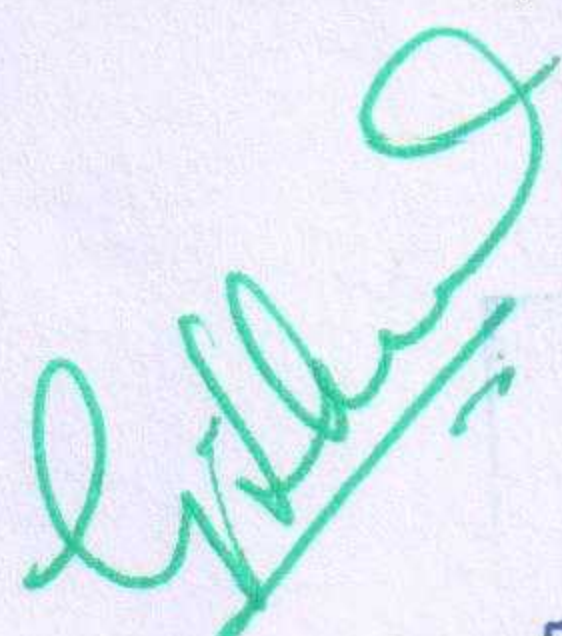
❖ **Field Study:**

(5 hours)

- Pond Ecosystem
- Forest Ecosystem

REFERENCES:

- Environmental Studies - from crisis to cure – by R. Rajagopalan (Third edition) Oxford University Press.
- Text book of Environmental Studies for undergraduate courses (second edition) by Erach Bharucha
- A text book of Environmental Studies by Dr.D.K.Asthana and Dr. Meera Asthana



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KAKATIYA UNIVERSITY
B.Sc. I YEAR SEMESTER-II
Ability Enhancement Compulsory Course (AECC)
Basic Computer Skills

FUNDAMENTALS OF COMPUTERS

Unit-I:

Introduction to Computers: what is a computer, characteristics of Computers, Generations of Computers, Classifications of Computers, Basic Computer organization, Applications of Computers. Input and Output Devices: Input devices, Output devices, Softcopy devices, Hard copy devices. Computer Memory and Processors: Introduction, Memory Hierarchy, Processor, Registers, Cache memory, primary memory, secondary storage devices, magnetic tapes, floppy disks, hard disks, optical drives, USB flash drivers, Memory cards, Mass storage devices, Basic processors architecture.

Unit-II:

Number System and Computer Codes: Binary number system, working with binary numbers, octal number system, hexadecimal number system, working with fractions, signed number representation in binary form, BCD code, and other codes. Boolean algebra and logic gates: Boolean algebra, Venn diagrams, representation of Boolean functions, logic gates, logic diagrams and Boolean expressions using karnaugh map. Computer Software: Introduction to computer software, classification of computer software, system software, application software, firmware, middleware, acquiring computer software, design and implementation of correct, efficient and maintainable programs.

Text: ReemaThareja, Fundamentals of Computers.

References

1. V.Rajaraman, 6th Edition Fundamentals of Computers, NeeharikaAdabala.
2. Anita Goel, Computer Fundamentals.

KAKATIYA UNIVERSITY - WARANGAL - TELANGANA

B.Sc. Programme under CBCS

With effect from the A.Y: 2019

Skill Enhancement Course- I

II Year

(Common to all Science Courses)

SEMESTER – III

FUNDAMENTALS OF NANO TECHNOLOGY

Theory: 2 Hours/Week; Credits: 2 Marks: 50 (Internal: 10; External: 40)

UNIT I:

Background to Nanotechnology:

Scientific revolution, molecular and atomic size, emergence of Nanotechnology, Challenges in Nanotechnology, Carbon age :(new forms of carbon graphene sheet to CNT)

Nucleation:

Macroscopic to microscopic crystals and nanocrystals, large surface to volume ratio, top-down and bottom-up approaches, self-assembly process, grain bounda volume in nanocrystals, defects in nanocrystals, surface effects on the properties.

UNIT- II:

Nano materials and properties:

Types of Nanostructure: one dimensional (1D), two dimensional (2D), three dimensional (3D) Nanostructured materials, Quantum dots, Quantum wire, Quantum sheet structures.

Carbon nanotubes (CNT), Metals (Au, Ag), Metal oxides(TiO₂,Zno), semiconductors (Si, Ge, CdS, ZnSe), Ceramics and composites, Biological system, DNA, RNA, Lipids, Size dependent properties, mechanical, physical and chemical properties.

Applications of Nanomaterials:

Molecular electronics and nano electronics, Quantum electronic devices, CNT based transistor and Field emission Display, biological applications, Biochemical sensor, Membrane based water purification.

Reference books:

1. Nanotechnology: Basic science and emerging technologies, M.Wilson, K.Kannangara, G. Smith, Overseas Press India PVT.LTD,NEW DELHI:
2. The chemistry of Nanomaterials: Synthesis, properties & applications. C.N.R.Rao, A.Muller, Wiley
3. Nano structures and Nano materials: Synthesis, properties and applications by Guozhong Cao, Imperial College press.
4. Hari Singh Nalwa, Handbook of nanostructured materials &nanotechnology optical properties.
5. Nano fabrication towards biomedical applications, C.S.S.R.Kumar, Wiley-VCH Verlag GmbH & Co, Weinheim.



Mrs. G. Manjula, Chairperson, BoS



Prof. B. Venkatram Reddy, HoD

KAKATIYA UNIVERSITY
B.Sc. PROGRAMME
Under CBCS System wef A.Y: 2020-21
Second Year : : Semester- III

BS-302 / SEC-2: BIO STATISTICS

[2 HPW, #Credits: 2, Marks: 50 (Internal:10, External:40)]

Unit-I

Descriptive and Relational Statistics: Data collection and tabulation, Graphical representation of data, Measures of central tendency (Mean, Median and Mode) with simple applications, Measures of dispersion (Range, Quartile Deviation, Mean Deviation, Standard Deviation, Standard error and Coefficient of variation) with simple applications, Concept of Skewness and Kurtosis.

Concept of correlation, computation of Karl-Pearson correlation coefficient, Spearman' s rank correlation coefficient and Simple linear regression with simple applications,

Unit-II

Probability and Inferential Statistics: Basic concepts and Basic terms of probability, Mathematical, Statistical and Axiomatic definitions of probability Conditional probability and independence of events, Addition and multiplication theorems (Statements only) with simple applications. Statements and applications of Binomial, Poisson and Normal distributions.

Concepts of Population, Sample, Parameter, Statistic, Null and Alternative hypotheses, Critical region, two types of errors, Level of significance. Tests of significance based on goodness of fit, means, variances using χ^2 test, t-test, F-test and analysis of variance (ANOVA).

References:

1. Irfan Ali Khan and Atiya Khanum: Fundamentals of Bio Statistics, Ukaaz Publications, HYD.
2. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
3. V. K. Kapoor and S. C. Gupta: Statistical Methods, Sultan Chand & Sons, New Delhi.

KAKATIYA UNIVERSITY - WARANGAL - TELANGANA

B.Sc. Programme under CBCS

With effect from the A.Y: 2019

Skill Enhancement Course- III

II Year

(Common to all Science Courses)

SEMESTER – IV

Fundamentals of Python

Theory:

2 Hours/Week;

Credits: 2

Marks: 50 (Internal: 10; External: 40)

Unit – I

Introduction to Python Programming: How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations (Operators. Type conversions, Expressions), More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops. Lists and Tuples: Sequences, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists,

Unit – II

Tuples- operations on tuples, Strings: Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings. Dictionaries and Sets: Dictionaries, Sets- operations on sets and Dictionaries. Functions: Introduction, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions- Generating Random Numbers, Writing Our Own Value-Returning Functions, The math Module, Storing Functions in Modules. File and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions.

Text Book:

Tony Gaddis, Starting Out With Python (3e)

References:

1. Kenneth A. Lambert, Fundamentals of Python
2. Clinton W. Brownley, Foundations for Analytics with Python
3. James Payne, Beginning Python using Python 2.6 and Python 3
4. Charles Dierach, Introduction to Computer Science using Python
5. Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3

KAKATIYA UNIVERSITY, WARANGAL
B.Sc. Programme
Under CBCS System wef A.Y: 2020-21
Second Year :: Semester - IV
BS-402/ SEC-4 (Common to all Science Courses)

Remedial Methods of Pollution - Drinking Water & Soil Fertility

[2HPW, #Credits: 2, Marks:50 (Internal:10, External:40)]

(Taught by: Chemistry Department)

UNIT I: Remedial Methods for Pollution:

Prevention and control of air pollution: Ozone hole - Causes and harm due to ozone depletion, Effect of CFC's in Ozone depletion and their replacements, Global Warming and Green-house effect, Precaution measures to control global warming, Deleterious effect of pollutants, Endangered monuments, Acid rain, Precautions to protect monuments, Sources of Radiation pollution, Chernobyl accident and its consequences. Radiation effect by usage of cell phones and protection tips, Deleterious effects of cell phone towers and health hazards.

Sources of water pollution: (i) Pollution due to pesticides and inorganic chemicals, (ii) Thermal pollution (iii) Ground water pollution (iv) Eutrophication.

Methods for control of water pollution and water recycling: Dumping of plastics in rivers and oceans and their effect on aquatic life, Determination of (i) Dissolved oxygen and (ii) Chemical Oxygen demand in polluted water, Illustration through charts (or) demonstration of experiments,

Sources of soil pollution: (i) Plastic bags (ii) Industrial and (iii) Agricultural sources, Control of soil pollution, Environmental laws in India, Environmental benefits of planting trees.

UNIT II: Drinking Water and Soil Fertility Standards and Analysis:

Water quality and common treatments for private drinking water systems, Drinking Water Standards: 1. Primary drinking water standards: Inorganics, Organics and Volatile Organic Chemicals, 2. Secondary drinking water standards: Inorganics and Physical Problems, Water testing, Mineral analysis, Microbiological tests, Pesticide and Other Organic Chemical Tests, Principle involved in Water Treatment Techniques: (i) Reverse Osmosis (ii) Disinfection methods such as Chlorination, Ultraviolet light, ozonation etc... (iii) Chemical oxidation and iv) Ion exchange (water softeners). Visit to nearby drinking water plants and interaction at sites.

Introduction to Soil Chemistry: Basic Concepts. Effect of P^H on nutrient availability, Macronutrients and their effect on plants, Carbon, Hydrogen, Oxygen, Nitrogen and Phosphorus, other macronutrients, Calcium, Magnesium and Sulfur, Micronutrients and their effect on plants, Boron ($B_4O_7^{2-}$), Copper (Cu^{2+}), Iron (Fe^{2+} , Fe^{3+}), Manganese (Mn^{2+}), Molybdenum (MoO_4^{2-}), Zinc (Zn^{2+}), Cobalt (Co^{2+}), Chlorine (Cl^-) and others. Determination of soil nitrogen by Kjeldahl method, Illustration through charts and demonstration of experiment, Visit to nearby agricultural farms and interaction with farmers, Discussion with farmers on the use of 'Soil Analysis Kits'.

KAKATIYA UNIVERSITY, WARANGAL-506 009

B.Sc. Under CBCS System wef A.Y: 2021-22

Third Year : : Semester - V

GENERIC ELECTIVE (Common to all students)

WATER RESOURCES MANAGEMENT

(4 hrs/week) (Taught by ant Science Dept) (Credits:4) (Marks:100)

UNIT-I:

Introduction to water resources management, different types of water resources, water resources and its importance, Global distribution of water. Hydrological cycle, Conservation of water, recycling of water.

Unit-II:

Rain water harvesting, methods of roof top rain water harvesting in urban setting: Direct method - Storing rain water in tanks for direct use; indirect methods - Recharge pits, bore wells/dug wells, Recharge trenches. Over use of surface and ground water and control measures.

UNIT-III:

Importance of water shed and water shed management, Rain water harvesting in rural setting: Check dams, percolation tanks, gabion structure, continuous contour trenches, staggered contour trenches, farm ponds. Surface water and ground water pollution, control measures.

UNIT-IV :

Mission Bhagiratha: Telangana government water grid project for drinking water supply - aims and objectives and method of implementation. Mission Kakatiya: Telangana government project for the restoration of minor irrigation tanks, aims and objectives and method of implementation.

Text books:

- 1) Water Resources, Conservation and Management by Chatterjee, S.N.
- 2) Groundwater hydrology by Todd
- 3) Watershed management by J.V.S.Murthy
- 4) Applied Hydrogeology by Fetter.

KAKATIYA UNIVERSITY - WARANGAL - TELANGANA

B.Sc. Programme under CBCS

With effect from the A.Y: 2019

Optional Paper

(Common to all Science Courses)

III Year SEMESTER – VI

PUBLIC HEALTH AND HYGIENE

UNIT-I: Nutrition, Environment and Health

- 1.1 Classification of foods – Carbohydrates, Proteins, Lipids and Minerals.
- 1.2 Nutritional deficiencies and disorders of Carbohydrates, Proteins, Lipids and Minerals.
- 1.3 Concept, Steps and Applications of Environment and Health Impact Assessment.
- 1.4 Industrial, Agricultural and Urban Health. Environmental Pollution and Associated Health Hazards.

UNIT-II : Communicable and Non-Communicable Diseases

- 2.1 Causes, symptoms, diagnosis, treatment and prevention of Communicable Diseases (Malaria, Filariasis, Tuberculosis and AIDS).
- 2.2 Causes, symptoms, diagnosis, treatment and prevention of Non-Communicable Diseases (Hypertension, Coronary Heart Diseases, Diabetes and Obesity).
- 2.3 Symptoms, treatment and prevention measures of Water Borne Diseases (Diarrhea, Typhoid, Hepatitis and Amebiasis).
- 2.4 Symptoms, treatment and prevention measures Air Borne Diseases (COVID-19, Influenza, Whooping cough and Chickenpox).

UNIT-III :Food and Diet Systems

- 3.1 Definition of Food, Types of foods (Texturized foods, Novel foods and Organic foods).
- 3.2 Food safety system and issues; Physical, chemical and microbiological contaminants; The significance of foodborne diseases.
- 3.3 Principles of diet in diseases, Classification of diets according to nutrients.
- 3.4 Etiology, Symptom and Dietary Management in Obesity, Underweight, Hypertension, Diabetes Mellitus, Atherosclerosis.

UNIT-IV : Personal Hygiene and Sanitation

- 4.1 Definition of Hygiene and Sanitation, Personal Hygiene of food handler, Techniques of Washing Hands, Pest control and Garbage Disposal.
- 4.2 Definition of Public Health, Hygiene, Social and Preventive Medicine, Basic aspects of Personal Hygiene and Disposal of Waste.
- 4.3 The Hygiene Practices of the different categories of family members (children, parents and aged members)
- 4.4 Definition of Sanitation, Environmental Sanitation, Sanitation of Food Serving Institution, The importance of proper sanitation practices.

Suggested Readings:
