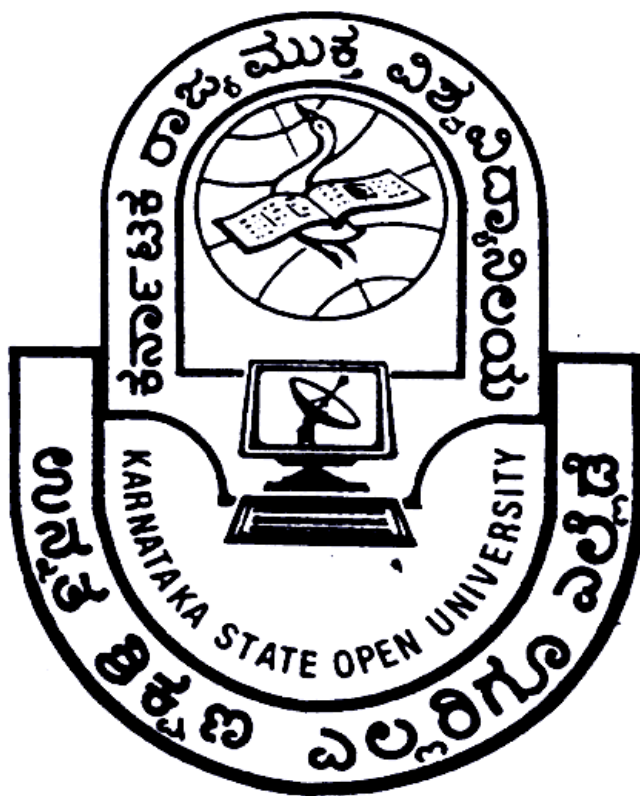


KARNATAKA STATE OPEN UNIVERSITY

PROGRAMME GUIDE

M.Sc in Biochemistry



**DEPARTMENT OF POST GRADUATE
STUDIES AND RESEARCH IN
BIOCHEMISTRY**

Mukthagangothri, Mysore – 570 006

VICE CHANCELLOR'S MESSAGE

Dear Learner,

The family of KSOU welcomes you to pursue the academic programmes you have chosen to achieve not only academic excellence but also to fulfill the desire of your career. The University, established by the Act of State Legislature has created wonderful academic ambience. The programmes offered by the University have been recognized by University Grants Commission. Therefore, the degrees are valid for employment opportunities across the country. The 'core values' of the University are derived from its vision 'Higher Education to Everyone, Everywhere'. The ultimate touchstone of quality higher education is the motto of the University. Today, higher education stands at the crossroads of keeping pace with the emerging needs of the country.

The University has adopted a school concept in its functioning. The school of science headed by a Director offers academic programmes in basic and applied sciences. It combines an interdisciplinary and professional approach to pedagogy and research. The University believes that rigors of the contemporary world require competent quality human resources to create knowledge based society. The academic activities of B.Sc. programmes are initiated through well-established department/s led by the Chairperson/s. Well-qualified teaching faculty with equally dedicated non-academic team is an asset to the University, which is always, committed for the welfare of the students.

The University functions in a 3-tier system of student support service, namely Headquarters, Regional Centres and Learners Support Centres spread all over Karnataka. The learners can undergo teaching-learning process in the notified Regional Centres/Learner Support Centres. The University has adopted a mechanism to deliver Self Learning Material by print, limited audio visual and Counseling/Personal Contact Programme. As a learner, you will have greater opportunity to gain knowledge and skill through those mechanisms. The academic counselors will play a strategic role and supports you from the enrollment of the programme till you accomplish the goal. A proper blending of the knowledge and skill will be imparted so that you will be transformed as a good citizen to contribute to the development of society and the country.

The UGC in its Public Notice dated: 23.02.2018 stated that the Degree/Diploma/Certificate Programme awarded through distance mode are at par with corresponding Degree/ Diploma/ Certificate Programme obtained through conventional universities. The degrees acquired through distance education are recognized for the purpose of employment in State/Central Government, MNCs, Private Sector etc. and also for pursuing higher education in other educational institutes. Therefore, you have greater opportunity of pursuing Higher Education without any kind of fear about your career.

I am sure you will enjoy good experience with services rendered by the university through its Regional centres and Learner Support Centres, besides Headquarters. I wish you all the best in your academic endeavors.

Prof. Vidyashankar S

MESSAGE FROM DEAN (ACADEMIC)

Dear learner,

As you know education imparts knowledge and skills which empowers all to build civilized society. Higher education policy which was once a priority sector is no longer maintaining the same, due to General Agreements and Trade in Services (GATS). The education policy of the government provides a greater opportunity to accelerate Gross Enrolment Ratio (GER).

Higher education is imparted both by conventional system and ODL system. The former education has inbuilt rigidity where ODL enjoy flexibility. Presently the GER in higher education around is 27%, thanks to the role played by ODL system. The ODL system operates under access, flexibility and success.

The Karnataka State Open University, which came up in 1996 under the Act of state legislation 1992 play a stupendous role in imparting quality education. As one of the premier institution in ODL system of the country, the university strive hard to empower various disadvantaged sections of the society like, house wives, economically and culturally backward, tribal, senior citizens, working groups, differently abled, professionals, technocrat, jail inmates etc., The University cater to the needs of students ranging from the age of 18 years to 80 years.

The programmes offered by KSOU are strictly in conformity with quality and standards set by regulatory bodies UGC/AICTE etc., The Karnataka State Open University was established on 1st June 1996 vide Government Notification No. EDI/ UOV/ 95 dated 12th February 1996- KSOU Act 1992, keeping in view the educational needs of our country, in general, and the state in particular. The University has a long and rich experience in the field of Distance Education as the erstwhile Institute of Correspondence Course and Continuing Education. University Grants Commission (UGC) New-Delhi vide order No: F.No 14-5/2018 (DEB-I) Dated : 14th August 2018 for the period from 2018-19 to 2022-23. The KSOU operates on dictum quality first and students foremost. Further the university is highly committed to provide need based education to the door steps of the students.

The KSOU has students' support services which work in 3 tiers - head office; regional centres and study centres within the jurisdiction of state. The admissions, counseling and the examinations are conducted in different places, hence, education at the door steps.

The dedicated staffs in various department and state of the art student support services create a conducive environment for teaching learning. The university put in places all possible efforts to keep the learners happy from the stage of enrolment till they get employed. I am confident that, as a learner in the university, you will enjoy good experience in the system.

I wish you all the best in your academic endeavors.

Truly yours,

Dean (Academic)

A WORD FROM CHAIRPERSON

Welcome to the Department of Biochemistry.

The KSOU, a premier ODL institution supports highly disadvantaged group of students to study the programme like Biochemistry by distance mode. Biochemistry is the 'Chemistry of Life'. It is central to all areas of the Biological or Life Sciences. Studying biochemistry provides an understanding of every aspect of the structure and function of living things at the molecular level. It is a laboratory based science that applies chemistry to biological systems. Since its foundation as a discipline, biochemistry has illuminated many of the problems that have fascinated and perplexed biologists for generations. Further, biochemistry has become an essential part of much of modern sciences; a Biochemistry MSc is a valuable foundation for many different careers.

Through studying biochemistry, you not only acquire a great deal of subject knowledge but you also develop many skills which will be invaluable for your next career move. Following completion of MSc Biochemistry, you will be ready to find exciting career opportunities. The syllabus is framed in accordance with the UGC guidelines and the chapters covered will automatically prepare you for eligibility examinations such as NET, SLET, GATE etc., Jobs directly related to Biochemistry include: Biomedical scientist, Clinical research associate, Forensic scientist, Higher education lecturer, Research scientist (life sciences), Toxicologist etc., Remember that many other life sciences employers accept applications from Biochemists, so don't restrict your thinking to the jobs listed above.

The Department provides you the study materials in print. The material is in the form of self-learning and revolves around the learners. The information and communication technology will be employed extensively to reach the students. Further, during contact and counseling sessions paramount importance at individual level will be focused to enable sufficient learning of laboratory and experimental skills. Utmost emphasis will be provided towards designing and performing experiments independently. In addition, the university has a state of art library to enrich your knowledge. I am confident that, following completion of the course; you will be an asset in the scientific society, as you acquire requisite skills, knowledge and attitude. Welcome to our world of biochemistry; it's a wonderful place to be.

Chairman

Department of Biochemistry

CONTENTS

Sl.No.	Description	Page-No.
1	Department of Studies in Biochemistry	6-14
2	Programme: Master of Science in Biochemistry	14-15
3	Syllabus	16-54
4	Annexure – I Open Elective for 1 st SEM	55-76
	Annexure – II Open Elective for 2 nd SEM	77-94
	Annexure - III	95-97
	A. Question Paper Pattern	
	B. Model Question Paper	

1. DEPARTMENT OF STUDIES IN BIOCHEMISTRY

Department of Studies in Biochemistry, KSOU, Mysore was established during the year 2012. The Department proposes to conduct M.Sc., biochemistry programme in ODL mode as per the motto "Education to everyone everywhere" on a mission to provide quality higher education with emphasis on educating the public by offering respected, relevant, accessible, affordable and student-focused programmes under UGC guidelines. The proposed M.Sc., in Biochemistry course is highly relevant to the mission and goals of KSOU, as distance learning is rapidly becoming an alternative to traditional classrooms. This will afford students the degree they are looking for with a synchronous delivery, in which a student is provided with self-learning materials along with personal contact classes for practical's and counselling sessions.

We engage and embrace a community of graduate students and post-graduates from various natural and chemical science streams. This department provides an amazing opportunity to explore the biological sciences. As the study of life itself, biology is a subject that draws the interest of almost everyone. Our understanding of the chemical foundations of life is constantly growing, becoming more sophisticated every year. As a broad-based biochemistry department, we form a community dedicated to understanding the natural world down to molecular interactions. The Department of Biochemistry is one of the dynamic and interactive departments under the School of Sciences along with other science programmes located in Vijnana Bhavan.

Faculty Details

a. Department of Biochemistry

Sl. No.	Name of the Faculty	Designation	Qualification	Specialization	Expe- rience in Years	Mobile Number
1	Dr. Nataraju Angaswamy	Assistant Professor and Chairman	M.Sc., Ph.D	Immunology		9620697355
2	Smt. Rajeshwari G	Assistant Professor (Guest Faculty)		Biochemistry		9071080249

2. PROGRAMME: MASTER OF SCIENCE IN BIOCHEMISTRY

M.Sc. in Biochemistry programme consists of four semesters. During each semester students have to appear for four semester end theory examinations and 2 practical exams each. The first semester has basic and advanced study of courses such as building blocks of biomolecules, biochemical techniques, physiology and nutrition and cell biology / general chemistry. The second semester upgrades the students with the knowledge of functional biomolecules, enzymology, bioenergetics with advanced techniques and microbiology/ biostatistics and bioinformatics. Building on the basic knowledge obtained in the first two semesters the third semester syllabus is a notch above in providing advanced learning pertinent to metabolism of proteins, carbohydrates, lipids, nucleic acids and other biomolecules along with theoretical and practical understanding of immunology and genetics.

Fourth semester has further advanced subjects such as molecular biology, biochemistry of hormones and clinical biochemistry applicable to laboratory and clinical level. In addition, the students are advised to take-up a dissertation or project work in well-established laboratories.

Thorough knowledge of the molecular interactions that underlie both normal physiology and disease states is the foundation for rational approaches to therapies, drug design and personalized medicine. Our goal in this endeavor is to advance the understanding of biology using the discipline of biochemistry. Such knowledge is necessary for the current populations to take meaningful decisions during illness and bad health and they can advise others.

The learner's outcome from joining our courses will be to work as laboratory biochemists (in clinical, research and industries) teachers and NGO's. They have huge opportunities in various research and development laboratories of hospitals, research organizations, pharmaceutical, food, beverage and chemical industries, research institutes, teaching field etc., The course is one of the most versatile degrees that can be obtained because of the fundamental nature of the discipline, and also because it's interdisciplinary nature which can be combined with so many other sciences, leading to powerful and sought-after skills and exciting career possibilities.

Successful students rely on their proficiency to learn and monitor their own learning. In this context, this course has a well-structured set of self-learning material customized to learner's capacity and aptitude. This essentially is a self-study course along with required coaching through contact classes and counseling sessions. However, the course is modulated to assess the pupil's progress through checks involving direct dialogue between the instructors and learners. Laboratory and field work component are designed at regular stages which will add to the experience of the learner.

2.1 MISSION AND OBJECTIVES

a. Mission:

- ❖ To impart quality education at affordable cost.
- ❖ To impart the learners with requisite knowledge, skill and attitude in Biochemistry.
- ❖ To motivate the learners to develop research attitude.
- ❖ To train the learners to realize the individual, corporate and social responsibilities.
- ❖ To impart education to the learner and thereby imbibe civic, moral and ethical values.

b. Objectives:

- ❖ To provide an effective and less expensive alternative higher education through ODL mode in Biochemistry to different categories of potential qualified learners.

- ❖ To provide an advanced learning of core principles in the field of Biochemistry with appropriate skills and aptitude, which could be applied to other subjects such as biotechnology, food science, nutrition, microbiology, genetics, molecular biology etc.
- ❖ To produce professionals who can engage in clinical laboratories, research laboratories and work in community health sectors.
- ❖ To provide basic and advanced understanding of Biochemistry principles both in theory and practicals, which are required to clear many competitive exams that are conducted based on interdisciplinary knowledge and application skills such as UGC, NET, CSIR, ICMR, etc.

3. SYLLABUS and COURSE MATRIX

M.Sc. Biochemistry Course patter for prospectus.

Sem	Nature	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Minimum Passing marks		Duration of Exam (hours)
						Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end	
I	HC	BC-1.1	Building blocks of	4	12	20	80	100	08	32	3
	HC	BC-1.2	Biochemical Techniques	4	12	20	80	100	08	32	3
	SC	BC- A -1.3	Human Physiology	3	09	20	80	100	08	32	3
		BC-A-1.4	Cell Biology-I	3	09	20	80	100	08	32	3
	SC	BC –B-1.3	Microbiology-I	3	09	20	80	100	08	32	3
		BC-B-1.4	Bioenergetics	3	09	20	80	100	08	32	3
	HC	BC-1.5	Practical 1 and Practical 2	4	120	20	80	100	08	32	3
	IE	BC-IE -1	Basics of Bioinorganic and Biophysical chemistry for Biology graduates.	2	06	10	40	50	04	16	1 ^{1/2}
			Total	20	168	110	440	550	44	176	-

Sem	Nature	Course Code	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Minimum Passing marks		Duration of Exam (hours)
						Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
II	HC	BC-2.1	Functional Biomolecules	4	12	20	80	100	08	32	3
	HC	BC-2.2	Enzymology	4	12	20	80	100	08	32	3
	SC	BC- A -2.3	Nutritional Biochemistry	3	09	20	80	100	08	32	3
		BC-A-2.4	Cell Biology-II	3	09	20	80	100	08	32	3
	SC	BC –B-2.3	Microbiology-II	3	09	20	80	100	08	32	3
		BC-B-2.4	Advanced techniques in	3	09	20	80	100	08	32	3
	HC	BC-2.5	Practical 3 and Practical 4	4	120	20	80	100	08	32	3
	IE	BC-IE -2	Basic Bioorganic chemistry for Biology graduates.	2	06	10	40	50	04	16	1 ^{1/2}
			Total	20	168	110	440	550	44	176	-

Sem	Nature	CourseCode	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Minimum Passing marks		Duration of Exam (hours)
						Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
III	HC	BC-3.1	Metabolism-I	4	12	20	80	100	08	32	3
	HC	BC-3.2	Metabolism-II	4	12	20	80	100	08	32	3
	SC	BC- A -3.3	Immunology-I	3	09	20	80	100	08	32	3
		BC- A-3.4	Biochemistry of Hormones-I	3	09	20	80	100	08	32	3
	SC	BC – B -3.3	Biostatistics	3	09	20	80	100	08	32	3
		BC- B -3.4	Principles of Genetics -I	3	09	20	80	100	08	32	3
	HC	BC -3.5	Practical 5 and Practical 6	4	120	20	80	100	08	32	3
	SEC	BC-SEC -1	Clinical Biochemistry-I / Project work or Dissertation – Phase I	3	09	20	80	100	08	32	3
			Total	21	171	120	480	600	48	192	-

Sem	Nature	CourseCode	Course Title	Credits	Counseling/PCP Hours	Max. Marks			Minimum Passing marks		Duration of Exam (hours)
						Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
IV	HC	BC - 4.1	Molecular Biology-I	4	12	20	80	100	08	32	3
	HC	BC - 4.2	Molecular Biology-II	4	12	20	80	100	08	32	3
	SC	BC –A- 4.3	Immunology-II	3	09	20	80	100	08	32	3
		BC- A- 4.4	Biochemistry of Hormones-II	3	09	20	80	100	08	32	3
	SC	BC –B- 4.3	Bioinformatics	3	09	20	80	100	08	32	3
		BC B - 4.4	Principles of Genetics -II	3	09	20	80	100	08	32	3
	HC	BC - 4.5	Practical 7 and Practical 8	4	120	20	80	100	08	32	3
	SEC	BC-SEC-2	Clinical Biochemistry-II / Project work or Dissertation – Phase II	3	09	20	80	100	08	32	3
			Total	21	171	120	480	600	48	192	-

Note: HC-Hard Core, SC-Soft Core, EL-Interdisciplinary Elective, SEC-Skill Enhancement Course, T-Theory, P-Practical. Out of the four soft core (SC) papers, students can choose any two. The Students shall study additional mandatory course, for which no assessment will be made.

M.Sc. in Biochemistry

Revised Syllabus as per Choice Based Credit System

CBCS Course Matrix

Course Code	Semester and Course	Credits	Counseling/PCP hours*	Maximum Marks			Examination duration
				Internal Assessment	Term-End Examination	Total	
HC 1.1	Semester - I Course 1	4	12	20	80	100	3
HC 1.2	Course 2	4	12	20	80	100	3
HC 1.3	Course 3 (Practical)	4	120	20	80	100	3
SC 1.1	Course 1	3	09	20	80	100	3
SC 1.2	Course 2	3	09	20	80	100	3
EL-1	Inter Disciplinary course –I	2	06	10	40	50	1 ^{1/2}
	Semester - I Total	20	168	110	440	550	
HC 2.1	Semester - II Course 1	4	12	20	80	100	3
HC 2.2	Course 2	4	12	20	80	100	3
HC 2.3	Course 3 (Practical)	4	120	20	80	100	3
SC 2.1	Course 1	3	09	20	80	100	3
SC 2.2	Course 2	3	09	20	80	100	3
EL-2	Inter Disciplinary course–II	2	06	10	40	50	1 ^{1/2}
	Semester - II Total	20	168	110	440	550	
HC 3.1	Semester - III Course 1	4	12	20	80	100	3
HC 3.2	Course 2	4	12	20	80	100	3
HC 3.3	Course 3 (Practical)	4	120	20	80	100	3
SC 3.1	Course 1	3	09	20	80	100	3
SC 3.2	Course 2	3	09	20	80	100	3
SEC-1	@Skill Enhancement course –1 /Project/Dissertation –Phase I	3	09	20	80	100	3
	Semester – III Total	21	171	120	480	600	
HC 4.1	Semester - IV Course 1	4	12	20	80	100	3
HC 4.2	Course 2	4	12	20	80	100	3
HC 4.3	Course 3 (Practical)	4	120	20	80	100	3
SC 4.1	Course 1	3	09	20	80	100	3
SC 4.2	Course 2	3	09	20	80	100	3
SEC-2	@Skill Enhancement course – 2 /Project/Dissertation –Phase II	3	09	20	80	100	3
	Semester – IV Total	21	171	120	480	600	
Semester I to IV Grand total		82	678	460	1840	2300	

Note: The Students shall study mandatory course, for which no assessment in III semester only

*10% of credits on total learning hours

#during 3rd and 4th Semester the department concerned may offer specialized soft courses with limited mobility.

HC-Hard Core, SC-Soft Core, EL-Interdisciplinary Elective, SEC-Skill Enhancement Course.

@ = Optional, Students can either choose skill enhancement program (appear for theory exams) or perform a Project work/Dissertation for **6 Credits (III Sem-3 credits and IV Sem 3 credits = 6 Credits)** and present their work along with the report and appear for viva-voce.

M.Sc. Biochemistry – Revised Syllabus as per CBCS

M.Sc. Biochemistry - First Semester

Course	Course Code	Course Title	Credits
HC Course 1	BC-1.1	Building blocks of Biomolecules	4
HC Course 2	BC -1.2	Biochemical Techniques	4
SC Course 1 (A stream)	BC -A 1.3	Human Physiology	2
SC Course 2 (A stream)	BC- A 1.4	Cell Biology-I	2
SC Course 1 (B stream)	BC –B 1.3	Microbiology-I	2
SC Course 2 (B stream)	BC –B 1.4	Bioenergetics	2
HC Course 3(Practical)	BC -1.5	Practical 1 and Practical 2	4
Interdisciplinary Elective 1	IE -1	-	2
Total			18

Note: Of the two streams (A stream and B Stream) of Soft Core (SC) courses, the student may choose any one stream.

M.Sc. Biochemistry - Second Semester

Course	Course Code	Course Title	Credits
HC Course 1	BC- 2.1	Functional Biomolecules	4
HC Course 2	BC 2.2	Enzymology	4
SC Course 1 (A stream)	BC-A 2.3	Nutritional Biochemistry	2
SC Course 2 (A stream)	BC–A 2.4	Cell Biology-II	2
SC Course 1 (B stream)	BC–B 2.3	Microbiology-II	2
SC Course 2 (B stream)	BC-B 2.4	Advanced techniques in Biochemistry	2
HC Course 3(Practical)	BC- 2.5	Practical 3 and Practical 4	4
Interdisciplinary Elective2	IE -2	-	2
Total			18

Note: Of the two streams (A stream and B Stream) of Soft Core (SC) courses, the student may choose any one stream.

M.Sc. Biochemistry - Third Semester

Course	Course Code	Course Title	Credits
HC Course 1	BC- 3.1	Metabolism-I	4
HC Course 2	BC- 3.2	Metabolism-II	4
SC Course 1 (A stream)	BC-A 3.3	Immunology-I	2
SC Course 2 (A stream)	BC-A 3.4	Biochemistry of Hormones-I	2
SC Course 1 (B stream)	BC-B 3.3	Biostatistics	2
SC Course 2 (B stream)	BC-B 3.4	Principles of Genetics -I	2
HC Course 3(Practical)	BC- 3.5	Practical 5 and Practical 6	4
Skill Enhancement Course 1	SEC-1	Clinical Biochemistry-I	2
Total			18

Note: Of the two streams (A stream and B Stream) of Soft Core (SC) courses, the student may choose any one stream.

M.Sc. Biochemistry - Fourth Semester

Course	Course Code	Course Title	Credits
HC Course 1	BC 4.1	Molecular Biology-I	4
HC Course 2	BC 4.2	Molecular Biology-II	4
SC Course 1 (A stream)	BC -A 4.3	Immunology-II	2
SC Course 2 (A stream)	BC -A 4.4	Biochemistry of Hormones-II	2
SC Course 1 (B stream)	BC- B 4.3	Bioinformatics	2
SC Course 2 (B stream)	BC- B 4.4	Principles of Genetics -II	2
HC Course 3 (Practical)	BC 4.5	Practical 7 and Practical 8	4
Skill Enhancement Course 2	SEC-2	Clinical Biochemistry-II	2
Total			18

Note: Of the two streams of Soft Core (SC) courses, the student may choose any one stream.
Dissertation/project work is compulsory.

Interdisciplinary Electives to be offered by Department of Biochemistry

IE-1: Basics of Bioinorganic and Biophysical chemistry for Biology graduates.

IE-2: Basic Bioorganic chemistry for Biology graduates.

Skill Enhancement Course to be offered by Department of Biochemistry

SEC-1: Clinical Biochemistry-I

SEC-2: Clinical Biochemistry-II

Two Streams of Soft Core Courses in Biochemistry

	Biochemistry-Stream A		Biochemistry-Stream B	
First Semester	BC-A1.3	Human Physiology	BC-B1.3	Microbiology-I
	BC-A1.4	Cell Biology-I	BC-B1.4	Bioenergetics
Second Semester	BC-A2.3	Nutritional Biochemistry	BC-B2.3	Microbiology-II
	BC-A2.4	Cell Biology-II	BC-B2.4	Advanced techniques in Biochemistry
Third Semester	BC-A3.3	Immunology-I	BC-B3.3	Biostatistics
	BC-A3.4	Biochemistry of Hormones-I	BC-B3.4	Principles of Genetics -I
Fourth Semester	BC-A4.3	Immunology-II	BC-B4.3	Bioinformatics
	BC-A4.4	Biochemistry of Hormones-II	BC-B4.4	Principles of Genetics -II

Note: Of the two streams of Soft Core (SC) courses, the student may choose any one stream. The student will continue in the same stream for all the four semesters.

Interdisciplinary Electives (Open Electives)

SL No	Department	Sub Code	I Semester	Sub Code	II Semester
1	KANNADA	ELK-01	ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ	ELK-02	ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ
2	ENGLISH	ELE-01	Indian Literature -I	ELE-02	Indian Literature -II
3	HINDI	ELH-01	Vyavaharik Hindi Vyakaran	ELH-02	Hindi Cinema
4	TELUGU	ELT-01	Tilak	ELT-02	Telugu Samskruthi – Samaajam
5	HISTORY	ELHS-01	Ancient World Civilisations (Egypt, Mesopotamia, Greek, Roman, Inca, Chinese)	ELHS-02	Social Reform Movement in India
6	ECONOMICS	ELEC-01	Economic Policies of India Since 1991	ELEC-02	Institutions for International Development
7	POLITICAL SCIENCE	ELP-01	Local Government in India.	ELP-02	Indian Constitution
8	PUBLIC ADMINISTRATION	ELPA-01	Indian Polity-1	ELPA-02	Indian Polity-2
9	SOCIOLOGY	ELS-01	Invitation to Sociology	ELS-02	Study of Indian Society
10	JOURNALISM AND MASS COMMUNICATION	ELJ-01	Aspects of Journalism and Mass Communication - I	ELJ-02	Aspects of Journalism and Mass Communication - II
11	ANCIENT HISTORY AND ARCHEOLOGY	ELA-01	World heritage sites of India	ELA-02	Cultural History of Hoysalas
12	EDUCATION	ELED-01	Foundations of Education	ELED-02	Higher Education
13	COMMERCE	ELC –01	Personal Financial Planning	ELC –02	Entrepreneurship Development
14	MANAGEMENT	ELM –01	Disaster Management	ELM –02	E-Commerce
15	BIOCHEMISTRY	ELMBC –01	Basics of Bioinorganic and Biophysical chemistry for Biology graduates.	ELMBC –02	Basic Bioorganic chemistry for Biology graduates.
16	BIOTECHNOLOGY	ELMBT –01	Biotechnology Principles and applications	ELMBT –02	Fundamentals of Biotechnology
17	CHEMISTRY	ELMC –01	Open Elective I	ELMC –02	Open Elective II
18	CLINICAL NUTRITION AND	ELMCND – 01	Healthy lifestyles and nutrition	ELMCND–02	Nutraceuticals and health foods

	DIETETICS				
19	COMPUTER SCIENCE	ELMCS –01	Mobile App Development	ELMCS –02	E-Commerce
20	ENVIRONMENTAL SCIENCE	ELMES –01	Basics of Environmental Science	ELMES –02	Advances in Environmental Science
21	GEOGRAPHY	ELMG –01	Introduction to Physical Geography	ELMG –02	Geography of Karnataka
22	MATHEMATICS	ELMM –01	Fundamentals of Mathematics	ELMM –02	Combinatorics and Graph Theory
23	MICROBIOLOGY	ELMMB –01	Microbial World and Microbial Diversity	ELMMB –02	Microbes in Sustainable Agriculture and Development
24	PHYSICS	ELMP –01	Mechanics	ELMP –02	Waves and Optics
25	PSYCHOLOGY	ELMPSY –01	Introduction to Psychology	ELMPSY –02	Psychology in Everyday Life
26	INFORMATION TECHNOLOGY	ELMIT –01	Green Computing	ELMIT –02	E-Commerce
27	BOTANY (NEW)	ELMBOT –01	Plant-Microbe Interactions	ELMBOT –02	Plant Diversity and Human Welfare
28	ZOOLOGY (NEW)	ELMZ –01	Parasites Vectors & communicable diseases	ELMZ–02	Essential of Reproductive Health
29	FOOD AND NUTRITION SCIENCES	ELMFNS –01	Food Psychology	ELMFNS –02	Nutritional Management in Disaster Conditions

Note:

- A. I and II Semester Open elective (Interdisciplinary Electives) syllabus are attached in Annexure – I and Annexure - II respectively.
- B. The Students may contact respective department chairperson in case of any queries regarding open elective course. The contact details available in the university website.

DETAILED SYLLABI FOR M.Sc. IN BIOCHEMISTRY (SEMESTER SCHEME)

FIRST SEMESTER

HC: BC-1.1: COURSE-I: BUILDING BLOCKS OF BIOMOLECULES 4 Credits

BC-1.1: Block-I: Carbohydrates

Unit-1: Classification of Carbohydrates: Mono, di, oligo and polysaccharides. Structure and Chemistry of monosaccharides; Pentoses, Hexoses, Deoxysugars, Amino sugars; Muramic and Neuraminic acids.

Unit-2: Linkages in Sucrose, Lactose, Maltose and other Glycosides. Homo polysaccharide: Eg. Starch, Cellulose, Glycogen. Isolation- ex. Starch, Hetero polysaccharides: Chondroitin sulphate, Heparin, Blood group polysaccharides, Chitin and Bacterial cell wall polysaccharides.

Unit-3: Structural elucidation of homo and hetero polysaccharides:

a) Degradation by graded acid hydrolysis, b) Periodate oxidation. c) Methylation.

Unit-4: Secondary structure of polysaccharides. GC-MS.

BC-1.1: Block-II: Amino acids-Building blocks of proteins

Unit-5: Nomenclature & classification. Physico-chemical properties: Physical properties: Zwitterionic structure, pI, pKa and pH titration of amino acids; determination of pI and pKa.

Unit-6: Spectral properties of amino acids: UV absorption, Fluorescence emission. Chemical reactions of amino acids.

Unit-7: Stereo-chemistry of amino acids D & L and R and S. Quantitative estimation of amino acids, Formal titration and colorimetric methods.

Unit-8: Peptide bond. Solid phase Synthesis of biologically active peptides Ex. Glutathione. Structure and Importance of cyclic peptides Ex. Vasopressin, oxytocin, endorphins, enkephalin Vanomycin.

BC-1.1: Block-III: Lipids:

Unit-9: Classification of lipids: Oils, Fats and waxes, Occurrence and properties. Fatty acids, esters of fatty acids and Cholesterol.

Unit-10: Compound lipids: Phospho lipids, Glycolipids and sphingo lipids, Cerebrosides and Gangliosides. Lipid bilayers,

Unit-11: Eicosanoids: Prostaglandins, Leucotrienes and Prostacyclins, Thromboxans, diacylglycerol, PAF and IP₃.

Unit-12: Chemical principles of Isoprenoids, Terpenes, Polyphenols, Procyanidins, Flavonoids, Xanthans, Alkaloids and Pigments.

BC-1.1: Block-IV: Nucleic acids

Unit-13: Isolation of DNA and RNA from biological sources (microbes, plants and animals). Purification of nucleic acids. Physicochemical properties and Hypo and hyper chromic

effects. Melting of DNA, T_m – factors affecting T_m , Cot curve, and classification of DNA based on Cot curve, Chargaff's rule.

Unit-14: Structure of DNA and RNA

Unit-15: Chemical reactions of DNA and RNA

Unit-16: Chemistry and biological occurrence of Furan, Pyridine, Indole, Thiazole. Pterine, Pteridine, Iso-allaoxazine, Pyrrole, Porphyrin and Haeme and other porphyrins.

Selected References:

1. Chemistry of carbohydrates- Pigmann and Horton, 3rd Ed (1970), Academic press Cambridge, Massachusetts.
 2. Instant Notes in Biochemistry. Hames, B. D. Hopper, N. M and Houghton (1998), J. D. Viva Book Pvt. Ltd. New Delhi.
 3. Biochemistry. Donald Voet and Judith, G. Voet. 4th Ed. (2010). John Wiley and Sons Inc.
 4. Biochemistry. Stryer, L. 5th Ed. (2002), W. H. Freeman, New York.
- Biochemistry. Garret, R. H. and Grishman, 4th Ed. (1995), C. M. Saunders College Publishing.

HC: BC-1.2: COURSE-II: BIOCHEMICAL TECHNIQUES 4 Credits

BC-1.2: Block-I: Chromatography

Unit-1: Preliminary techniques in biochemistry: Animal models-choice of animals. Types of studies using: mutant organisms, cultured cells; plants as models.

Unit-2: General principle of chromatographic techniques, Paper chromatography: a) Ascending b) Descending c) circular d) Two dimensional.

Unit-3: TLC: Qualitative and quantitative. Adsorption, ion exchange, gel filtration,

Unit-4: Affinity chromatography, GLC, chromatofocussing, HPLC and RP-HPLC.

BC-1.2: Block-II: Electrophoresis techniques

Unit-5: Polyacrylamide gel electrophoresis, SDS-PAGE, 2D-electrophoresis, Agarose gel electrophoresis, separation of protein, lipoproteins, nucleic acids.

Unit-6: Visualizing separated macromolecules– staining, fluorescence, PAS staining, zymogram and reverse zymogram.

Unit-7: Iso-electric focusing, pulsed field electrophoresis, high voltage electrophoresis, capillary electrophoresis, isotachopheresis.

Unit-8: Electrodes: Hydrogen electrode, oxygen electrode potential, oxidation and reduction red-ox potential.

BC-1.2: Block-III: Ultra centrifugation

Unit-9: Construction of preparative and analytical ultra-centrifuge. Optical system, Schlieren optics, Raleigh scattering

Unit-10: Svedberg's constant, Molecular weight determination by sedimentation velocity and sedimentation equilibrium. Preparation of gradients: Continuous and Discontinuous gradients (CsCl₂, Sucrose, Percol.)

Unit-11: Cell fractionation techniques –Isolation of cell organelles, differential and density gradient centrifugation.

Unit-12: Spectroscopic techniques: Colorimeter, Beer-Lambert's law and its limitations. Determination of extinction coefficient; applications of colorimeter.

BC-1.2: Block-IV: Tracer techniques

Unit-13: Isotopic tracers: Natural and artificial radioactivity, Nuclear reactions and generation of light isotopes (radio-isotopes). Heavy isotopes; theory and construction of mass spectrometer.

Unit-14: Radioisotopes in Biology: ^3H , ^{14}C , ^{32}P , ^{131}I , ^{35}S , Concept of half-life, decay constant; detection and quantitation – GM counter and scintillation counters- solid and liquid scintillation counter.

Unit-15: Specific activity, carrier free isotope, isotope dilution techniques, autoradiography.

Unit-16: Synthesis of isotopically labeled glucose (Glucose 1- ^{14}C , and uniformly labeled glucose) and acetate (1- ^{14}C and 2- ^{14}C), Leucine, ATP (α - ^{32}P). Determination of position of labeling in labeled glucose. Safety measures in Radiobiology laboratory.

Selected References:

1. Manuals in Biomedical Research, Wenk, Markus R. Fernandis, Aaron Zefrin Aaron University of Singapore, World Scientific - Vol. 3 (2012).
2. A manual for biochemistry protocols. Markus R. Wenk, World Scientific, (2007).
3. Biophysical Chemistry, Upadhyaya, A., Upadhyaya, K. & Nath, N. Himalayan Publishing House, 4th Ed. (2016).
4. Practical Biochemistry- Principles and Techniques. Wilson and Walker. J. Cambridge Uni.Press, 5th Ed. (2000).
5. Physical Biochemistry-David Freifelder. W. H. Freeman; 2nd Ed. (1982).
6. Principles of Instrumental Analysis. Douglas A Skoog, James Holler and Timothy A Nieman. Brooks Cole, 5th Ed. (1998).

Stream-A

BC-A1.3: COURSE-III: HUMAN PHYSIOLOGY

2 Credits

BC-1.3: Block-I:

Unit-1: Basic body plan in humans and location of organs.

Unit-2: Blood: Composition, cells. Erythrocytes – structure and function. Stability of RBCs: hypo and hypertonic solutions. WBC– types and functions, differential count. Platelets and their functions. Buffer systems. Hemostasis; blood volume, blood pressure and its regulation. Blood clotting, digestion of clot; anticoagulants. CSF-Composition and function, Lymph and its composition.

Unit-3: Nervous systems: Types of neurons, brain, spinal cord and transmission of impulses.

Unit-4: Excretory systems: Ultra-structure of the nephron, glomerular filtration, formation of urine. Acid-base balance and its regulation.

BC-1.3: Block-II:

Unit-5: Hepatobiliary system- Anatomy of liver, blood supply; hepatocytes, endothelial cells, Kupffer cells and parenchyma cells. Secretory and excretory functions of liver. Detoxification and formation of bile.

Unit-6: Digestive system – GI tract, digestion and absorption of carbohydrates, proteins and lipids. Mechanism of HCl production in the stomach. Gastrointestinal hormones. Role of pancreas.

Unit-7: Endocrine system-Endocrine organs in man. Hierarchy and regulation of hormone release. Feed-back mechanisms. Structure and control of hypothalamus, GRH, somatostatin, TRH, CRH, GnRH.

Unit-8: Pituitary-anatomy and structure. Hormones of anterior, posterior and median lobes. Melanocortin. Hormones of Thyroid, parathyroid, adrenals, gonads, testes and ovaries. Menstrual cycle.

Selected References:

1. Principles of Biochemistry-White, Handler and Smith (1964).
2. Text book of Medical Physiology - Arthur C. Guyton, John E. Hall, 9th Ed (1996).
3. Text book of Physiology- Chatterjee (11th Ed. 2016).

BC-A1.4: COURSE- IV: CELL BIOLOGY-I

2 Credits

BC-1.4: Block-I

Unit-1: Structural organization of cell and functions of intracellular organelles: Cell wall, nucleus, Mitochondria, Golgi bodies, Lysosome, Endoplasmic reticulum, Proxisome, Plastids, Vacuoles, Chloroplast. Structure and functions of cytoskeletal elements, and their role in motility.

Unit-2: Cell division and cell cycle: Mitosis and Meiosis and Cell cycle, Cellular signaling: Extracellular signaling – G protein linked receptors, Role of cyclic AMP, tyrosine kinase, Ca²⁺ as a second messenger.

Unit-3: Multiplex signaling pathways; Insulin receptor (regulation of blood glucose), regulation of cell surface receptors and transcription factors in signaling pathways. Chemical messengers for Peptide and steroid hormones; mechanism of hormone action.

Unit-4: Growth Factors: Platelet derived growth factors, vascular endothelial growth factors and their mechanism of action. Plant hormones and growth factors-Auxins, Gibberellins, cytokines and others.

BC-1.4: Block-II

Unit-5: Cell organelles and membrane proteins: Membrane structure. Mechanism and regulation of vesicular transport, golgi & post-golgi sorting, receptor mediated endocytosis.

Unit-6: Multicellularity: Role of extracellular matrix- hyaluronans and proteoglycans, matrix proteins and their receptors. Adhesive proteins and cell junction in multicellularity.

Unit-7: Structure and function of plant cell wall.

Unit-8: Structural elements in micro filaments, Cell motility and cell shape; Actin-Architecture and assembly.

Selected References:

1. Molecular Biology of the Cell. 5th Ed. Bruce Alberts, Alexander Johnson et al., Running Pr Book Publisher, (2008).

2. Molecular Cell Biology. 5th Ed. Harvey *Lodish*, Arnold Berk et al., W. H. Freeman (2003).
3. Cell and Molecular Biology. 6th Ed. Gerald Karp. Wiley (2009).
4. The Cell: A Molecular Approach. 4th Ed. Geoffrey M Cooper & Robert E Hausman. Sinauer Associates Inc (2007).
5. Cell Biology: A Laboratory Handbook. 3rd Ed., 4th Volume, Julio E Celis. Academic Press (2005).
6. Infrastructure and activities of cells: 1st Ed. Biotol, B C Currell, R C E Dam-Mieras. Butterworth & Heinemann (1991).

Stream-B

BC-B1.3: COURSE III: MICROBIOLOGY-I

BC-1.3: Block-I

Unit-1: Historical aspects - Discovery of microorganisms. Theory of spontaneous generation. Era of Louis Pasteur. Microbes and fermentation. Microbes and diseases-Koch's Postulates.

Unit-2: General characteristics: Morphology, nomenclature and classification of bacteria, yeasts, molds, fungi, actinomycetes, rickettsiae

Unit-3: Techniques - Isolation and culture of microorganisms - aerobic and anaerobic culture methods, culture media.

Unit-4: Isolation of pure colony and characterization: Staining – Gram's, acid fast, endospores and flagella.

BC-1.3: Block-II:

Unit-5: Microbial nutrition-Factors influencing growth, growth curve of bacteria. Measurement of growth.

Unit-6: Continuous culture: synchronous culture and chemostat.

Unit-7: Auxotrophs, autotrophs, heterotrophs. Methods of cultivation and preservation of microorganisms.

Unit-8: Microbial physiology: Growth, yield and characteristics; strategies of cell division, stress response.

Selected References:

1. Microbiology. Fundamentals and Applications-Purohit, Agribios (2006).
2. Microbiology. 7th Ed. Prescott, L, Harley, J.P. and Klein, D.A. Brown Communication Inc. IA (2015).
3. Microbiology Principles and Explorations. 8th Ed. Jacquelyn G Black (2012).
4. Brock Biology of Microorganisms. 11th Ed. Michael T Madigan and John M Martinko (2010).
5. Microbiology and Introduction. 8th Ed. Gerard J Tortora, Berdell R, Funke and Christine L Case (2004).

6. Microbiology-Diversity, Disease and the Environment. Abigail A Salyers, Dixie D Whitt (2003).

BC-B1.4: COURSE-IV: BIOENERGETICS

2 Credits

BC-1.4: Block-I:

Unit-1: Laws of thermodynamics: first, second and third laws of thermodynamics. Enthalpy, Entropy and free energy change.

Unit-2: Mitochondrial electron transport: Entry of reducing equivalents for oxidation-Malate- aspartate shuttle; glycerol phosphate shuttle.

Unit-3: Organization of respiratory chain complexes. Structure and function of the components -Fe-S proteins, cytochromes, Q cycle, and proton transfer, P/O ratio,

Unit-4: Respiratory control, oxidative phosphorylation, uncouplers and inhibitors, sequence of electron carriers based on red-ox potentials.

BC-1.4: Block-II

Unit-5: ATP synthesis, ATP synthase complex, binding change mechanism, proton motive force, Mitchell's hypothesis.

Unit-6: Photosynthetic generation of ATP-Cyclic and non-cyclic photophosphorylation

Unit-7: Introduction - Catabolism, anabolism and amphibolic pathways.

Unit-8: Energetic of glycolysis, fatty acid degradation.

Selected References:

1. Biophysical chemistry (2007), Upadhyaya, A., Upadhyaya, K. & Nath, N. Himalayan Publishing House.
2. Practical biochemistry (2006) - Principles and Techniques. Wilson & Walker. J. Cambridge Uni. Press.
3. Principles of Biochemistry (1995) – G. Zubay, W. W. Parson & D. E. Vance.
4. Lehninger - Principles of Biochemistry, 5th Ed. (2008) - D. L. Nelson & M. M. Cox.
5. Biochemistry, 4th Ed. (2010) - Donald Voet, Judith G. Voet.
6. Biochemistry, 4th Ed. (2010) - R. H. Garrett & C. M. Grisham.
7. Biochemistry, 2nd Ed. (2003) - S.C. Rastogi, Tata McGraw - Hill Education.

HC Course: BC 1.5 (Practical)

Practical 1 and Practical 2

4 Credits

PRACTICAL 1

- Expt. 01: Separation of amino acids by ascending chromatography.
Expt. 02: Separation of amino acids by descending chromatography.
Expt. 03: Separation of amino acids by circular chromatography.
Expt. 04: Separation of amino acids by 2D-paper chromatography.
Expt. 05: TLC of amino acids.
Expt. 06: TLC of carbohydrates.
Expt. 07: TLC of lipids.
Expt. 08: Determination of Iodine absorption number of oils.
Expt. 09: Determination of saponification value of oils.
Expt. 10: Determination of acid value of oils.
Expt. 11: Determination of peroxide value of oils.

- Expt. 12: Determination of α -Keto-acid by DNPH method.
 Expt. 13: Determination of ascorbic acid by DNPH method.
 Expt. 14: Isolation of DNA and RNA from biological sources.
 Expt. 15: Quantitative determination of DNA and RNA.

PRACTICAL-2

- Expt. 01: Determination of molar extinction coefficient.
 Expt. 02: Colorimetric estimation of reducing sugars (DNS method).
 Expt. 03: Colorimetric estimation of amino acids (Ninhydrin method).
 Expt. 04: UV-Vis spectra of proteins.
 Expt. 05: UV-Vis spectra of nucleic acids.
 Expt. 06: UV-Vis spectra of aromatic compounds.
 Expt.07: Fluorescence emission of proteins (excitation & emission maxima).
 Expt.08: Fluorescence emission of vitamins (excitation & emission maxima).
 Expt.09: Preparation of buffers, pKa- pH titrates of amino acids.
 Expt.10: Tetrameric method for determination of reducing sugar.
 Expt.11: Determination of sugars by Hagedorn and Jensen Method.
 Expt.12: Determination of sugars by Somogyi Shaffer Hartmen method.
 Expt.13: Estimation of glucose - DNS method.
 Expt.14: Estimation of glucose - Folin Wu method.
 Expt.15: Estimation of Proteins by Biuret method.
 Expt.16: Estimation of Proteins by Lowrey's method.
 Expt.17: Estimation of Iron-Thiocynate method.
 Expt.18: Estimation of Phosphorus – Fiske Subbarow's method.
 Expt.19: Estimation of Calcium – Oxalate method.
 Expt.20: Differential cell counting of blood.

Selected References:

1. Practical Biochemistry- Wilson & Walker Edward Arnold, 3rd Ed. (1999).
2. Practical Elinical Biochemistry, 5th Ed. H Varley: A.H. Gowenlick & M. Bell. (1992).
3. Practical Clinical Biochemistry: Methods and Interpretations, 3rd Ed. Ranjana Chawla, Gopsons paper Ltd. (2003).

II SEMESTER

BC-2.1: COURSE-I: FUNCTIONAL BIOMOLECULES

4 Credits

BC-2.1: Block – I: Carbohydrates and Proteins

Unit-1: Glyco-biology: Glyco-proteins: N- and O-glycosylation of proteins, lectins. Carbohydrates in tissue engineering.

Unit-2: Proteoglycans-agreecan, syndecan, and decorin. Pectin and pectic polysaccharides.

Unit-3: Peptide bond: Stereochemistry of peptide bond. Naturally occurring peptides- glutathione enkaphalins and endorphins. Chemical synthesis of peptides - Khorana's solution phase and Merrifield's solid phase.

Unit-4: Determination of amino acid composition-Acid/base catalyzed hydrolysis; separation and quantitation of aminoacids. Determination of N- and C- terminal amino acid residues.

BC-2.1: Block-II: Proteins

Unit-5: Isolation of proteins - Overview of purification. Preliminary procedures- Salting in, salting out, Heat denaturation, Dialysis, Gel filtration.

Unit-6: Determination of primary structure - sequencing strategies N-terminal sequencing methods. Automated sequanators. Determination of s-s-bond and their position.

Unit-7: Secondary structure of protein - α , β sheets, β bend and β turn.

Unit-8: Prediction of secondary structure of proteins- Chou and Fasman algorithm. Helix supporting and helix breakers amino acid residues.

BC-2.1: Block-III: Proteins

Unit-9: Factors responsible for protein folding– Christian Anfinsen's experiment on RNAase. Protein denaturing agents. Denaturation and re-naturation of proteins.

Unit-10: Stabilization of protein structure by non-covalent interactions. 3D Structure of myoglobin, hemoglobin, immunoglobulins.

Unit-11: Structures of Collagen and Keratin. Application of physical techniques in the determination of 3D structure of proteins.

Unit-12: Over view of forces stabilizing structures of macromolecules: Hydrogen bonding, Vander Waal's forces, London dispersion force, ionic interactions, hydrophobic interactions, S-S bridges, peptide bond, glycosidic and phosphodiester bonds.

BC-2.1: Block-IV: Nucleic acids

Unit-13: Secondary structure of DNA, Watson and Crick model. B and Z DNA, other models of DNA.

Unit-14: Secondary structures of t-RNAs- clover leaf model.

Unit-15: Other secondary structural features in DNA - stem loop structure, Palindrome, cruciform's. Topology of DNA structure.

Unit-16: DNA protein interaction- zinc finger, leucine zipper, helix- turn - helix, other motifs. DNA bending and kinks.

Selected References:

1. Biochemistry, 4th Ed. (2010) - Donald Voet, Judith G. Voet.
2. Biochemistry, 4th Ed. (2010) - R. H. Garrett & C. M. Grisham.
3. Harper's Illustrated Biochemistry, 26th Ed. (2013) – R. K. Murray, D. K. Granner, P. A. Mayes & V. W. Rodwell.
4. Lehninger - Principles of Biochemistry, 5th Ed. (2008) - D. L. Nelson & M. M. Cox.
5. Principles of Biochemistry (1995) – G. Zubay, W. W. Parson & D. E. Vance.
6. Biochemistry, 2nd Ed. (2003) - S.C. Rastogi, Tata McGraw- Hill Education.

Block-I

Unit-1: General aspects–Nature of enzymes, localization, isolation, purification and characterization of enzymes.

Unit-2: Criteria of purity of enzymes. Units of enzyme activity: IU Ktal. Expression of activity and specific activities.

Unit-3: Nomenclature and IUB classification of enzymes.

Unit-4: Assay methods – coupled enzyme assays, continuous, end point and kinetic assay procedures. Enzyme kinetics– Rate, order and molecularity of enzymatic reactions.

BC-2.2: Block-II

Unit-5: Michaelis Menten equation, initial velocity approach, steady state approach. Determination of V_{max} and K_m and their significance. Linear transformation of Michaelis Menten equation– Lineweaver Burk plot, Eadie Hofstee, Haynes – Wolf and Cornish-Bowden plots. Turnover number.

Unit-6: Enzyme Inhibition– Competitive, non-competitive and uncompetitive, product inhibition, irreversible inhibition and suicide inhibition. Determination of K_i .

Unit-7: Bisubstrate enzyme catalysed reactions– Cleland's notation with examples for ordered, ping pong, and random ordered bi-substrate enzyme catalyzed reactions. General, rate equation. Primary and secondary plots.

Unit-8: Mechanisms of enzyme catalysis– Active site structure and its investigation. Methods of determining active site structure – isolation of ES complex, affinity labeling, chemical modification studies.

BC2.2: Block-III

Unit-9: Nature of enzyme catalysis –Transition state theory, proximity and orientation, orbital steering, acid base catalysis, covalent catalysis, metal ion catalysis,

Unit-10: Nucleophilic and electrophilic catalysis, intramolecular catalyses, entropy effects. Effect of temperature and pH on enzyme catalysed reactions.

Unit-11: Cooperativity – Binding of ligands to macromolecules – positive effectors, negative effectors. Homotropic and heterotropic effectors

Unit-12: Scatchard plot, cooperativity. Positive and negative cooperativity. Oxygen binding to hemoglobin. Hill equation, homotropic and heterotropic effectors. Allosteric enzymes- Aspartyl transcarbamylase.

BC-2.2: Block-IV

Unit-13: Mechanisms of action of specific enzymes, acid-base catalysis, charge relay network. Lysozyme; alcohol dehydrogenase, ribonuclease, carboxypeptidase A, RNA as enzyme- mechanism of action with examples.

Unit-14: Coenzymic structure and action of NAD⁺ FAD, TPP, PLP, biotin, CoA, folic acid and lipoic acid. Multimolecular and multienzyme complexes – eg. LDH. Multifunctional enzyme (DNA polymerase) multi enzyme complex (PDC).

Unit-15: Metabolic regulation of enzyme activity–Feedback regulation, fine control of enzyme activity. Fast reactions – Stopped flow, temperature jump method with

examples of enzymes.

Unit-16: Endo-proteases. Pathways for the degradation of endogenous proteins: Ubiquitin pathway Nucleic acid hydrolyzing enzymes- endo- and exo- nuclease. Restriction endo-nucleases.

Selected References:

1. Fundamentals of Enzymology (2000). Price NC and Stevans, L. Oxford Univ. Press.
2. Enzymes. Palmer, T. (2001) Harwood Pub.
3. Biochemistry, 4th Ed. (2010) - Donald Voet, Judith G. Voet.
4. Biochemistry, 4th Ed. (2010) - R. H. Garrett & C. M. Grisham.
5. Principles of Biochemistry (1995) – G. Zubay, W. W. Parson & D. E. Vance.
Lehninger - Principles of Biochemistry, 5th Ed. (2008) - D. L. Nelson & M. M. Cox.

Stream-A

BC-A2.3: COURSE-III: NUTRITIONAL BIOCHEMISTRY

BC-2.3: Block- I:

Unit-1: Nutrition– Concepts of macro and micro nutrients, essential nutrients and their classification. Food groups, proximate analysis of foods, chemical and biological analysis of nutrients.

Unit-2: Food as source of energy, methods of determining energy value of foods, calorimetric, physiological fuel values and daily requirement of energy, high and low calorie diets. Basal metabolic rate (BMR) factors affecting BMR, specific dynamic action of foods.

Unit-3: Carbohydrates: Dietary sources, dietary fibers and essentiality of carbohydrates.
Proteins: Evaluation of nutritive value of dietary protein; PER, BV, essential amino acids, nutritional classification of proteins, supplementary value of proteins.

Unit-4: Protein calorie malnutrition; Kwashiorkor and Marasmus. Fats: Sources, invisible fat, essential fatty acids, PUFA.

BC-A2.3: Block- II:

Unit-5: Vitamins: Classification of vitamins –Fat soluble, water soluble and vitamin like compounds. Fat soluble vitamins-Provitamins, dietary sources, structure, daily requirements, function and deficiency symptoms. Hyper vitaminosis.

Unit-6: Water soluble vitamins- B complex members and vitamin C. Dietary sources. Antivitamins. Structure deficiency symptoms, Coenzyme forms of B-complex members.

Unit-7: Water and mineral metabolism- Distribution of water in the body-fluid compartments, factors affecting water balance.

Unit-8: Minerals: Macro and micro nutrients, sources, requirements, functions and deficiency symptoms, recommended daily allowances, special nutrition for infants, children, during pregnancy, lactation and old age.

Selected References:

1. Principles of Biochemistry-White, Handler and Smith (1964).
2. Text book of Medical Physiology - Arthur C. Guyton, John E. Hall, 9th Ed (1996).
3. Text book of Physiology- Chatterjee (11th Ed. 2016).
4. Essentials of Food and Nutrition- Swaminathan M. (1977).
5. A text book of Biochemistry- A.V.S.S. Rama Rao-(1st Ed.) UBS Publishers (2006).
6. Biochemistry- U. Satyanarayana and U. Chakrapani (4th Ed. 2013).

BC-A2.4: COURSE- IV: CELL BIOLOGY-II

2 Credits

BC-2.4: Block-I

Unit-1: Muscle contraction: Actin-Myosin, complex and its role in muscle contraction. Function of calcium ions and ATP.

Unit-2: Microtubules-structure, assembly and dynamics and micro tubule associated proteins; cilia, flagella and intermediate filaments.

Unit-3: Cell cycle- Strategies in cell cycle, discrete cell cycle events, early embryonic cell cycle, yeast cell cycle.

Unit-4: Regulation of cell cycle, cyclins, cyclin dependent kinases, inhibitors, cell division control in multicellular organism; apoptosis.

BC-2.4: Block-II

Unit-5: Mitochondria and Chloroplasts. Structure of mitochondria. Organization of ETC. Production of ATP.

Unit-6: Structure of chloroplast-Photo systems-I and II, cyclic and non-cyclic Photo-phosphorylation.

Unit-7: Structure and functions of ribosome and nucleosome.

Unit-8: Composition of cytoplasm and its role in cell function.

Selected References:

1. Molecular Biology of the Cell. 5th Ed. Bruce Alberts, Alexander Johnson et al., Running Pr Book Publisher, (2008).
2. Molecular Cell Biology. 5th Ed. Harvey Lodish, Arnold Berk et al., W. H. Freeman (2003).
3. Cell and Molecular Biology. 6th Ed. Gerald Karp. Wiley (2009).
4. The Cell: A Molecular Approach. 4th Ed. Geoffrey M Cooper & Robert E Hausman. Sinauer Associates Inc (2007).
5. Cell Biology: A Laboratory Handbook. 3rd Ed., 4th Volume, Julio E Celis. Academic Press (2005).
6. Infrastructure and activities of cells: 1st Ed. Biotol, B C Currell, R C E Dam-Mieras. Butterworth & Heinemann (1991).

Stream-B

BC-B2.3: COURSE III: MICROBIOLOGY-II

2 Credits

BC-2.3: Block-I

Unit-1: Methods to control microorganisms: Mechanisms of disinfection. Bacteriostatic and bacteriocidal agents.

Unit-2: Sterilization- physical and chemical methods.

Unit-3: Virology - Discovery of viruses, assay of viruses. Classification of viruses based on genetic material.

Unit-4: Structure of typical viruses - Bacteriophage T4, TMV and HIV. Bacteriophages as antibiotics.

BC-2.3: Block-II

Unit-5: Host parasite interaction: Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells.

Unit-6: Alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.

Unit-7: Industrial microbiology: Fermentation, Solid & liquid phase fermentation methods.

Unit-8: Production of organic Solvents, antibiotics and vitamins.

Selected References:

1. Microbiology. Fundamentals and Applications-Purohit, Agribios (2006).
2. Microbiology. 7th Ed. Prescott, L, Harley, J.P. and Klein, D.A. Brown Communication Inc. IA (2015).
3. Microbiology Principles and Explorations. 8th Ed. Jacquelyn G Black (2012).
4. Brock Biology of Microorganisms. 11th Ed. Michael T Madigan and John M Martinko (2010).
5. Microbiology and Introduction. 8th Ed. Gerard J Tortora, Berdell R, Funke and Christine L Case (2004).
6. Microbiology-Diversity, Disease and the Environment. Abigail A Salyers, Dixie D Whitt (2003).

BC-B2.4: COURSE-IV: ADVANCED TECHNIQUES IN BIOCHEMISTRY

BC-2.4: Block-I:

Unit-1: Magnetic resonance- NMR and ESR- Principles and applications.

Unit-2: Vibration spectra- IR and Raman spectroscopy- Principles and applications.

Unit-3: Polarized Light- Plane and circularly polarized light. CD, ORD & their applications.

Unit-4: Turbidometry, flame photometry, spectrophotometer-instrumentation & applications.

BC-2.4: Block-II

Unit-5: Mass Spectrometry-Ionization, fragmentation, m/e, time of flight, MALDI and ESI.

Unit-6: X-ray crystallography - Protein crystals preparation. Bragg's law, unit cell, isomorphous replacement, fibre pattern of DNA.

Unit-7: Immuno-electrophoresis, blotting techniques.

Unit-8: Capillary electrophoresis, HPLC/RPHPLC.

Selected References:

1. Biophysical chemistry (2007), Upadhyaya, A., Upadhyaya, K. & Nath, N. Himalayan Publishing House.
2. Practical biochemistry (2006) - Principles and Techniques. Wilson & Walker. J. Cambridge Uni. Press.
3. Principles of Biochemistry (1995) – G. Zubay, W. W. Parson & D. E. Vance.
4. Lehninger - Principles of Biochemistry, 5th Ed. (2008) - D. L. Nelson & M. M. Cox.
5. Biochemistry, 4th Ed. (2010) - Donald Voet, Judith G. Voet.
6. Biochemistry, 4th Ed. (2010) - R. H. Garrett & C. M. Grisham.
7. Biochemistry, 2nd Ed. (2003) - S.C. Rastogi, Tata McGraw - Hill Education.

HC Course: BC 2.5 (Practical)

Practical 3 and Practical 4

4 Credits

PRACTICAL-3

Salivary amylase analysis:

- Expt. 01: Determination of optimum time for salivary amylase activity.
Expt. 02: Determination of optimum pH for salivary amylase activity.
Expt. 03: Determination of optimum temperature and energy of activation for salivary amylase activity.
Expt. 04: Determination of K_m and V_{max} of salivary amylase
Expt. 05: Determination of specific activity of salivary amylase

Amylase from Sweet Potato:

- Expt. 01: Isolation of amylase from sweet potato
Expt.02: Determination of optimum time for sweet potato amylase activity.
Expt.03: Determination of optimum pH for sweet potato amylase activity.
Expt. 04: Determination of optimum temperature and energy of activation for sweet potato amylase activity.
Expt. 05: Determination of K_m and V_{max} of sweet potato amylase.
Expt. 06: Determination of specific activity of sweet potato amylase.

Acid Phosphatase from *Synodenium grantii*

- Expt. 01: Determination of optimum time for *S. grantii* acid phosphatase activity.
Expt. 02: Determination of optimum pH for *S. grantii* acid phosphatase activity.
Expt. 03: Determination of optimum temperature and energy of activation for *S. grantii* acid phosphatase activity.
Expt. 04: Determination of K_m and V_{max} of *S. grantii* acid phosphatase.
Expt. 05: Determination of specific activity of *S. grantii* acid phosphatase.

Acid Phosphatase from Potato.

- Expt. 01: Determination of optimum time for Potato acid phosphatase activity.

- Expt. 02: Determination of optimum pH for Potato acid phosphatase activity.
 Expt. 03: Determination of optimum temperature and energy of activation for Potato acid phosphatase activity.
 Expt. 04: Determination of K_m and V_{max} of Potato acid phosphatase.
 Expt. 05: Determination of specific activity of Potato acid phosphatase.

PRACTICAL-4

Microbiology

- Expt. 01: Aseptic Transfer of Microorganisms
 Expt. 02: Streak Plate Method
 Expt. 03: Bacterial Growth Curve
 Expt. 04: Gram Staining
 Expt. 05: Differential and Cytological Staining Techniques
 Expt. 06: Catalase Test
 Expt. 07: Carbohydrate Fermentation Test
 Expt. 08: Antibiotic Susceptibility Testing
 Expt. 09: Methylene Blue Reductase Test
 Expt. 10: Slide Culture Technique for Fungi

Selected References:

1. Enzyme assays 2nd Ed. Eisenthal, Bath press, (1995).
2. Enzyme kinetics, Segel, Interscience Willey, (1998).
3. Enzymes–Biochemistry, Biotechnology and Clinical chemistry, T Palmer, (2007).
4. Microbiology. Fundamentals and Applications-Purohit, Agribios (2006).
5. Microbiology Principles and Explorations. 5th Ed. Jac quelyn G Black (2012).

III SEMESTER

HC: BC-3.1: COURSE-I: METABOLISM –I

4 Credits

BC-3.1: Block-I

- Unit-1:** Carbohydrates- Glycolysis and its regulation. Pathways for utilization of pyruvate, lactate and ethyl alcohol.
Unit-2: Gluconeogenesis and its regulation; Cori cycle; Citric acid cycle and its regulation,
Unit-3: Anaplerosis, glyoxylate cycle. HMP shunt pathways, inter-conversion of hexoses.
Unit-4: Biosynthesis of disaccharides: sucrose maltose and lactose. Lactose intolerance

BC-3.1: Block-II

- Unit-5:** Biosynthesis of glycogen and starch. Glycogen storage diseases.
Unit-6: Lipids- Degradation of triacyl glycerol and phospholipids - lipase, hormone sensitive lipase & phospholipases.
Unit-7: Degradation of fatty acids- Knoop's experiment, α , β and ω -oxidation of fatty acids. Oxidation of saturated & unsaturated fatty acids. Regulation of oxidation of fatty acids

Unit-8: Biosynthesis of Fatty acids- FA synthetase complex, chain elongation and de-saturation; pathways in plants and animals, conversion of linoleate to arachidonate (scheme only).

BC-3.1: Block-III

Unit-9: Cholesterol biosynthesis and degradation- regulation of cholesterol metabolism.

Unit-10: Metabolism of circulating lipids -chylomicrons, HDL, LDL and VLDL. Reverse cholesterol transport by HDL. Oxidised lipids and their metabolism; foam cell formation.

Unit-11: *de novo* pathway for the phospholipid biosynthesis and inter conversion. Biosynthesis of sphingolipids, ether lipids and glycolipids.

Unit-12: Degradation and biosynthesis of gangliosides and cerebrosides.

BC-3.1: Block-IV

Unit-13: Biosynthesis of prostaglandins, thromboxanes and leukotrienes.

Unit-14: Integration of carbohydrate and lipid metabolism, glucose paradox.

Unit-15: Role of insulin and glucagons on carbohydrate and lipid metabolism.

Unit-16: Disorders of lipid metabolism. Taysacch's disease, fatty liver condition, Nieman-Pick disease, Fabry's disease.

Selected References:

1. Text Book of Biochemistry (1964)-White Handler and Smith.
2. Principles of Biochemistry (2002)- Horton, Moran, Ochs, Rawn and Scrimgeour, 3rd Ed. Prentice Hall Inc.
3. Lehninger - Principles of Biochemistry, 5th Ed. (2008) - D. L. Nelson & M. M. Cox.
4. Principles of Biochemistry (1995) – G. Zubay, W. W. Parson & D. E. Vance.
5. Biochemistry, 4th Ed. (2010) - Donald Voet, Judith G. Voet.
6. Biochemistry, 4th Ed. (2010) - R. H. Garrett & C. M. Grisham.

HC: BC-3.2: COURSE-II: METABOLISM-II

4 Credits

BC-3.2: Block-I

Unit-1: Introduction to protein metabolism- action of digestive track enzymes on proteins. Absorption of amino acids.

Unit-2: General mechanisms of amino acid metabolism-Deamination, transamination, decarboxylation and desulphuration.

Unit-3: Degradation of individual amino acids. Entry of R-groups of amino acids into TCA cycle.

Unit-4: Intermediary metabolism of amino acids. Ammonia fixation

BC-3.2: Block-II

Unit-5: Ketogenic and glucogenic amino acids. In born errors of amino acid metabolism- Phenyl ketonuria, alkaptonuria, maple syrup urine.

Unit-6: Biosynthesis of amino acids. Differences in pathways in microorganisms, plants and animals.

Unit-7: Regulation in the biosynthesis of amino acids- transglutaminase cycle, urea cycle.

Unit-8: Proteins- Degradation and biosynthesis of glycoproteins, proteoglycans.

BC-3.2: Block-III

Unit-9: Biosynthesis and degradation of heme, porphyrins. Biosynthesis of creatine, polyamines, glutathione and gramicidine.

Unit-10: Pathways of degradation of nucleic acids in cells.

Unit-11: Catabolism of purine and pyrimidine nucleotides. Uric acid formation.

Unit-12: Biosynthesis of purine and pyrimidine nucleotides.

BC-3.2: Block-IV

Unit-13: Regulation of biosynthesis of nucleotides. Salvage pathways.

Unit-14: Disorders of nucleotide metabolism-Gout and Lysch-Nyhan syndrome.

Unit-15: Conversion of nucleotides to deoxynucleotides. Mechanisms of action of methotrexate, 5-fluorouridine and azathymidine.

Unit-16: Biosynthesis of NAD⁺, FAD and coenzyme A.

Selected References:

1. Text Book of Biochemistry (1964)-White Handler and Smith.
2. Principles of Biochemistry (2002)- Horton, Moran, Ochs, Rawn and Scrimgeour, 3rd Ed. Prentice Hall Inc.
3. Lehninger - Principles of Biochemistry, 5th Ed. (2008) - D. L. Nelson & M. M. Cox.
4. Principles of Biochemistry (1995) – G. Zubay, W. W. Parson & D. E. Vance.
5. Biochemistry, 4th Ed. (2010) - Donald Voet, Judith G. Voet.
6. Biochemistry, 4th Ed. (2010) - R. H. Garrett & C. M. Grisham.

Stream-A

SC: BC-3.3: COURSE-III: IMMUNOLOGY –I

2 Credits

BC-3.3: Block- I

Unit-1: Introduction - Historical development and milestones in immunology. Definitions- antigenicity, immunogenicity, primary & secondary lymphoid organs.

Unit-2: Self and non-self discrimination. Innate & acquired immunity.

Unit-3: Antigens and Antibodies-Haptens and determinants-Epitopes & paratopes. Antigenicity, carbohydrates, proteins, nucleic acids, and cells as antigens. Valency of antigen. Epitope analysis.

Unit-4: Classes and subclasses of immunoglobulins, structure of immunoglobulins, hyper variable region, isotypic, allotypic and idiotypic variation.

BC-3.3: Block-II

Unit-5: Complements- Structure, components, properties and functions of complement pathways, biological consequences of complement activation. Cellular basis of immunity- Primary & secondary immune response. Reticulo endothelial system. T, B & accessory cells.

Unit-6: Subsets of T: T-helper cells, T-killer cells, T-suppressor cells and B cells. Development of T & B cells. T & B cell receptors; antigen processing and presentation.

Unit-7: Cytokines and co-stimulatory molecules -Lymphokines, interleukins structure and function of IL-2, TNF_α . T and B interaction.

Unit-8: Suppression of immune response, immunoglobulin gene- generation of immunoglobulin diversity, gene rearrangement and other mechanisms, clonal selection theory of Burnet.

Selected References:

1. Essential Immunology- Ivan M. Roitt & Peter J. Delves, 10th Ed. Blackwell Science (2001).
2. Fundamental Immunology. Paul W.E. Raven Press, 7th Ed. (1984).
3. Immunology- Kuby, W.H. Freeman and company, New York, 7th Ed. (2013).
4. An introduction to Immunology. Rao, C.V. Narosa Publication house (2012).
5. Immunology-A short course. Coico, R., Sunshine, G. & Benjamini, E. John Wiley & Sons, 7th Ed. (2009).
6. Prescott's Microbiology. J. Willey, L. Sherwood, C. J. Woolverton, 7th Ed. McGraw-Hill (2006).

SC: BC-3.4 COURSE-IV: BIOCHEMISTRY OF HORMONES-I

2 Credits

BC-3.4: Block-I

Unit-1: An overview of mammalian endocrine system: Location, structure and functions of different endocrine glands. Major endocrine disorder

Unit-2: General classes of chemical messengers: Paracrine, autocrine exocrine. Secretions – peptide, amino acid derivatives

Unit-3: steroid hormones, growth stimulating factors,

Unit-4: chalcones, eicosanoids, pheromones and the cell regulators .

BC-3.4: Block-II

Unit-5: Mechanism of hormone action at cellular and molecular levels: Hormone receptors – surface and intracellular.

Unit-6: Mechanism mediated by secondary messengers- G-protein, cAMP, IP_3 , DAG, Ca^{2+}

Unit-7: Mechanism mediated by receptor- tyrosine kinase; mechanism mediated through genomic transcription (steroid hormones).

Unit-8: Biomedical applications of hormones: Chemical / bio-technological, synthesis by recombinant technology- Thyroxine, catecholamine, insulin, growth hormone.

Selected References:

1. Basic Medical Endocrinology: H Maurice Goodman 3rd Ed. Academic press San Diego CA (2000).
2. Endocrinology, Hadley, MG: 3rd Ed. Printice Hall New Jersey (2000).

3. Endocrine Secrets, McDeemott, MT. 4th Ed. Mosby Philadelphia (2005).
4. Molecular Endocrinology, Bolander, FF. 3rd Ed. Academic press San Diego CA (2004).
5. Comparative Vertebrate Endocrinology, Bentley, PJ. 3rd Ed. Cambridge University press, Cambridge (1998).
6. Endocrinology – An integrated Approach, Murray, SS, Whitehead SA, Taylor and Francis (2001).
7. The physiology of Insecta Vol III. Morris Rockstein, Academic Press (1964).
8. Endocrinology. Vol I, II, III. 3rd Ed. Leslie J Degroot, WB Saunders Company, USA (1995).
9. Applied Entomology, PG Fennimore and Alka Prakash: New Age International Publishers Pvt. Ltd, Bangalore (1992).
10. Biotechnology – A text book of Industrial Production. Cruger and Cruger: Parima Publishers, Bangalore (2005).

Stream-B

BC-B3.3: COURSE-III: BIOSTATISTICS

2 Credits

BC-3.3: Block-I: Biostatistics

Unit-1: Samples and sampling; Random sampling. Use of random number tables. Classification and representation of data: histogram, frequency curve, pie chart.

Unit-2: Normal and binomial distribution. Probability and probability distribution.

Unit-3: Estimation: Error estimation; confidence levels, estimating mean with large and small samples, choosing of sample size.

Unit-4: Mean, weighted mean, variance and standard deviations.

BC-3.3: Block-II: Biostatistics

Unit-5: Hypothesis and hypothesis testing: Involving mean, difference of two means and paired differences using students “t” test.

Unit-6: Chi-square test: Test of independence, goodness of fit and estimating variance and standard deviation.

Unit-7: ANOVA: One factor ANOVA – Comparing several samples means.

Unit-6: Non parametric statistics: The sign test, Rank sum test and spearman rank correction. Correlation and regression, Non-linear regression.

Selected References:

1. Elementary statistics- Spence, Cotton, Underwood and Ducan (1991).
2. Understandable statistics- Brace and Brace (2014).
3. Statistical methods in biology- Bailey (1995).

BC-B3.4: COURSE-IV: PRINCIPLES OF GENETICS-I

BC-3.4: Block-I

Unit-1: Basic principles of Mendelism - Laws of inheritance, dominance, co-dominance, epistasis, (eg. Comb shape in chickens). Pleiotropism. Cytoplasmic inheritances (eg. Male sterility in plants, Shell Coiling).

Unit-2: Gene linkage and chromosome - Linkage and recombination of genes in a chromosome. Crossing over gene mapping with three point test cross, mapping by tetrad analysis.

Unit-3: X-linked inheritance- Polygenic inheritance, mitochondrial inheritance, Y-chromosome inheritance. Map unit.

Unit-4: Mapping in prokaryotes and viruses - Bacterial transformation and transduction, conjugation - F⁺ plasmids, Hfr cells, Time of entry mapping.

BC-3.4: Block-II

Unit-5: Arrangement of genes in phage chromosome, plaque formation and lytic cycle. Fine structure of rII locus of T4. Lysogeny and lytic phage.

Unit-6: Organization of genes in prokaryotic and eukaryotic chromosome - Genome size and evolutionary complexity, C-value paradox, structure of bacterial chromosome.

Unit-7: Structure of eukaryotic chromosome, nucleosome organization, arrangement of chromatin fibers in a chromosome.

Unit-8: Polytene chromosomes, Centromere and telomere structure.

Selected References:

1. Basic Genetic-Hartle, Friefelder, Snyder, 3rd Ed. ASM Press (2007).
2. Genetics- Strickberger, M. W., Prentice Hall of India Pvt. Ltd (1995).
3. Genetics-A molecular approach. Brown, T. A. Chapman and Hall (1990).
4. Molecular Biology of the Cell. Alberts et al., 4th Ed. Garland Publ.(2002).
5. Genes VII. Lewin, B. Pearson Education International. (2003).

HC Course: BC 3.5 (Practical)

Practical 5 and Practical 6

4 Credits

PRACTICAL-5

Expt. 01: Raising antibodies in rat. Preparation of antigen-adjuvant mixture, injection, determination of antibody titer.

Expt. 02: Immunodiffusion

Expt. 03: Western blot techniques.

Expt. 04: Isolation of protease from Papaya: Activity and Activation studies.

Expt. 05: Estimation of pyruvate.

Expt. 06: Studies on Amino transferase from silk worm ovary.

PRACTICAL-6

Expt. 01: Estimation of alkaline phosphatase from milk.

Expt. 02: Characterization of Lactate Dehydrogenase.

Expt. 03: Photosynthetic reduction of 2, 6-dichlorophenol indophenols.

Expt. 04: Estimation of urea and uric acid.

Expt. 05: Glconeogenesis in liver slice by estimation of glucose by GOD/POD method.

Expt. 06: Isolation of DNA and RNA – UV ratio at 260/280nm.

Selected References:

1. Text book of biochemistry with clinical correlations- Thomas M. Devlin, 6th Ed., Wiley-Liss, A.John-Wiley and Sons, Inc.
2. Practical clinical biochemistry, 5th Ed., H Valey, A H Gowenlock and M Bell Heinemann publication.
3. Practical clinical biochemistry methods and interpretation 3rd Ed., Ranjana Chawla, Gopsons paper Ltd. 2003.
4. Review of Medical Physiology Gannong, W H Maruzen Asia, 15th Ed., 1991.

SEMESTER-IV

HC: BC-4.1: MOLECULAR BIOLOGY -I

4 Credits

BC-4.1: Block- I

Unit-1: Introduction- Historical perspective, Central dogma of molecular biology.

Unit-2: DNA– Antiparallel nature - Nearest neighbour base frequency analysis.

Unit-3: Replication of DNA semiconservative model- Messelson and Stahl experiment. Direction of replication of *E.coli*, discontinuous replication- Okazaki fragments.

Unit-4: DNA polymerase I, II and III of *E.coli* DNA ligase, fidelity of replication. DNA topoisomerases & gyrases. Replication in viruses single stranded DNA virus, ϕ X174, rolling circle model. Role of DNA Polymerases α , β , γ , δ , ϵ . Replication of mitochondrial DNA.

BC-4.1: Block-II

Unit-5: Transcription - RNA polymerase I, II and III.

Unit-6: RNA biosynthesis in prokaryotes and eukaryotes- initiation, elongation and termination.

Unit-7: RNA dependent RNA synthesis - RNA replicase of QB virus.

Unit-8: Processing of eukaryotic RNA cap addition, poly-A tail addition, intron splicing, RNA editing. Processing of t-RNA and m-RNA transcripts.

BC-4.1: Block-III

Unit-9: Translation - Genetic code, triplet codon, universality features of the genetic code, assignment of codons, studies of Khorona & Nirenberg.

Unit-10: Triplet binding techniques, degeneracy of codons, wobble hypothesis, evolution of genetic code and codon usage, variation in the codon usage.

Unit-11: The structure of prokaryotic and eukaryotic ribosomes.

Unit-12: Translation- initiation, elongation and termination.

BC-4.1: Block-IV

Unit-13: Role of m-RNA and t-RNA; aminoacyl tRNA synthetase and its role in translation accuracy.

Unit-14: Signal sequence, translational proof-reading, translational inhibitors

Unit-15: Post translationa modifications- signal peptide cleavage, disulphide bond formation, O- and N-glycosylation.

Unit-16: Folding of nascent protein, role of chaperones, attachment of glycosyl anchor, and other modifications.

Selected References:

1. DNA replication-Kornberg, 2nd Ed. University Science Books (2005)
2. Molecular cell biology-Darnell, Lodish Baltimore, 4th Ed. W. H. Freeman & company, New York.
3. Molecular biology, Freifelder, D. Narosa Publication House (2004).
4. Advance Molecular Biology. Twyman, R. M. Viva Book Pvt. Ltd (2003).

HC: BC-4.2: COURSE-II: MOLECULAR BIOLOGY-II

4 Credits

BC-4.2: Block-I

Unit-1: Fine structure of the prokaryotic and eukaryotic gene - promoters, introns, exons, other regulatory sequences, enhancers, silencers, function of introns.

Unit-2: Regulation of Gene expression in prokaryotes - Operon model - lac operon- structure and regulation; galactose operon - role of two promoters; arabinose operon - positive control; tryptophan operon- attenuation control.

Unit-3: Regulation of gene expression at the level of DNA structure - Super coiling, DNA methylation, role of nucleosome. Structure of eukaryotic DNA in gene expression- eg. glucocorticoid gene, chromatin remodeling .

Unit-4: Regulation at the level of transcription - Transcription factors, TF II, NFκB. Regulation of NFκB and its activation. Formation of initiation complex. Role of enhancers.

BC-4.2: Block-II

Unit-5: Regulation at the level of RNA processing- RNA export and RNA stability. Factors affecting RNA stability. RNA degradation.

Unit-6: Regulation at the level of translation- Secondary structure in the 5' and 3' untranslated region- eg. Regulation of Ferretin and Transformation of m-RNA.

Unit-7: Allocating genes to chromosomes -chromosome walking, RFLP and RAPD.

Unit-8: Role of upstream AUG codons. (eg. GCN 4 gene regulation), transplicing and translational introns, protein splicing introns.

BC-4.2: Block-III

Unit-9: Role of aminoacyl t-RNA synthetase in the regulation of translation- proof-reading mechanism.

Unit-10: Ribosomal optimization of translation. Regulation at the level of ribosome assembly.

Unit-11: Role of DNA binding protein motifs

Unit-12: Regulation at the level of post-translational modification, protein stability, N-end rule, PEST and other sequences.

BC-4.2: Block-IV

Unit-13: Genetic engineering - Extraction and purification of nucleic acids (DNA and RNA) from biological sources.

Unit-14: Gene cloning-genomic cloning, c-DNA cloning. Vectors, plasmids, phage, cosmids and phagemid,

Unit-15: Yeast cloning vectors, plant vectors, bacterial artificial chromosome, SV40, shuttle vectors construction of expression vectors.

Unit-16: Restriction endo-nucleases - blunt end and staggered cut. isochizomers.

Selected References:

1. DNA replication-Kornberg, 2nd Ed. University Science Books (2005)
2. Molecular cell biology-Darnell, Lodish Baltimore, 4th Ed. W. H. Freeman & company, New York.
3. Molecular biology, Freifelder, D. Narosa Publication House (2004).
4. Advance Molecular Biology. Twyman, R. M. Viva Book Pvt. Ltd. (2003).
5. Molecular biology of Cells-Alberts et al., 3rd Ed. Garland Publishing (1994).
6. Gene Structure and Expression-Hawkins, 3rd Ed. Cambridge University Press; (1996)
7. Microbiology- Prescott, L. Harley, J.P. and Klein, D.A. 7th Ed. McGraw Hill Publication (2008)
8. Genetic Engineering: Sandy B. Primrose, Richard Twyman. 7th Ed. Oxford (2006)
Molecular Bio-technology- Principles and application of Recombinant DNA. GLicks, R. Bernard and Pasternak, J. Jack. Panima Publishing Corporation (2002).

Stream-A

BC-A4.3: COURSE-III: IMMUNOLOGY-II

2 Credits

BC-4.3: Block- I

Unit-1: MHC- MHC gene and its polymorphism, role of MHC in immune response. MHC in transplantation.

Unit-2: Non-specific defences in man Barriers to infection-skin, mucous membrane, inflammation, complement

Unit-3: Hyper sensitivity reactions (Type I, II, III and IV).

Unit-4: Transplantation–Auto-graft, iso-graft, allo-graft & xeno-graft. Graft rejection, graft versus host reaction.

BC-4.3: Block- II

Unit-5: Tumour immunology - Tumour associated antigens; factors favouring tumour growth; immune surveillance. Tumour necrosis factors α and β .

Unit-6: Disorders of immunity - Immunological tolerance, auto immune disorders, AIDS, SCID.

Unit-7: Vaccines–Adjuvants; vaccines and their preparations. Polyclonal and monoclonal antibodies- hybridoma technique.

Unit-8: Antigen-antibody reaction *in vitro* methods- precipitation, agglutination, complements fixation, immuno-diffusion, immuno-electrophoresis, immuno-fluorescence, RIA, ELISA.

Unit-9: Defense systems in plants- Host parasite interaction and defenses in plants.

Selected References:

1. Essential Immunology- Ivan M. Roitt & Peter J. Delves, 10th Ed. Blackwell Science (2001).
2. Fundamental Immunology. Paul W.E. Raven Press, 7th Ed. (1984).
3. Immunology- Kuby, W.H. Freeman and company, New York, 7th Ed. (2013).
4. An introduction to Immunology. Rao, C.V. Narosa Publication house (2012).
5. Immunology-A short course. Coico, R., Sunshine, G. & Benjamini, E. John Wiley & Sons, 7th Ed. (2009).
6. Prescott's Microbiology. J. Willey, L. Sherwood, C. J. Woolverton, 7th Ed. McGraw-Hill (2006).

SC: BC-A4.4 COURSE-IV: BIOCHEMISTRY OF HORMONES-II

2 Credits

BC-4.4: Block-I

Unit-1: Biosynthesis of steroid hormones and their applications in human diseases. Anabolic steroids and their abuse.

Unit-2: Hormones in contraception. Hormones in treating infertility. IVF and test tube baby.

Unit-3: Commercial application of hormones and pheromones: Use of hormones in poultry, dairy and agriculture.

Unit-4: Insect hormones and pheromones in pest control; commercial production of pheromones.

BC-4.4: Block-II

Unit-5: Hormones in plants and their applications: Auxins, gibberellins,

Unit-6: Cytokinins, ABA, ethylene and jasmonates.

Unit-7: Growth promoting factors- and their role in agriculture and plant tissue culture.

Unit-8: Formulation of media (dehydrated) commercial production of plant hormones.

Selected References:

1. Basic Medical Endocrinology: H Maurice Goodman 3rd Ed. Academic press San Diego CA (2000).
2. Endocrinology, Hadley, MG: 3rd Ed. Printice Hall New Jersey (2000).

3. Endocrine Secrets, McDeemott, MT. 4th Ed. Mosby Philadelphia (2005).
4. Molecular Endocrinology, Bolander, FF. 3rd Ed. Academic press San Diego CA (2004).
5. Comparative Vertebrate Endocrinology, Bentley, PJ. 3rd Ed. Cambridge University press, Cambridge (1998).
6. Endocrinology – An integrated Approach, Murray, SS, Whitehead SA, Taylor and Francis (2001).
7. The physiology of Insecta Vol III. Morris Rockstein, Academic Press (1964).
8. Endocrinology. Vol I, II, III. 3rd Ed. Leslie J Degroot, WB Saunders Company, USA (1995).
9. Applied Entomology, PG Fennimore and Alka Prakash: New Age International Publishers Pvt. Ltd, Bangalore (1992).
10. Biotechnology – A text book of Industrial Production. Cruger and Cruger: Parima Publishers, Bangalore (2005).

Stream-B

BC-B4.3: COURSE-III: BIOINFORMATICS

2 Credits

BC-2.4A: Block-I: Bioinformatics

Unit-1: Introduction to Information technology, information types, sources of data.

Unit-2: Computer networking LAN, WAN, internet and resource sharing.

Unit-3: Biological data bases, tools for bioinformatics and molecular visualization software.

Unit-4: Protein databases - Alignment, multiple alignment, search for motifs, prediction methods.

BC-2.4B: Block-II: Bioinformatics

Unit-5: Classification of protein families based of bioinformatics. Prediction of trans-membrane regions and molecular modeling.

Unit-6: Nucleotide sequence analysis of nucleic acids. Tools and methods.

Unit-7: Single nucleotide polymorphism.

Unit-8: Molecular phylogenetic tree construction.

Selected References:

1. Bioinformatics- Sequence and genome analysis by Mount (2004).
2. Bioinformatics- Methods and Protocols- Misener and Krawetz (1999).
3. Developing Bioinformatics computer skills- Gibas and Jambeck (2001).

SC: BC-B4.4: COURSE-IV: PRINCIPLES OF GENETICS-II

2 Credits

BC-4.4: Block-I

Unit-1: Organisation of genes in chromosomes - Single copy gene, gene families, tandemly repeating genes, pseudo genes.

Unit-2: Chromosome number- Ploidy, karyotyping, sex chromosome and dosage compensation. Mobile genetic elements.

Unit-3: Chromosomal basis of human diseases- Extra or missing chromosome, abnormality in chromosome structure - deletion duplication, inversion and translocation.

Unit-4: Mutations- nature of mutations-spontaneous and induced mutation, conditional lethal (eg. Temperature sensitive) mutation.

BC-4.4: Block-II

Unit-5: Biochemical basis of mutation. Point mutation, base substitution mutation, missense, nonsense and silent mutations.

Unit-6: Mutation rates. Chemical mutagens, radiation induced mutation, reverse mutations.

Unit-7: Suppressor mutations - intergenic and intragenic suppression, reversion as a means of detecting mutagens - Ames test.

Unit-8: Repair Mechanism – DNA repair mechanisms. Reciprocal recombination, site specific recombination, *E.coli* rec system. Holliday model of recombination.

Selected References:

1. Basic Genetic-Hartle, Friefelder, Snyder, 3rd Ed. ASM Press (2007).
2. Genetics- Strickberger, M. W., Prentice Hall of India Pvt. Ltd (1995).
3. Genetics-A molecular approach. Brown, T. A. Chapman and Hall (1990).
4. Molecular Biology of the Cell. Alberts et al., 4th Ed. Garland Publ.(2002).
5. Genes VII. Lewin, B. Pearson Education International. (2003).

HC Course: BC 4.5 (Practical)

Practical 7 and Practical 8

4 Credits

PRACTICAL-7: Clinical analysis of Urine

Qualitative analysis of urine for abnormal constituents- Glucose, albumin, ketone bodies.

Quantitative analysis – Titrable acidity, creatine, creatinine, urea, uric acid, sulphate, chloride.

PRACTICAL-8: Clinical analysis of Blood

Blood glucose, GTT, Urea, uric acid, creatine, cholesterol, HDL-C and LDL-C

Enzymes - Alkaline phosphatase, SGOT, SGPT, LDH, 5'-nucleotidase, Electrophoresis of lipoproteins; serum proteins. Albumin / Globulin ratio. Fractionation of serum proteins- Ammonium sulphate precipitation.

Selected References:

1. Text Books of Biochemistry with Clinical Correlations-Thomas M. Devline, Wiley-Liss, 6th Ed. A. John-Wiley and Sons, Inc. Publication (2010).
2. Practical Clinical Biochemistry, 5th Ed. H Valey, A H Gowenlock and M Bell Heinemann publication (1984).

3. Practical Clinical Biochemistry Methods and Interpretation 3rd Ed. Ranjana Chawla, Gopsons paper Ltd. (2003).
4. Review of Medical Physiology, Gannong, 15th Ed. W H Maruzen Asia, (1991).

SKILL ENHANCEMENT COURSE TO BE OFFERED BY DEPARTMENT OF BIOCHEMISTRY

SEC-1: CLINICAL BIOCHEMISTRY-I

2 Credits

Block-I

Unit-1: Basic concepts - Health and disease. Normal and pathological changes affecting cells in the body- cell death and the physiological causes - physical, chemical and biological agents. Nutritional deficiency.

Unit-2: Diagnostic enzymology - Mechanisms of elevated enzyme activities. Some important enzymes - alkaline phosphatase, creatine Kinase, LDH, AST, ALT- isoenzyme changes.

Unit-3: Blood- Disorders of hemoglobin- Thalassemia, sickle cell anemia. Anemias - microcytic, normocytic and macrocytic.

Unit-4: Kidney - Assessment of renal function - creatine clearance, renal calculi, uremia, laboratory investigation of kidney disorders.

Block- II

Unit-5: Liver - Biochemical indices of hepatobiliary diseases. Bile pigments - formation of bilirubin, urobilinogen, bile acids.

Unit-6: Jaundice – pre-hepatic, hepatic and post-hepatic. Diagnosis- liver function tests, diseases of the liver – hepatitis, cholestasis, cirrhosis, gall stones.

Unit-7: Cardiovasular disorders- Atheroschlrosis - risk factors, pathogenesis. Diagnosis and prognosis.

Unit-8: Gastrointestinal disorders - Fractional gastric analysis, hypo- and hyper- acidity, gastric ulcers, malabsorption syndrome, steatorrhea, diarrhea.

Practical: Clinical analysis of Urine

Qualitative analysis of urine for abnormal constituents- Glucose, albumin, ketone bodies.

Quantitative analysis – Titrable acidity, creatine, creatinine, urea, uric acid, sulphate, chloride.

Selected References:

1. Applied Biochemistry of Clinical Disorders- Gornal A.G. 2nd Ed. Lippincott Williams and Wilkins (1986).
2. Text Books of Biochemistry with Clinical Correlations-Thomas M. Devline, 6th Ed. Wiley-Liss, A. John-Wiley and Sons, Inc. Publication (2010).
3. Clinical Biochemistry-Albert L. Latner, 6th Ed. Elsevier Publications (2010).

SEC-2: CLINICAL BIOCHEMISTRY-II**2 Credits****Block-I**

Unit-1: Endocrine disorders - Laboratory diagnosis of function of pituitary, thyroid, adrenals and gonads.

Unit-2: Disorders- Graves' disease, Addison's disease hypo- and hyper- secretion of hormones of the pituitary gland.

Unit-3: Metabolic disorders - Disorders of carbohydrate metabolism - Diabetes mellitus, classification, etiology, management, laboratory investigations - GTT, HB_{A1c}, diabetic complications.

Unit-4: In born errors of carbohydrate metabolism - galactosemia, lactose intolerance, fructoseurea, pentosuria.

Block-II

Unit-5: Disorders of lipid metabolism - Hyper lipoproteinemia - types of modification of lipoproteins - glycation, oxidation, consequences on metabolism - foam cell formation.

Unit-6: Autoimmune diseases: Myasthenia gravis, Hashimoto syndrome.

Unit-7: Disease caused by retrovirus- AIDS, HIV its transmission and regulation.

Unit-8: Cancer-etiology, diagnosis, management and prognosis.

Practicals: Clinical analysis of Blood

Blood glucose, GTT, Urea, uric acid, creatine, cholesterol, HDL-C and LDL-C

Enzymes - Alkaline phosphatase, SGOT, SGPT, LDH, 5'-nucleotidase, Electrophoresis of lipoproteins; serum proteins. Albumin / Globulin ratio. Fractionation of serum proteins- Ammonium sulphate precipitation.

Selected References:

1. Applied Biochemistry of Clinical Disorders- Gornal A.G. 2nd Ed. Lippincott Williams and Wilkins (1986).
2. Text Books of Biochemistry with Clinical Correlations-Thomas M. Devline, 6th Ed. Wiley-Liss, A. John-Wiley and Sons, Inc. Publication (2010).
3. Clinical Biochemistry-Albert L. Latner, 6th Ed. Elsevier Publications (2010).

INTER- DISCIPLINARY COURSE (Open Elective) for First Semester

ವಿಭಾಗ- ಕನ್ನಡ

ಪತ್ರಿಕೆ-೬: ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ EL 1.1 (ಕ್ರೆಡಿಟ್-೩)

ಬ್ಲಾಕ್-೧೯: ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಮುಖ್ಯ ಘಟ್ಟಗಳು

ಘಟಕ-೨೩: ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ ಮತ್ತು ಪ್ರೇರಣೆಗಳು.

ಘಟಕ-೨೪: ನವೋದಯ ಪೂರ್ವ, ನವೋದಯ- ಬಿ.ಎಂ.ಶ್ರೀ., ಕುವೆಂಪು, ದ.ರಾ.ಬೇಂದ್ರೆ, ಶಿವರಾಮಕಾರಂತ, ಮಾಸ್ತಿವೆಂಕಟೇಶ್ ಅಯ್ಯಂಗಾರ್, ಕೆ.ಎಸ್. ನರಸಿಂಹಸ್ವಾಮಿ.

ಘಟಕ-೨೫: ಪ್ರಗತಿಶೀಲ ಮತ್ತು ನವ್ಯ: ಅನಕೃ, ಕಟ್ಟೀಮನಿ, ನಿರಂಜನ, ಚದುರಂಗ, ವಿ.ಕೃ. ಗೋಕಾಕ, ಅಡಿಗ, ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ಶಾಂತಿನಾಥ ದೇಸಾಯಿ, ಅನಂತಮೂರ್ತಿ, ಯಶವಂತ ಚಿತ್ತಾಲ, ಲಂಕೇಶ್, ತೇಜಸ್ವಿ, ವೈದೇಹಿ, ವೀಣಾ ಶಾಂತೇಶ್ವರ, ವಿಜಯಾದಿಪ್ತಿ.

ಘಟಕ-೨೬: ಬಂಡಾಯ ಮತ್ತು ದಲಿತ:

ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ, ಬಿ.ಟಿ. ಲಲಿತಾನಾಯಕ, ಸಾರಾ ಅಬೂಬಕ್ಕರ್, ದೇವನೂರು ಮಹಾದೇವ, ಸಿದ್ದಲಿಂಗಯ್ಯ, ಅರವಿಂದ ಮಾಲಗತ್ತಿ, ಮೊಗ್ಗಿ ಗಣೇಶ.

ಬ್ಲಾಕ್-೨೦: ಆಧುನಿಕ ಕನ್ನಡ ಕಾವ್ಯ ಮತ್ತು ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು

ಘಟಕ-೨೭: ಕಾವ್ಯ ಪ್ರಕಾರಗಳು: ಭಾವಗೀತೆ, ಸುನೀತ, ಶೋಕಗೀತೆ, ಪ್ರಗಾಥ.

ಘಟಕ-೨೮: ಕಥನ ಕಾವ್ಯ, ಖಂಡ ಕಾವ್ಯ, ಮಹಾಕಾವ್ಯ.

ಘಟಕ-೨೯: ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು: ಕಥೆ, ಕಾದಂಬರಿ, ನಾಟಕ ಜೀವನ ಚರಿತ್ರೆ.

ಘಟಕ-೩೦: ಲಲಿತ ಪ್ರಬಂಧ, ಆತ್ಮಕತೆ, ಪ್ರವಾಸ ಸಾಹಿತ್ಯ, ಸಂಪಾದನೆ, ವಿಚಾರ ಸಾಹಿತ್ಯ, ವಿಜ್ಞಾನ ಸಾಹಿತ್ಯ

ಪರಾಮರ್ಶನ ಗ್ರಂಥಗಳು

೧. ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ: ಎಲ್.ಎಸ್. ಶೇಷಗಿರಿರಾವ್, ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್, ಬೆಂಗಳೂರು, ೧೯೯೨

೨. ಯುಗಧರ್ಮ ಮತ್ತು ಸಾಹಿತ್ಯ ದರ್ಶನ: ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಮನೋಹರ ಗ್ರಂಥ ಮಾಲೆ, ಧಾರವಾಡ, ೧೯೯೧

೩. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಇತಿಹಾಸ: ರಂ.ಶ್ರೀ. ಮಗುಳಿ, ಗೀತಾ ಬುಕ್ ಹೌಸ್, ಮೈಸೂರು, ೨೦೧೮

೪. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ: ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಹಂಪಿ, ಹೊಸಪೇಟೆ, ೧೯೯೫

೫. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ: (ಪ್ರ.ಸಂ) ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ, ಕರ್ನಾಟಕ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ೨೦೧೮

೬. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ: ತ.ಸು. ಶಾಮರಾಯ, ತಳುಕಿನ ವೆಂಕಣ್ಣಯ್ಯ ಸ್ಮಾರಕ ಗ್ರಂಥಮಾಲೆ, ಮೈಸೂರು, ೨೦೧೪

೭. ಹೊಸಗನ್ನಡ ಕಾವ್ಯ ಪ್ರಕಾರಗಳು: ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ.ರಂಗಸ್ವಾಮಿ, ಲೇ. ಮ. ರಾಮಕೃಷ್ಣ, ಪ್ರಸಾರಂಗ, ಕರಾಮುವಿ, ಮೈಸೂರು, ೨೦೧೦

ಲ. ಆಧುನಿಕ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು: ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ. ರಂಗಸ್ವಾಮಿ, ಲೇ. ಡಾ. ಜಿ.ಆರ್. ತಿಪ್ಪೇಸ್ವಾಮಿ,
ಪ್ರಸಾರಂಗ, ಕರಾಮವಿ, ಮೈಸೂರು, ೨೦೧೦

DEPARTMENT - ENGLISH

EL-1.1: INTER- DISCIPLINARY COURSE-I (OPEN ELECTIVE)

INDIAN LITERATURE-I

OBJECTIVES

- To help to understand the contribution of Kalidasa to Sanskrit drama as a playwright
- To create an awareness of the importance of Shakuntala and Mrichhakatika as classical Indian texts
- To evaluate Lord Macaulay and Raja Ram Mohan Roy writers of English Prose.
- To introduce the role of Autobiographies in Indian writing in English

BLOCK -I

Kalidasa: Shakuntala

Shudraka: Mrichhakatika

BLOCK -II

Jawaharlal Nehru: An Autobiography

Ram Mohan Roy: Letter to Lord Amherst

Macaulay: Minutes on Indian Education

Vivekananda: Address to the Parliament of Religions

Suggested Reading:

- **M.K.Naik:** Critical Essays on Indian Writing in English. Sahitya Akademi, 1969.
- **Narasimhaiah. C.D:** The Swan and the Eagle. Indian Institute of Advanced Study, 1987.
- **Meenakshi Mukherjee:** The Twice Born Fiction. Heinemann Educational Publishers, 1972.
- **Chirantan Kulshrestha.** Contemporary Indian English Verse: An Evaluation. Arnold-Heinemann, 1981.

DEPARTMENT - HINDI

व्यावहारिक हिंदी एवं व्याकरण

वर्ण विचार

- वर्ण
- स्वर और उसका वर्गीकरण
- व्यंजन और उसका वर्गीकरण
- वर्णों का उच्चारण स्थान
- संधि
- समास

शब्द विचार

- शब्द के भेद
- अर्थ के आधार पर शब्द भेद
- व्युत्पत्ति के आधार पर शब्द भेद
- रचना के आधार पर शब्द भेद
- प्रयोग के आधार पर शब्द भेद
- विकारी और अविकारी शब्द भेद
- अव्यय
- संज्ञा और उसके भेद
- वचन- उसके भेद, वचन परिवर्तन के नियम
- लिंग- उसके भेद, लिंग परिवर्तन के नियम
- काल और उसके भेद
- कारक और विभक्ति- उसके प्रकार,
- सर्वनाम और उसके भेद
- विशेषण और उसके भेद
- क्रिया और उसके भेद
- क्रिया विशेषण और उसके भेद
- समुच्चय बोधक और उसके भेद
- संबंधबोधक और उसके भेद
- विस्मयादिबोधक और उसके भेद
- परसर्ग और उपसर्ग
- वाच्य और उसके प्रकार

वाक्य विचार

- वाक्य का अर्थ और परिभाषा
- वाक्य के प्रकार आदि

□□□□□□ □□□□□

- □□□□□□ □□□□□□ □□□- □□□□□□ □□□ □□□□□□□□ □□□□.
- □□□□□□ □□□□□□- □□□□□□ □□□ □□□□□□□□ □□□□.
- □□□□□□□□□□ □□□□□ □□ □□□□- □□□□□ □□□□□ □□□□□□□□, □□□□ □□□□□□□□
- □□□□□□ □□□□□ □□□□□□□ □□ □□□□- □□. □□□□□□□□□□□□□ □□□□□□, □□□□□ □□□
- □□□□□□□□□ □□□□□ □□□□-□□□□□□ □□□□□□□□- □□□□□□□□□ □□□□□ □□□□□□□□
- □□□□□ □□□□□□□□- □□□□□□□□□□□□ □□□□□

DEPARTMENT - TELUGU

E. L. 1.1 Thilak Prathyeka Adhyayanam

Block - 1:Thilak Kavithvam - 1

Unit - 1:Amrutham Kurisina Raathri

Unit - 2:Thilak Padhya Kavithaa Vaibhavam

Unit - 3:Thilak Abhiruchulu - Alavaatlu

Unit - 4: Thapala bantrothu

Block - 2: Thilak Kavithvam

Unit - 1:Thilak Sahithya Parichayam - 1

Unit - 2: Thilak Sahithya Parichayam - 2

Unit - 3:Thilak vachana kavithaa Vaibhavam - 1

Unit - 4: Thilak Vachana Kavithaa Vaibhavam – 2

DEPARTMENT - HISTORY

ANCIENT WORLD CIVILIZATIONS

(Egypt, Mesopotamia, Greek, Roman, Inca, Chinese)

Objective: The course is aims to understand major world civilizations. It is to provide a global historical perspective of ancient world which special reference to Egypt, china, Greek, Roman, Inca civilizations.

Pedagogy: personal contact programmes, audio video programmes, online lectures

Assignments, etc

Credits: 2.

Examination Duration: 11/2 hours and Maximum Marks:40

Course outcomes:

After completing this course the students should be able to

- Discuss the Egyptian and Mesopotamian civilizations.
- Analyse the political socio economic conditions of Greek Roman civilizations.
- Evaluate the Chinese contributions to ancient world.

Block – I

Unit-1

Egyptian Civilization: Importance of the Nile, Geographical importance, Gift of Nile, Political conditions.

Unit-2

Social, Economic and religious conditions, Literature and learning, arts and architecture.

Unit-3

Mesopotamian Civilization, Sumer and Babylonian, Hammurabi's code, Society and Culture, Economic conditions, art and literature, Assyrian Empire.

Unit - 4

Greek Civilization, Political Organizations, the city, State, Alexander the Great, Greek political theory, Religion, Philosophy, art and architecture, Characteristic of Hellenistic Civilization.

Block – II

Unit - 5

Roman Civilization, The Land and the people, the Government, Roman Republic, Roman Empire, Roman Republic, The Empire, The Patricians and Plebeians, Punic wars.

Unit – 6

Julius Caesar, his wars, fall Augustus Caesar, Social Economic Conditions, Roman art and architecture.

Unit - 7

Painting, Sculpture, Roman Law, Roman Religion, Philosophy, Roman literature, Decline of the Roman Empire.

Unit - 8

Inca Civilisation, Socio – economic Political conditions, Chinese Civilisation, Socio – economic Political conditions.

Suggested readings:

1. Breasted, J.H. : Ancient Times, A History of the early world.
2. Rostovzeff, M.S. : History of Ancient World
3. Schvidler, H. : The History of Civilization
4. Swain, J.E. : A History of World Civilization

5. Breasted.J.H. : History of Egypt
6. Jastrow.M : The Civilization of Babylonia and Assyria
7. Bury.J.E. & OTHERS: The Hellenistic Age
8. Bailey.C : The Legacy of Rome and others
9. Abot.F.F.: Society and Politics of Ancient Rome

DEPARTMENT – ECONOMICS

EL1.1: Economic Policies of India Since 1991.

- **Objective:** To enable the Students to understand the economic policies of India in the era of new economic policy.
- **Pedagogy:** A Combination of Lectures, Group Discussion, Assignments.
- **Credits:** 2 ; Examination Duration: 1½ and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

BLOCK – I: India's Economic Policies

UNIT : 1 Economic Policies in India Since 1991

Economic reforms in India – Economic Scenario in India during 1990-91 – Domestic Financial Crisis – Balance of Payment Crisis – Extent of External debt and debt Trap Problem.

UNIT : 2 Need for Reforms

Measures Taken – Devaluation – Privatization – Liberalization – Globalization.

UNIT : 3 Monetary Policy and Fiscal Policy

Narasimhan Committee on Banking and Financial Sector Reforms Since 1998 – Fiscal Reforms: Raja Chellaiah Committee and Tax Reform Policies – Fiscal Prudence and Policies.

UNIT : 4 Structural Adjustments and External Sector in India

Foreign Trade: Trends in Exports and Imports – Balance of Payment and its Crisis – Export Import Policy – In Defence of Import Substitution – Foreign Exchange Policy.

BLOCK : II FDI and the Role of State

UNIT : 5 Foreign Direct Investment (FDI)

Trends in FDI – FDI Policy – Its Impact on the Domestic Economy – Labour Migration: causes and Consequences on Indian Economy – Information and Communication Revolution and India.

UNIT : 6 Challenges to Development in India

Poverty – Unemployment – Poverty alleviation Programmes - urban Poverty and Problems – Income Inequality – Employment Generating Schemes.

UNIT: 7 The Role of State

Parallel Economy in India – Black Money – Corruption – Slams – Redefining the Role of the State and the Markets – Balance between Economic and Socio

- Political Goals.

UNIT : 8 Administrative Reforms

Rights to Information – Measures Towards Good Governance – NITI Ayoga and aftermath – Digitalized India – Demonetization – GST – Make in India.

References:

1. Acharya Shankar, (2003) India's Economy: Some Issues and Answers, Academic Foundation, New Delhi.
2. Byres J Terence (Ed.) (1999) The Indian Economy, Major Debates since Independence, OUP, New Delhi.
3. Datt Ruddar, (2002) Economic Reforms in India - A Critique, S.Chand and Co, New Delhi.
4. Kapila Uma (Ed) (2015) Indian Economy since Independence, Academic Foundations, New Delhi.
5. Kapila Uma, (2005) Understanding the Problem of Indian Economy, Academic Foundation, New Delhi.
6. Misra S.K. & V.K. Puri, (2011) Indian Economy-Its Development Experience, Himalaya Pub., House, Mumbai.
7. NCAER, Economic and Policy Reforms in India, NCAER, New Delhi.
8. Rangarajan C, (1998) Indian Economy- Essays on Money and Finance, UBSPD, New Delhi.
9. Sachs D.Jeffrey, A.Varshney & N Bajpai (Ed)(1999) India in the Era of Economic Reforms,OUP, New Delhi.
10. Vaidyanathan A, India's Economic Reforms and Development, OUP, New Delhi

DEPARTMENT - POLITICAL SCIENCE

(OEL-I) Local Government in India

Block-I

- Unit:1 Meaning, Nature and Scope of Local Governments.
- Unit:2 Evolution of Panchayat Raj Institution in India.
- a) Constitute Assembly and Village Panchayat.
- b) Balavanth Roy Mehta Committee Report
- c) Ashok Mehta Committee Report.
- d) G.V.K. Rao Committee Report.
- Unit:3 Constitutional Amendments and Panchayat Raj Institutions:
- a) Basis of Constitutional Amendment.
- b) 73rd and 74th Constitutional Amendment.
- c) Karnataka Panchayat Raj At of 1983.
- d) Karnataka Panchayat Raj Act of 1993.
- Unit:4 Zilla Panchayat: Structure, Functions and Sources of Revenue.

Block-II

- Unit:5 Taluk Panchayat : Structure, Functions, Executive Officer, Powers and

- Functions.
- Unit:6 Gram Panchayat: Gram Sabha, Ward Sabha: Structure, Functions and Sources of Revenue.
- Unit:7 Panchayat Development Officer and Secretary: Powers and Functions.
- Unit:8 Role of Panchayat Raj Institutions in Development (with Reference to Karnataka)
- Panchayat Raj in Rural Development.
 - Social Change: Empowerment of the Weaker Sections.

References:

1. Verma B. M, Social justice and Panchayath Raj
2. Mutarib-M.A. and Others, Theory of Local Government,
3. Dr. Arjun darshankar, Panchayath Raj aani Nagari.
4. V. B. Patil, Pancayath Raj.
5. A.N. Kulkarni, Bharatiya Sthanik Swashasan,
6. Shantaram Bhosale, Bharatiya Sthanik Shasan,
7. Kikherji. S, Essays on Rural Development.
8. Balaramu. C. H. Administration of Anty Poverty Programmes.
9. 73rd Constitutional Amendment Act, Government of India, 1993.
10. Karnataka Panchayatraj Acts, 1985, 1995.

DEPARTMENT – PUBLIC ADMINISTRATION

INDIAN POLITY – I

BLOCK – 1

- UNIT – 1 Indian Constitution.
- UNIT – 2 Preamble - Meaning and Importance.
- UNIT – 3 Fundamental Rights and Duties.
- UNIT – 4 Directive Principles of State Policy and Relation with Fundamental Rights.

BLOCK – 2

- UNIT – 5 Indian Federalism and Parliamentary system of Government.
- UNIT – 6 Centre - State Relations. Legislative Administrative and Financial
- UNIT – 7 Union Executive - President Elections, Powers and Positions.
- UNIT – 8 Council of Ministers and Prime Ministers - Powers and Functions

DEPARTMENT - SOCIOLOGY

Invitation to Sociology

(02 Credits)

Course Description

This course introduces learners to the basic concepts of sociology. It is particularly designed to orient the learners from interdisciplinary background about the essence of sociology and intends to inculcate sociological imagination.

Course Objectives

- To introduce the learner to the basic concepts and processes of sociology
- to comprehend the structural and organizational aspects of society
- to examine the process of social change

Learning Outcomes and Competencies

After successfully completing the course, following outcomes and competencies are possible among the learners. Learner will have/can

- Conceptual precision and clarity about the basic sociological concepts
- Develop sociological imagination and apply to analyze the contemporary events
- explain major social processes of society
- analytical view about Indian social structure
- explicate major process of social change and can conceptualize the changing aspects of Indian society

Course Contents

Block-1 Basic Concepts and Processes

- Unit-1 Emergence of Sociology-Factors and Early Thinkers-Sociological Imagination
- Unit-2 Society, Community- Associations and Institutions- Culture and Socialization
- Unit-3 Social System, Structure and Function
- Unit-4 Social Processes-Cooperation, Competition, Conflict, Accommodation and Assimilation

Block-2 Social Organization and Social Change

- Unit-5 Caste and Class System-Changes in Caste
- Unit-6 Social Mobility and Types
- Unit-7 Factors of Social Change
- Unit-8 Process of Social Change in India (Sanskritization, Westernization, Modernization and Globalization)

References

1. Berger, Peter L. 1978. An Invitation to Sociology, Allen and Unwin, London. Davis, Kingsley. Human Society, Macmilan, New Delhi.
2. Dumont, Louis, 1988, Homo Hierarchicus. Oxford University Press. Giddens, Anthony. 2009. Sociology. Politi Press, Malden.
3. Inkles, Alex. 2002. What is Sociology, Prentice Hall India, New Delhi. Jayaram, N, 1990, Introductory Sociology, Macmilan, New Delhi.
4. Johnson Harry M., 2011: Sociology: A Systematic Introduction: Allied Publishers, New Delhi.
5. MacIver, R.M and C.H. Page. Society - Introduction to Sociology, Macmilan, New Delhi
6. Samuel, Koenig. 1957. Sociology: An Introduction to Science of Society, Barnes & Nobel Books, London.
7. Singh, Yogendra. 1993: Social Change in India: Crisis and Resilience, Har-Anand, New Delhi.

DEPARTMENT – ANCIENT HISTORY AND ARCHEOLOGY

AHA
OE 1.1

World Heritage Sites of India

Block - 1

Introduction

Unit - 1 Nature - Scope - Criteria for incorporation of World Heritage sites

Unit - 2 Types of World Heritage sites in India

Block - 2

Archaeological and Cave Heritage sites

Unit - 3 Bimbetka - Sanchi- Nalanda – Champaner - Dholavira

Unit – 4 Ajanta – Ellora - Elephant

Block - 3

North Indian World Heritage Sites

Unit – 5 Bodh Gaya — Kajuraho–Konarak–Rani kivav– Jaipur,

Unit – 6 Agra Fort – Red Fort - FatehpurSikri–Taj Mahal – Humayun’s Tomb –
Ahamadabad, Qutub Minar

Block - 4

South Indian World Heritages Sites

Unit – 7 Mahabalipuram – Pattadakallu – Chola temples

Unit - 8 Monuments of Hampi – Churches and Convents of Old Goa – Ramappa Temple

References:

1. Marco Canneo, Jasmina: The world heritage sites of UNESCO – The Treasure of Art
2. ASI: World Heritage Sites Series
3. Individual guide: Books on respective city Individual

DEPARTMENT - EDUCATION

IDC – 1 FOUNDATIONS OF EDUCATION

BLOCK-1 FOUNDATIONS OF EDUCATION – I

Unit-1 Philosophical Foundations
Unit-2 Basic Concepts of Philosophy
Unit-3 Psychology as a Science
Unit-4 Basic Concept in Psychology related to Education

BLOCK-2 FOUNDATIONS OF LEARNING – II

Unit-5 Sociological bases of Education
Unit-6 Educational Issues in Indian Society
Unit-7 Cultural and Historical Foundations
Unit-8 Political and Economic bases of Education

References:

1. Harison and Myers (1970), Education, Manpower and Economic Growth, McGrothill, Oxfords, IBH Publishing Co., New Delhi.
2. Kamala Bhatia & Baldev Bhatia, (1974) The Philosophical and Sociological Foundations of Education, Doaba House, New Delhi.
3. Bhatia B.D, (1974), 'Theory and Principles of Education, Doaba House, Delhi'.
4. Sorokim .P, (1947) 'Society, Culture and Personality', Harper and Brothers Publishers, New York.

DEPARTMENT – COMMERCE

EL1.1: Personal Financial Planning

Objective: To enable the Students to understand about the different Investment Avenues, Saving Schemes designed by various agencies particularly for the individuals.

Pedagogy: A Combination of Lectures, Group Discussion, Assignments.

Credits: 2

Examination Duration: 1 ¹/₂ and Maximum Marks: 50

(Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

Block I

- **Unit -1: Introduction to Financial Planning:** Introduction - The Process Financial Planning – Client Interactions – Time Value of Money Applications – Personal Financial Statements – Cash Flow and Debt Management – Planning to Finance Education.
- **Unit -2: Financial Planning Process:** Introduction - Setting Goals – Informal Budget Preparation – Investment Opportunities – Financial Vs Physical Investments – Role of a Financial Planner.
- **Unit -3: Savings Plans:** Introduction - Setting Goals – Savings Instruments – Savings Plan – Tax Savings Schemes.
- **Unit -4: Investment Planning:** Introduction - Risk Return Analysis – Mutual Fund – Derivatives – Asset Allocation – Investment Strategies and Portfolio Construction and Management.

Block II

- **Unit -5: Risk Analysis and Insurance Planning:** Introduction - Risk Management and Insurance Decision in Personal Financial Planning – Various Insurance Policies and Strategies for General Insurance – Life Insurance – Motor Insurance – Medical Insurance.
- **Unit -6: Retirement Planning and Benefits:** Introduction - Retirement Need Analysis Techniques – Savings and Investment Plans for Retirement – Employee Provident Fund – Public Provident Fund – Superannuation Fund – Gratuity – Annuity Plans.
- **Unit -7: Tax Planning:** Introduction - Income-tax Computation for Individuals – Companies - Trust and other bodies – Statutory Provisions Pertaining to Capital Gains and Indexation – House Property – Deduction and Allowances.
- **Unit -8: Health Financing:** Introduction - Health Financing Models – Financing of Health in India – National Rural Health Mission – Challenges of Access to Health Care and Service Quality – Health Insurance Mechanism & Financial Protection.

Books Recommended for Reference

01. Khan M.Y, Financial Services, Tata MacGraw Hill.
02. Singhanar V.K, Students' Guide to Income Tax, Taxmann.
03. Ranganathan and Madhuamathi, Investment Analysis and Portfolio Management, Pearson Publications.
04. Gordon and Natarajan, Emerging Scenario of Financial Services, Himalaya Publishing House.
05. George Rejda, Principles of Risk Management and Insurance, Pearson.

DEPARTMENT - MANAGEMENT

COURSE: OE-1 : Disaster Management - Credit: 2

MBAS 459: DISASTER MANAGEMENT

Objectives	: The course aims at familiarizing the students with the concepts of disaster management, need for disaster management and its relevance.
Pedagogy	: Lectures, assignments, Industrial visits and practical exercises, discussions.

1. Understanding Disasters · Meaning, nature, characteristics and types of Disasters, Causes and effects, Disaster: A Global View, Disaster Profile of India, The Disaster Management cycle.
2. Geological and Mountain Area Disasters · Earthquakes · Volcanic Eruption · Landslides Snow Avalanches, Wind and Water Related Natural Disaster · Floods and Flash Floods · Droughts · Cyclones · Tsunamis, Man Made Disasters · Understanding Man-Made Disasters · Fires and Forest Fires · Nuclear, Biological and Chemical disaster · Road Accidents
3. Introduction to disaster Preparedness · Disaster Management: Prevention, Preparedness and Mitigation · Disaster Preparedness: Concept & Nature · Disaster Preparedness Plan · Disaster Preparedness for People and Infrastructure · Community based Disaster Preparedness Plan
4. Roles & Responsibilities of Different Agencies and Govt. · Roll of Information, Education, Communication & Training · Role and Responsibilities of Central, State, District and local administration. · Role and Responsibilities of Armed Forces, Police, Para Military Forces. Role and Responsibilities of International Agencies, NGO's, Community Based Org. (CBO's)
5. Technologies for Disaster Management · Role of IT in Disaster Preparedness · Remote Sensing, GIS and GPS · Use and Application of Emerging Technologies · Application of Modern Technologies for the Emergency communication. · Application and use of ICST for different disasters.
6. Disaster Mitigation · Disaster Mitigation: meaning and concept · Disaster Mitigation Strategies · Emerging Trends in Disaster Mitigation · Mitigation management · Role of Team and Coordination
7. Disaster Management in India Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter-Governmental Agencies. National Disaster management Authority.

References

1. Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
2. Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila.
3. Central Water Commission, 1987, Flood Atlas of India, CWC, New Delhi.
4. Central Water Commission, 1989, Manual of Flood Forecasting, New Delhi.
5. Government of India, 1997, Vulnerability Atlas of India, New Delhi.
6. Sahni, Pardeep et.al. (eds.) 2002, Disaster Mitigation Experiences and Reflections, Prentice Hall of India, New Delhi.

DEPARTMENT - BIO CHEMISTRY

Basics of Bioinorganic and Biophysical chemistry for Biology graduates.

Bioinorganic chemistry

Coordination Compounds: Transition metals, properties (Colour, Oxidation states, Magnetic properties) Coordinate bond, double and complex salts– differences with examples.

Postulates of Warner's theory. Types of ligands: For examples: uni, bi, polydentate ligands. Coordination number, examples.

Porphyrin nucleus and their classification. Important metallo-porphyrins occurring in nature. Structure and biological importance of Heme, cytochrome, chlorophyll, Vitamin B₁₂.

Nitrogen, Fixation of atmospheric nitrogen – Symbiotic and non-symbiotic. Nitrogen cycle.

Environmental pollution by nitrogen compounds. Phosphorous: Importance of Phosphorous compounds in biological system, phosphorous cycle

Oxygen, Formation of ozone in atmosphere. Role of ozone in maintenance of life on earth. Effect of environmental pollutants on ozone layer.

Sulphur and Selenium, Importance of compounds of Sulphur and Selenium in biological systems. Effect of sulphur compounds on environmental pollution.

Biophysical chemistry.

Units in chemistry, Avogadro's number, Mole, Mole fraction, Molarity, Equivalent weight, Normality, Molality. Colligative Properties, Osmotic pressure and its measurements. Hypo-, Hyper- and isotonic solutions. Effect of osmotic pressure on living cells.

Donnan membrane equilibrium. Relative lowering of vapour pressure, Raoult's law. Elevation of boiling point, depression in freezing point.

Adsorption: Freundlich and Langmuir's adsorption isotherm. Applications of adsorption.

Viscosity: Definition, determination of viscosity of liquids & solutions by Ostwald's viscometer (solutions of gum and protein to be taken as examples).

Distribution law, Distribution law, partition coefficient, application of distribution law.

Acids, bases and buffers- Lewis concept of acids and bases. Ionic product of water. pH scale, buffers, Henderson- Hasselbach equation, buffer capacity Choice of buffers. Theory of acid base indicators. pH titration curve and iso-electric pH of amino acids.

Selected References:

1. Basic Principles of Organic Chemistry, Roberts and Caserio, W. A. Benjamin, Inc. (1964).
2. Organic Chemistry, Morrison and Boyd, Allyn and Bacon Inc (1992).
3. Principles of Inorganic chemistry by Cotton & Wilkinson, Wiley (1999).
4. Textbook of Organic chemistry by Ahluwalia V K & Madhuri G Narosa publications (2001).
5. Physical chemistry by Castellan G W, Narosa Publications (2004).
6. Physical chemistry by Chakraborty D K, Narosa Publications (2004).

DEPARTMENT - BIOTECHNOLOGY

MBT EL –I- Biotechnology and its Applications

Introduction to biotechnology. Principles of biotechnology, classification.

Recombinant DNA Technology

Introduction, outline of genetic engineering procedure, restriction endonucleases, cloning & expression vectors- plasmids, cloning in plasmid, transformation and detection of transformants- lacZ, genomic and cDNA libraries, gene analysis techniques-hybridization: Southern, Northern, Western, in situ, Polymerase chain reaction.

Microbial and food and environmental Biotechnology

Basics of fermentation technology: Types of microbial culture- batch, continuous and fed-batch. Microbial production: Use of microbes in production of vitamins, enzymes, organic acids, amino acids, polysaccharides, flavors, sweeteners, proteins and antibiotics.

Fermented food products- yogurt, cheese, tempeh, sauerkraut; beverages- wine and beer. Pre- and Pro-biotics, single cell proteins, Genetically modified foods, designer foods.

Current status of biotechnology in environment. Bioconservation, biofuels, gasohol, biogas. Bioremediation: Concepts and principles, bioremediation using microbes, in situ and ex situ bioremediation, biosorption and bioaccumulation of heavy metals.

Plant Biotechnology

Landmarks in Plant tissue culture. Types of cultures- embryo, organ, callus and cell cultures, Somatic embryogenesis, Haploid Production, Androgenesis, Protoplast culture and somatic hybridization. Micropropagation- Methods and stages, applications. Synthetic seeds, somaclonal variation. Production of secondary metabolites by plant cells, Biotransformation.

Plant transformation techniques: Direct and indirect methods of gene transfer in plants. Transgenic plants and crop improvement- herbicide tolerance, disease resistance, abiotic stress tolerance, delayed ripening, improvement of nutritional quality, molecular pharming.

Animal Biotechnology

Basics of animal cell culture techniques, cell lines, physical conditions for culturing animal cells, equipments required, scale-up of culture methods.

Application of animal cell culture- Hybridomas, production of therapeutic antibodies, stem cell technology, cell and tissue engineering.

Genetic engineering of animals: Methods for gene transfer in animals, microinjection, nuclear transplantation, retrovirus-mediated gene transfer, gene knockdown techniques. Transgenic- animals- sheep, pigs, cattle, chickens; applications of transgenic animals.

DEPARTMENT - CHEMISTRY

Block-1	Title: Periodic Table and chemical Periodicity
Unit-1	Elements, atomic structure, atomic number, atomic mass, quantum numbers, electronic configuration,
Unit-2	Periodic properties of elements, State of Matter, their resources. Important periodic properties of the elements, covalent radii, ionic radii, ionization potential, electron affinity and electronegativity
Unit-3	Concepts of Acids and Bases: Review of acid base concepts. Lux-Flood and solvent system concepts. Hard-soft acids and bases. Applications.
Unit-4	Solutions: Concentration units, solutions of liquids in liquids, Raoult's law, ideal and non-ideal solutions.

Block-2	Title: Bonding and molecular structure
Unit-5	Calcification of matter: (elements, compounds, substance and mixture), The three states of matter, physical and chemical properties of matter, fundamental particles of atoms, atomic number, atomic mass, atomic structure of atom molecular formula, empirical formula, molecular mass.
Unit-6	Ions and ionic compounds, properties of ionic compounds, formation of ionic compounds, covalent compounds, properties of covalent compounds, properties of covalent compounds
Unit-7	Metals, properties of metals, theory of metallic bond formation, types of metals conductor, semiconductor and insulators, n-type semiconductors and p-type semiconductors, alloys and superconducting materials.
Unit-8	Acids and bases, general properties of acid and bases, Acid base reactions, oxidation reduction reactions, oxidation number, types of redox reactions, balancing oxidation-reduction equation, exothermic and endothermic reactions energy change in chemical reactions.

DEPARTMENT : CLINICAL NUTRITION AND DIETETICS

OEL-1: HEALTHY LIFESTYLES AND NUTRITION

3 Credits

BLOCK 1: INTRODUCTION TO FOOD AND NUTRITION

Unit 1.- Factors affecting food habits, choices and dietary patterns – Definition of Food, Nutrition, Health, Fitness. Interrelationship between nutrition and health, concept of a desirable diet for optimum nutrition, health and fitness.

Unit 2.- A brief review of nutrients in general –

- Energy and macronutrients – Carbohydrates, Protein, Fat - functions, sources deficiency disorders and recommended intakes.
- Micronutrients: Minerals – calcium, Iron, Iodine, and other elements, Vitamins – Fat Soluble & Water Soluble.

Unit 3: Nutritional assessment- Anthropometric, biochemical, clinical, dietary and Biochemical assessments

Unit 4: Basic principles of planning diet –, RDA for Indians, Food groups, Dietary guides and balanced diets.

BLOCK 2: PLANNING OF DIET

Unit 5: Principles of planning a normal diet: characteristics of a normal diet, meeting nutrient requirements of individuals and family. Use of Dietary guidelines for Indians.

Unit 6: Objectives of diet therapy- Regular diet and rationale for modifications in energy and other nutrients, texture, fluid, soft diets etc.

Unit 7: Role of dietician in hospital- specific functions, team approach in patient care, psychological consideration, interpersonal relationship with patients. Nutrition and medical ethics. Hospital dietary- scope and importance, types of food service, quality management.

Unit 8: Nutrition counseling: definition, concept, role of clinical dietician, the recipient and counseling environment and goals of counseling. An overview of systems approach to nutritional care and its components (planning, implementation and evaluation).

REFERENCES

- Srilakshmi B (2004) Nutrition Science. New Age International (P) Ltd, Publishers.
- Kango M (2005) Normal Nutrition, Curing diseases through diet. First Edition CBS Publications. Paul S (2003) Text Book of Bio-Nutrition, Fundamental and Management. RBSA Publishers.
- Williams SR (2000) Nutrition and Diet Therapy. Sixth Edition C.V. Melskey Co.
- Mudambi SR and Rajagopal MV (1997) Fundamentals of Foods and Nutrition. New Age International (P) Ltd, Publishers.
- Swaminathan M (1999) Essential of Food and Nutrition. Vol I and II, Bappco publications, Madras.
- Corinne, H. Robinson 2010– “Normal and Therapeutic nutrition”, Oxford and IBH publishing company, Bombay.
-

B.

DEPARTMENT - COMPUTER SCIENCE

ELMCS-01 Mobile App Development: Credit 2

Block – I

Unit-1: Introduction to Mobile Computing: applications, a simplified reference model, Wireless

Transmission:

Unit-2: Frequencies of radio transmission, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum, cellular system.

Unit-3 Media Access Control: motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA ,and Comparisons.

Unit-4: GSM, DECT, Wireless LAN: Infrared vs. radio transmission, Infrastructure and ad-hoc networks, IEEE 802.11, HPERLAN, Bluetooth.

Block – II

Unit-5: Mobile Network Layer: mobile IP, dynamic host configuration protocol,

Unit-6: ad-hoc networks. Mobile Transport Layer: Traditional TCP, classical TCP improvements,

Unit-7: TCP over 2.5/3G wireless networks. File Systems, World Wide Web,

Unit-8: Wireless Application Protocol (WAP) and WAP 2.0.

Text book:

1. Jochen H. Schiller, Mobile Communications(2e)

Reference

1. Raj Kamal, Mobile Computing
2. Asoke K. Talukder, Roopa R. Yavagal, Mobile Computing
3. Mazliza Othman, Principles of Mobile Computing and Communications
4. Prasant Kumar Pattnaik, Rajib Mall, Fundamentals of Mobile Computing
5. Ivan Stojmenovic, Handbook of Wireless Networks and Mobile Computer
6. David Taniar, Mobile Computing Concepts, Methodologies, Tools, and Applications

DEPARTMENT - ENVIRONMENTAL SCIENCE

ESOEL-1: Basics of Environmental Science

Block I: Ecology and Environment

Unit 1: Definition, Principles and Scope. Biotic and abiotic factors of environment. Ecosystems: pond, forest, river, grassland and estuary ecosystems

- Unit 2:** Ecosystem – trophic structure, energy flow, food chain, food web, Ecological pyramids.
- Unit 3:** Population dynamics: Definition, population density, Natality, Mortality, Age structure, Growth pattern, population dispersion.
- Unit 4:** Biogeochemical cycle – types, sedimentary and gaseous cycles, N, C, S, P, O cycles. Rock and hydrological cycles.

Block II: Biodiversity and Conservation

- Unit 5:** Biodiversity, Definition, Types of Biodiversity, importance and roles.
- Unit 6:** Needs and benefits of biodiversity, Loss of biodiversity- causes and consequences, Need for conservation of biodiversity
- Unit 7:** Conservation strategies, endemic and exotic species, Red Data book, National parks, wildlife sanctuaries, biosphere reserves, biodiversity hotspots, wildlife protection act, biodiversity act, wetland conservation and management, Hotspots of biodiversity.
- Unit 8:** Project Tiger, Project elephant, Ramsar site and other conservation projects. Experts Committee Reports on Environmental conservation

DEPARTMENT - GEOGRAPHY

ELMG –01, Introduction to Physical Geography (Credit-2)

Block-1

Origin, Shape and Size of the Earth, Movement of the Earth- Rotation and Revolution, Effects of the movement of Earth, Coordinates -Latitude, Longitude and Time; Structure of the Earth, Rocks - types, significance, Weathering –types; Agents of Denudation - River, Glacier, Wind and Under Ground water; Structure and Composition of Atmosphere, Weather and Climate

Block-2

Atmospheric Pressure, Winds and Precipitation; Distribution of Land and Sea, Submarine Relief of the Ocean, Temperature and Salinity of Sea Water; Ocean Tides and Oceanic Currents- Atlantic, Pacific and Indian Oceans; Biosphere- Elements, Ecology, Ecosystem, World's Biomes, Biodiversity – Importance, Types and Conservation

References

1. B.S. Negi (1993) Physical Geography. S.J. Publication, Meerut
2. D.S.Lal (1998) Climatology. Chaitnya publishing house, Allahabad
3. K. Siddhartha (2001) Atmosphere, Weather and Climate. Kishalay publication, New Delhi
4. R.N.Tikka (2002) Physical Geography. Kedarnath Ramnath & co, Meerut
5. William D. Thornbury (1997) Principle of Geomorphology. New Age International (Pvt Ltd.) New Delhi.

DEPARTMENT -MATHEMATICS

ELMM –01 - FUNDAMENTALS OF MATHEMATICS

(2 Credits)

Block-I: Number Theory: Natural numbers, integers, Real numbers, GCD, LCM, Prime numbers. Surds, Indices, Logarithms, Progressions, Arithmetic Progression, Geometric Progression, Harmonic Progression,

Block-II: Set Theory: Operations of Union, Intersection, Complementation. Relations & Functions: Types of relations One-one, onto, Many-one functions, graphs of functions.

Mathematical Logic: Propositions, logical connectives, Methods of proofs.

Books for Reference:

1. Kolman and Busby: Discrete Mathematics, PHI.
2. S. L. Loney: The Elements of Coordinate Geometry, London Macmillan & Co.
3. B. S. Grewal: Higher Engineering Mathematics, 36th Ed., Khanna Pub.
4. S. Lipschutz and M. Lipson: Theory and Problems of Discrete Mathematics. Schaum Series. 2nd Ed. Tata McGraw Hill.

DEPARTMENT - MICRO BIOLOGY

Microbial World and Microbial Diversity

- i. Introduction to microbial world, Physiochemical and biological characteristics; Characteristics of Acellular microorganisms (Viruses); Baltimore classification, general structure with special reference to viroids and prions.
- ii. Binomial Nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility.
- iii. Difference between prokaryotic and eukaryotic microorganisms
- i. General characteristics of Cellular microorganisms, types - archaebacteria, eubacteria, wall-less forms - MLO (mycoplasma and spheroplasts) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance.
- ii. Structure, reproduction and economic importance of Mycoplasma.
- i. General concept of Phytoplanktons and Zooplanktons. Characteristics, occurrence, thallus organization and classification of Algae.
- ii. Cyanobacteria - occurrence, thallus organization, cell ultra structure, reproduction and economic importance. Applications of algae in agriculture, industry, environment and food.
- i. Historical developments in the field of Mycology including significant contributions of eminent mycologists.
- ii. General characteristics of fungi including habitat, distribution, nutritional requirements, fungal cell ultra- structure, thallus organization and aggregation, mode of reproduction and
- iii. Economic importance of fungi with examples in agriculture, environment, Industry, medicine and food.

- i. General characteristics, structure, mode of reproduction and economic importance of Actinomycetes with special reference to its application in medicine and industry.
- ii. General characteristics, occurrence, classification structure, reproduction and economic importance of Protozoa.

References:

1. Singh, R.P. General Microbiology. Kalyani Publishers, New Delhi (2007).
2. Aneja, K.R. Experiments in Microbiology, Plant pathology and Biotechnology, Fourth edition, New Age International publishers.
3. Dubey, R.C. and Maheshwary, D.K. Text book of Microbiology. S. Chand and company (1999).
4. Powar, C.B. and Dagainawal, H.F. General Microbiology. Vol-I and Vol- II, Himalaya Publishing House.
5. Chakraborty P. A Textbook Of Microbiology. New central book Agency (2005).
6. Prescott, M.J., Harley, J.P. and Klein, D.A. Microbiology. 5th Edition WCB Mc Graw Hill, New York, (2002).
7. Tortora, G.J., Funke, B.R. and Case, C.L. Microbiology: An Introduction. Pearson Education, Singapore, (2004).
8. Alcomo, I.E. Fundamentals of Microbiology. VI Edition, Jones and Bartlett Publishers. Sudbury. Massachusetts, (2001).
9. Black J.G. Microbiology-Principles and Explorations. John Wiley & Sons Inc. New York, (2002).
10. Pelczar, M.J. Chan ECS and Krieg NR, Microbiology McGraw-Hill.
11. Willey, Sherwood, Woolverton. Prescott, Harley, and Klein's Microbiology McGraw-Hill publication
12. Tortora, Funke, Case. Microbiology. Pearson Benjamin Cummings.
13. JACQUELYN G. BLACK. Microbiology Principles and explorations. JOHN WILEY & SONS, INC.
14. Madigan, Martinko, Bender, Buckley, Stahl. Brock Biology of Microorganisms. Pearson
15. Tom Besty, D.C Jim Koegh. Microbiology Demystified Mc GRAW-HILL.

DEPARTMENT -PHYSICS

MP-EL1: Mechanics

BLOCK-A

Unit-1: Laws of Motion: Frames of reference, Newton's Laws of motion, Dynamics of a system of particles, Centre of Mass.

Unit-2: Momentum and Energy: Conservation of momentum, Work and energy, Conservation of energy, Motion of rockets.

Unit-3: Rotational Motion: Angular velocity and angular momentum, Torque, Conservation of angular momentum.

Unit-4: Gravitation: Kepler's Laws (statement only), Newton's Law of gravitation, motion of a particle in a central force field, satellite in circular orbit and applications, geosynchronous orbits,

weightlessness, basic idea of global positioning system (GPS).

BLOCK-B:

Unit-5: Oscillations: Simple harmonic motion, differential equation of SHM and its solutions, kinetic and potential energy, total energy and their time averages, damped oscillations.

Unit-6: Elasticity-1: Hooke's law, stress-strain diagram, elastic moduli-relation between elastic constants, Poisson's ratio, expression for Poisson's ratio in terms of elastic constants, work done in stretching and work done in twisting a wire.

Unit-7: Elasticity-2: Twisting couple on a cylinder - determination of rigidity modulus by static torsion, torsional pendulum-determination of rigidity modulus and moment of inertia - η and \square by Searles method.

Unit-8: Special Theory of Relativity: constancy of speed of light, postulates of special theory of relativity, length contraction, time dilation.

DEPARTMENT -PSYCHOLOGY

EL-1 Introduction to Psychology 2 Credits

Block 1: Introduction to Psychology-I

Unit 1: Introducing Psychology -Definition, Scope, and goals

Unit 2: Branches of Psychology

Unit 3: Motivation

Unit 4: Emotions

Block 2: Introduction to Psychology-II

Unit 5: Sensation, Attention and Perception

Unit 6: Learning, Memory and Forgetting

Unit 7: Intelligence

Unit 8: Personality

References:

1. Charles G.Morris. Albert A. Maisto Psychology an Introduction , Prentice Hall. New Jersey.
2. Feldman, A. R.,Understanding Psychology IV th Ed, 1996, McGraw Hill, New Delhi.
3. Morgan, King, Weisz &Schopler, Introduction to Psychology-V11 Ed,1993, Tata McGraw Hill, New Delhi.
4. Ernest R Hilgard, Richard C Atkinson ,Rita L Atkinson Introduction to Psychology Oxford Publication, New Delhi.

DEPARTMENT : INFORMATION TECHNOLOGY

ELMIT –01: Green Computing

(2 Credits)

Course Objective: Study the concepts related to Green IT, Green devices and hardware along with software methods, green enterprise activities, managing the green IT and various laws, standards, protocols along with outlook of green IT.

BLOCK 1: Overview of Green Computing

Unit 1: Green IT Introduction, Overview and issues, Initiatives and standards, Pathways of Green computing, Benefits of Green IT, Environmental Impacts of IT

Unit 2: Green devices and hardware Environmental issues arising from electronic devices, life cycle of electronic devices, Hazards and E-waste Recycling, Going paperless, Hardware considerations, Greening information systems, Managing Green IT, 3Rs of Green IT, Thinking About Money-Saving Efforts

Unit 3: Green Data Centres and Associated Energy Challenges, Data Centre IT Infrastructure, Data Centre Facility Infrastructure: Implications for Energy Efficiency, IT Infrastructure Management, Green Data Storage, Storage Media Power Characteristics,

Unit 4: Green network and communications, objectives and challenges of green networking, Enterprise Green IT strategy, Approaching Green IT strategies, Business drivers and dimensions for Green IT strategies, Steps in Developing a Green IT Strategy, Metrics and Measurements in Green Strategies

BLOCK 2: Management of Green Computing

Unit 5: Sustainable Information Systems and Green Metrics, Sustainable IT Services, Sustainable IT Roadmap, Enterprise, Green IT Readiness, Readiness and Capability Green Enterprises and the Role of IT, Organizational and Enterprise Greening, Information Systems in Greening Enterprises, Greening the Enterprise: IT Usage and Hardware,

Unit 6: Managing Green IT, Strategizing Green Initiatives, Implementation of Green IT, Regulating Green IT: Laws, Standards and Protocols,

Unit 7: Green Cloud Computing and Environmental Sustainability, Cloud Computing and Energy Usage Model: A Typical Example, Features of Clouds Enabling Green Computing, Green Cloud Architecture

Unit 8: Green IT: An Outlook, Awareness to Implementation, Green IT Trends, Greening by IT, A Seven-Step Approach to Creating Green IT Strategy

Text Books:

1. Gangadharan, G. R., & Murugesan, S. (2012). Harnessing Green IT: Principles and practices. Wiley Publication, ISBN: 9788126539680.
2. Smith, B. E. (2013). Green Computing: Tools and Techniques for Saving Energy, Money, and Resources. CRC Press.

DEPARTMENT -BOTANY

Plant-Microbe Interactions

Overview of plant microbes interactions,

Introduction, beneficial microbes, Rhizobium bacterium and nitrogen fixation, mycorrhizal fungi.

Plant pathogens, Agrobacterium tumefaciens and crown gall disease,

Mechanisms of plant disease mechanism, some bacterial plant diseases,

Plant viruses and mechanism of plant against viruses attacks.

Fungal pathogen- mechanism of plant disease,

Oomycete pathogens, Fungal mediated plant.

General concept of plant immunity,

PAMP-triggered immunity (PTI) and effectors-triggered immunity (ETI).

Transcription activator like effector and their role in virulence and disease resistance.

References

1. Lautenberg, B. (2015). Principles of Plant-Microbes Interactions: Microbes for sustainable Agriculture, Springer.
2. Stacey, G. and Keen, N. T. (1997). Plant-Microbes Interactions, Vol 4, . Springer.
3. Ramasamy, K, (2015). Plant Microbes Interactions, New India Publishing Agency.
4. Martin, F. and Kamoun, S. (2014). Effectors in Plant-Microbes Interactions 1st Edition, Wiley Blackwell.

DEPARTMENT -ZOOLOGY

MZO-IE-1: Parasites, Vectors & Communicable Diseases

Introduction to parasites.

Distribution, types, origin and evolution of parasites. Parasitism.

Types: Ecto-parasites, Endo-parasites and their adaptations.

Pathogenic micro-organisms, brief outline and classification of parasitic protozoan's: Entamoeba, Balantidium, Giardia, Trichomonas, Plasmodium, Leishmania and Trypanosoma and their diseases.

Control measures, diagnosis and therapy.

Pathogenic helminthes and vectors.

Etiology, epidemiology, pathogenesis, diagnosis, prevention and control of disease due to *Trichinella spiralis*, *Ancylostoma duodenale*, *Fasciola hepatica*, *Schistosoma* species.

Pathogenic Cestodes: Life cycle, treatment of diseases caused by Echinococcus, Hymenolepis and Diphylobothrium. Scope and importance of vectors. Origin and evolution of vectors. Habitat, life cycle, pathogenicity of fleas, mites, ticks, lice's and mosquitoes.

Historical perspectives and scientists involved in the discovery of vectors and communicable Diseases.

Epidemiology, bio-ecology, life cycle of biological and mechanical Vectors. Vector-host-parasites interactions, Host-pathogen interaction, insects transmitting Bacteria and viruses.

Control and management of vectors and vector borne diseases

Control measures: cultural, chemical, biological, genetic and environmental Methods of vectors. Management of biological and mechanical vectors during Different seasons. Integrated Vector Control and Management.

Insecticide resistance in vectors, Drug resistance in pathogens.

Importance of education, awareness among public on communicable diseases and community participation. Covid-19 pandemics. Epidemiology of corona virus and its mutants.
Vaccination against corona virus in India and other parts of the world.

DEPARTMENT –FOOD AND NUTRITION SCIENCE

ELMFNS- 01 FOOD PSYCHOLOGY

Credits: 2

BLOCK 1: FOOD: PREFERENCES AND CHOICES

Unit 1: Food: Physiological definition and significance, meaning of food, food classification, Food as statement of self-identity, Social interaction, Cultural identity

Unit 2: The Role of Food and Eating on Personality and Social Development: Psychology of eating, Food and emotion regulation, Food in daily living, Food Socialization, Food and control of others

Unit 3: Food Preferences and Fluctuations: Developmental Models, Cognitive Models & Psychophysiological Models, Physiology of food choice, Likes and Dislikes, acquired food preferences, Attitudes towards change, Food and sensory stimulus, Factors influencing eating behavior – (biological, environmental, individual, food characteristics, culture etc., Effect of eating on food selection and preferences, Understanding of the body and self – selection of the diet.

Unit 4: Food choices across lifespan and influence of society: The changing role of the senses in food choice and food intake across lifespan, Food in security and health across lifespan, Influence of media and advertisements, Digital platform and influence on food choices

BLOCK 2: EATING DISORDERS AND TREATMENTS

Unit 5: Mood, Emotions, food cravings and addictions: relation with food preferences, Connection between mood and eating, Biological and physiological aspects of food

cravings, Stress and eating behavior, Food addiction - description, neurobiology of food addiction

Unit 6: Eating disorders and treatment: Anorexia nervosa, Bulimia nervosa and binge eating Disorder-Definition, Symptoms, believed causes, Classification, Risk factors, Common myths of eating disorders, Treatment & dietary management

Unit 7: Overeating, Obesity and Weight management: Definition, Prevalence, Classification of Body Mass Index, Types & patterns, Etiology, Physiological component, Fad diets, Risk factors, Treatment - Weight management (Behavior & Cognitive), Lifestyle modifications, Dietary modification - (calorie restricted diet)

Unit 8: You are what you eat- Approaches to change the dietary behavior: Multidisciplinary approach, Strategies to support healthy dietary behavior: Encouraging healthy eating, Selection of food, Meal & portion size, developing education materials, Motivation & economics, Benefits of exercise, Stage classification for change, Barriers affecting the clinical outcome

REFERENCES:

1. [Smith John L.](#) (2002), The Psychology of Food and Eating (English, Hardcover, Smith John , Publisher: Palgrave MacmillanL.), ISBN: 9780333800201, 0333800206.
Alexandra W. LogueOct 2017, The Psychology of Eating and Drinking Fourth Edition.

Annexure II

INTER- DISCIPLINARY COURSE
(Open Elective) for Second Semester

ವಿಭಾಗ- ಕನ್ನಡ

ಪತ್ರಿಕೆ-೬: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ

EL-2.1 (ಕ್ರೆಡಿಟ್-೨)

ಬ್ಲಾಕ್-೩೮: ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಉಗಮ ಮತ್ತು ವಿಕಾಸ

ಘಟಕ-೧೪೯: ಸಾಹಿತ್ಯದ ಉಗಮ, ಬೆಳವಣಿಗೆ, ಉದ್ದೇಶ.

ಘಟಕ-೧೫೦: ಪ್ರಾಚೀನ ಪೂರ್ವ ಶಾಸನಸಾಹಿತ್ಯ.

ಘಟಕ-೧೫೧: ಪಂಪ ಪೂರ್ವ ಯುಗದ ಸಾಹಿತ್ಯ.

ಘಟಕ-೧೫೨: ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ವಿಭಾಗಕ್ರಮ.

ಬ್ಲಾಕ್-೩೯: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ

ಘಟಕ-೧೫೩: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ ರೂಪಗಳು; ಚಂಪೂ, ವಚನ, ರಗಳೆ, ಷಟ್ಪದಿ, ಸಾಂಗತ್ಯ ಇತ್ಯಾದಿ.

ಘಟಕ-೧೫೪: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪರಿಕಲ್ಪನೆಗಳು;

ಚರಿತ್ರೆ-ಪುರಾಣ, ಧರ್ಮ-ಕಾವ್ಯಧರ್ಮ, ಹಿಂಸೆ-ಅಹಿಂಸೆ, ಮಾರ್ಗ-ದೇಶಿ, ಲೌಕಿಕ-ಆಗಮಿಕ, ವಸ್ತುಕ-ವರ್ಣಕ, ಪ್ರಭುತ್ವ-ಪ್ರತಿರೋಧ.

ಘಟಕ-೧೫೫: ಪ್ರಾಚೀನ ಕನ್ನಡ ಕವಿ-ಕೃತಿ-ಕಾಲ-ದೇಶ-ಭಾಗ ೧.

ಪಂಪ, ರನ್ನ, ಪೊನ್ನ, ೧ನೆ ಚಾವುಂಡರಾಯ, ನಾಗವರ್ಮ ೨ನೆಯ ಚಾವುಂಡರಾಯ, ನಾಗಚಂದ್ರ, ನಯಸೇನ, ದುರ್ಗಸಿಂಹ, ಬ್ರಹ್ಮಶಿವ, ಕರ್ಣಪಾರ್ಯ, ಜನ್ನ.

ಘಟಕ-೧೫೬: ಪ್ರಾಚೀನ ಕನ್ನಡ ಕವಿ-ಕೃತಿ-ಕಾಲ-ದೇಶ-ಭಾಗ ೨.

ಆಂಡಯ್ಯ, ನೇಮಿಚಂದ್ರ, ರುದ್ರಭಟ್ಟ ಪ್ರಮುಖ ವಚನಕಾರರು - ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಬಸವಣ್ಣ, ಅಕ್ಕ ಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಚನ್ನಬಸವಣ್ಣ, ಹರಿಹರ, ರಾಘವಾಂಕ, ಕುಮಾರವ್ಯಾಸ, ಲಕ್ಷ್ಮೀಶ, ಪ್ರಮುಖ ಕೀರ್ತನಕಾರರು, ಚಾಮರಸ, ಕುಮಾರವಾಲ್ಮೀಕಿ, ಸರ್ವಜ್ಞ, ಷಡಕ್ಷರಿ, ಸಂಜಿ ಹೊನ್ನಮ್ಮ, ನಂಜುಂಡ, ರತ್ನಾಕರವರ್ಣಿ, ಮುದ್ದಣ, ಕೆಂಪುನಾರಾಯಣ.

ಪರಾಮರ್ಶನ ಗ್ರಂಥಗಳು

೧. ಗತಿಬಿಂಬ : ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ಬೆಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಬೆಂಗಳೂರು

೨. ಕಾವ್ಯ ವಿಹಾರ : ಕುವೆಂಪು, ಉದಯರವಿ ಪ್ರಕಾಶನ, ಮೈಸೂರು, ೧೯೬೯
೩. ಸಮಗ್ರ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ಬೆಂಗಳೂರು, ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಬೆಂಗಳೂರು, ೨೦೦೨
೪. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ಕೆ. ವೆಂಕಟರಾಮಪ್ಪ, ಪ್ರಸಾರಾಂಗ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು
೫. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ: ದೇವುಡು, ಶಾರದಾ ಪ್ರಕಾಶನ, ಮೈಸೂರು, ೧೯೩೫
೬. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ : ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಮನೋಹರ ಗ್ರಂಥಮಾಲೆ, ಧಾರವಾಡ
೭. ಶೈಲಿ : ಎಸ್.ವಿ.ರಂಗಣ್ಣ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು, ೧೯೭೬
೮. ಶತಮಾನದ ಕನ್ನಡ ಸಾಹಿತ್ಯ : ಸಂಪಾದಕರು, ಜಿ.ಎಸ್. ನಾಯಕ, ಕನ್ನಡ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ಬೆಂಗಳೂರು
೯. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ : ರಂ. ಶ್ರೀ. ಮುಗಳಿ, ಕೇಂದ್ರ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ನವದೆಹಲಿ, ೧೯೬೩
೧೦. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ರಂ.ಶ್ರೀ. ಮುಗಳಿ, ಉಷಾ ಸಾಹಿತ್ಯ ಮಾಲೆ, ಮೈಸೂರು, ೧೯೭೧
೧೧. ಬಿಂಬ: ಚದುರಂಗ, ಸಂವಹನ ಪ್ರಕಾಶನ, ಮೈಸೂರು
೧೨. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂಪುಟಗಳು : ಕುವೆಂಪು ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ, ಮೈಸೂರು. ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು, ೧೯೮೨
೧೩. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಾಚೀನತೆ: ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ. ರಂಗಸ್ವಾಮಿ, ಲೇ. ಎಚ್.ಪಿ. ಗೀತಾ, ಜನಪ್ರಿಯ ಕನ್ನಡ ಮಾಲೆ, ಕನ್ನಡ ಅಧ್ಯಯನ ಮತ್ತು ಸಂಶೋಧನಾ ವಿಭಾಗ, ಕರಾಮುವಿ, ಮೈಸೂರು, ೨೦೧೧
೧೪. ಪ್ರಾಚೀನ ಕನ್ನಡ ಕಾವ್ಯ ಸ್ಥಿರತೆ ಮತ್ತು ಚಲನ ಶೀಲತೆ : ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ. ರಂಗಸ್ವಾಮಿ, ಲೇ. ಶಿವರಾಮಯ್ಯ, ಜನಪ್ರಿಯ ಕನ್ನಡ ಮಾಲೆ, ಕನ್ನಡ ಅಧ್ಯಯನ ಮತ್ತು ಸಂಶೋಧನಾ ವಿಭಾಗ, ಕರಾಮುವಿ, ಮೈಸೂರು, ೨೦೧೨
೧೫. ಕನ್ನಡ ಕೃಷಿ: ಸಂಪುಟ ೨, ಪ್ರಸಾರಂಗ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು, ೨೦೦೭

DEPARTMENT - ENGLISH

EL-2.1: INDIAN LITERATURE-II

OBJECTIVES

- To appreciate artistic values in *Hayavadana* and the use of myth
- To know the importance of Indian English historical plays
- To appreciate Sri Aurobindo as a poet and critic
- To comprehend the different theories of aesthetic experience of art

BLOCK -I

Girish Karnad: Hayavadana

Gurucharan Das: Larin Sahib

BLOCK -II

M. Hiriyanna: Art Experience

Sri Aurobindo: Selections: The Poets of the Dawn and The Poets of the Dawn 3 (The Future Poetry)

Suggested Reading:

- **K.R.Srinivas Iyengar:** Indian Writing in English .Macmillan, 1979.
- **M.K.Naik:** Critical Essays on Indian Writing in English.Sahitya Akademi, 1969.
- **Narasimhaiah C.D:** The Swan and the Eagle. Indian Institute of Advanced Study, 1987.
- **Meenakshi Mukherjee:** The Twice Born Fiction. Heinemann Educational Publishers, 1972.

DEPARTMENT - HINDI

हिंदी सिनेमा

- सिनेमा का उद्भव और विकास
- मूक चलचित्र और दादा साहब फाल्के युग
- दूसरा पढ़ाव, सवाक चलचित्र अथवा आलमआरा
- रंगीन सिनेमा का युग
- सामाजिक सिनेमा एक विवेचन
- धर्म एवं सांस्कृतिक सिनेमा एक विवेचन
- राजनैतिक सिनेमा एक विवेचन
- आर्थिक सिनेमा एक विवेचन
- हास्य एवं व्यंग्य सिनेमा एक विवेचन
- बाल सिनेमा
- सिनेमा एवं संवेदना
- सिनेमा एवं भाषा-शिल्प सिनेमा एवं गायन
- सिनेमा एवं पात्र संयोजना
- सिनेमा एवं नैतिक मूल्य
- अनूदित सिनेमा
- सिनेमा का तुलनात्मक अध्ययन
- फिल्म समीक्षा.....आदि

□□□□□□ □□□□□□

- सिनेमा साहित्य और समाज- प्रहलाद अग्रवाल, अनामिका प्रकाशन, नई दिल्ली
- कथाकार कमलेश्वर और हिंदी सिनेमा- उज्ज्वल अग्रवाल, राजकमल प्रकाशन, नई दिल्ली
- बॉलिवुड पाठ विमर्श के संदर्भ- ललित जोशी, वाणी प्रकाशन, नई दिल्ली
- फलैशबैक, प्रभुनाथ आजमी, शिल्पायन, नई दिल्ली
- नाटक के सौ बरस, हरिश्चंद्र अग्रवाल और अजित पुष्कल, शिल्पायन, नई दिल्ली

DEPARTMENT - TELUGU

E. L. 2.1 TELUGU SAMSKRUTHI - SAMAJAM

Block - 1: ANDHRULA CHARITHRA - SAMSKRUTHI

Unit - 1: Samskruthi Vaisistyam

Unit - 2: Andhrula Charithra - Samskruthi Paraspara Prabhavam

Unit - 3: Andhrula kalalu

Unit - 4: Andhrula basha - samajam

Block - 2: ANDHRULA AACHARALU -SAMPRADHAYALU

Unit - 1: Andhrula Pandugalu

Unit - 2: Sthrela Nomulu - Vrathalu

Unit - 3: Andhrula Sangikaacharalu

Unit - 4: Andhrula Sampradhayalu

DEPARTMENT - HISTORY

OEL2.1 Social Reform Movements in Modern India

Objective: The course is aims to trace the causes for the division of society in various sections and need for reformation. Further it explains age old social evils which crippled Indian society.

Pedagogy: personal contact programmes, audio video programmes, online lectures
Assignments, etc

Credits: 2. **Examination Duration:** 1 1/2 hours and Maximum Marks: 40

Course outcomes

After completing this course the students should be able to

- Understanding the contributions of the Raja ram Mohan Roy Dayananda Sarawathi towards the Indian modernity
- Analyse the Jyothibai pule Savithribai Pule Ambedkar's contributions to Indian social reform movements
- Evalute the works of Sahu Maharaj and Krishna raja wadiyar IV patronage to social Justice.

Block-I

Unit : 1

Colonial Discovery of India : Orientalism, Anglicism, Evangelism-Understanding Indian Society, Meaning of Social Reform. The Concept of Modernity : Western Impact – Indian Response.

Unit : 2

Rajaram Mohan Roy and Brahmo Samaj, Dayananda Sarawathi and Arya Samaj- Nationalism and Society – Prarthana Samaj.

Unit : 3

Jyothi Ba- Phle and Savithri Ba Pule, Social and education reforms.

Unit : 4

Communalism, Eradication of Communalism, Muslim League, Wahhabi and Pan Islamism-Syed Ahmed and Aligarh Movement.

Block-II

Unit : 5

The debate over the interpretation of Shastras – Ishwar Chandra Vidya Sagar - B.M.Malabari – Vivekananda –M.G. Ranade—Bal Gangadhar Tilak.

Unit :6

Dr. B.R.Ambedkar-, His views on Society, A caste and its annihilation, Religion and Economy, M.K.Gandhi- E.V.Ramswamy Periyar and Sri.Narayanguru, Ayyan kali.

Unit :7

The reformers – Kandukuri Veereshalingam – Pandit Shivanatha Shastri – Gopal Ganesh Agarkar-K.T.Telang-Maharma.

Unit :8

D.K.Karve, Maharaj Saiyyaji Rao Gaekwad of Baroda – Chatrapathi Shahu Maharaj of Kolhapur and Maharaja Krishnaraja Wodeyar IV of Mysore.

Suggested readings:

1. Nararajan : A Century of Social Reform in Indian.
2. Seetharam Singh : Nationalism and Social Reform in India
3. Dhananjaya Keer : Ambedkar, Life and Mission
4. Dhananjaya Keer :Mahatma Jyoti Rao Phule : Father of Social Revolution in India
5. Charless Heimsath R : Indian Nationalism and Hindu social Reform
6. A.S.Altekar : Position of Women In Hindu Civilization.
7. Gail Omvedt : Cultural Revolt in a Colonial Society – The Non – Brahmin Movements in Western India.
8. Gail Omvedt : Dalits and Democratic Revolution.
9. Ravindrakumar : Selected Documents of B.G.Tilak.
10. S. Ramkrishna : Social Reform Movements in Andhra
11. M.K.Gandhi : Women and Social Injustice.

ವಿಜಯ ಪೂರ್ಣಚ್ಛ ತಂಬಂಡ (ಸಂ), ಭಾರತ ಉಪಖಂಡದ ಆಧುನಿಕ ಪೂರ್ವ ಚರಿತ್ರೆ ವಿವಿಧ ಆಯಾಮಗಳು
– ಸಂಪುಟ-03, ಪ್ರಸಾರಾಂಗ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಹಂಪಿ.

DEPARTMENT - ECONOMICS

EL2.1: Institutions for International Development

- **Objective:** To enable the Students to understand the need and importance of various International Institutions.
- **Pedagogy:** A Combination of Lectures, Group Discussion, Assignments.
- **Credits:** 2 ; Examination Duration: 1¹/₂ and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

Block – I

Economic Issues at Global and National Level

Unit – 1

Globalisation

Globalisation – Forces Driving Globalisation – Income Inequality – National Integrity – Impact on Labour – Multinational corporations – Global Business Environment – National Business Environment.

Unit – 2

Legal Issues of Business at Global and National Level

Political Risks – Legal System – Business Ethics – Centrally Planned Economy – Mixed Economy – Market Economy – Human Development

Unit – 3

International Trade

Importance – Volume – Direction – Composition – Trends – Theories of Trade - Mercantilism – Absolute Advantage – Comparative Advantage –

International Product Life Cycle – Political, Economic and Cultural Motives behind Government Intervention.

Unit – 4 GATT and WTO

Importance – objectives – Functions - GATT and W.T.O – India and WTO.

Block – II Economic Integration and International Business Issues

Unit – 5 Regional Economic Integration

Meaning – Effects – Integration in Europe: European Union – Integration in Americans : North American Free Trade Agreement (NAFTA) – Latin American Integration Association (LAIA) – Free Trade Area of Americans (FTAA) and Transatlantic Economic Partnership.

Unit – 6 Integration in Asia

Association of Southern East Asian Nations (ASEAN) - Asia Pacific Economic Cooperation (APEC) – Integration in middle East : Gulf Cooperation Council (GCC) – BRICS – SAARC.

Unit – 7 International Financial Markets

International capital markets – Foreign Exchange markets – Currency Convertibility – International Monetary System.

Unit – 8 Issues in International Business

Trade War – Balance of Payment – Terrorism – Oil Crisis – Smuggling – Dumping – Environmental Degradation – Exhibit of Nuclear power – Covid 19 and other pandemics.

References:

01. Apte A.N. (2011) International Financial Management, Tata McGraw Hill Pub., Co. Ltd., New Delhi.
 02. Bhambari C.P, (1980) The World Bank and India, Vikas Publishing House, New Delhi.
 03. International Development Association, Annual Reports.
 04. International Finance Corporation, Annual Reports.
 05. International Monetary Fund, Annual Reports.
 06. World Bank, (1995) The Evolving Role of the World Bank in the First Half Century, Washington D.C.
 07. World Bank, World Bank in India, Washington, D.C. USA
 08. World Bank, World Development Reports, and Annual Reports.
- Palle Krishna Rao, (2005) WTO, Text and Cases, PSG Excel Series, New Delhi.

DEPARTMENT - POLITICAL SCIENCE

(OEL-I) Indian Constitution

Block-I

Unit:1 Framing of the Indian Constitution.

Unit:2 Preamble and Salient Features of the Indian Constitution.

- Unit:3 Fundamental Rights and Duties.
Unit:4 Directive Principles of the State Policy.

Block-II

- Unit:5 Union Legislature : Composition, Powers and Functions.
Unit:6 Union Executive : President and Vice-President - Election, Powers and Functions, Prime ministers and Council of Minister - Powers and Functions.
Unit:7 State Legislature : Composition, Powers and Functions, State Executive -Governor and Chief Minister.
Unit:8 The Judiciary : Supreme Court and High Court - Composition, Jurisdiction and Functions.

References:

1. Andre Beteille, 1965. Caste, class, and Power. Berkley: University of California Press.
2. Appadorai, A 1968. India: Studies In Social And Political Development 1947-1967. New Delhi: Aisa Publishing House.
3. Desai, A R. 2016. Social Background of Indian Nationalism. Los Angeles: Popular Prakashan.
4. Granville Austin, 2000. The Indian Constitution: Cornerstone of a Nation. Melbourne: Oxford University Press.
5. Hanson and Douglas, 1972. India's Democracy. New York city: W W Norton & Co Inc.
6. Johari J C 1974. Indian Government and Politics. New Delhi: Vishal Publications.
7. Karunakaran, K.P 1964. Continuity and Change in Indian Politics. New Delhi: People's Pub. House.
8. Kochanek. A. 1968. The Congress Party of India: the Dynamics of a One-Party Democracy. New Jersey: Princeton University Press.
9. Morris Jones, 1967. The Government and Politics of India. London: Hutchinson University Library.
10. Myron Weiner, 1957. Party Politics in India. New Jersey: Princeton University Press.
11. Myron Weiner, 1967. Party Building in New Nation. Chicago: University of Chicago Press.
12. Palmer, N D 1971. The Indian Political System. Boston: Houghton Mifflin.
13. Partha Chatterjee, 1998. State and Politics in India. University of Michigan: Oxford University Press.
14. Pylee, M V 1960. Constitutional government in India. Bombay: Asia Pub. House.
15. Rajni Kothari, 1970. Politics in India. The University Of Michigan: Little Brown
16. Rajni Kothari, 1995. Caste in Indian Politics. Telangana: Orient Blackswan.
17. Venkatarangaiya: M Shiviah, 1975. Indian Federalism. New Delhi: Arnold-heinemann Publishers.
18. Zoya Hasan, 2000. The State in Indian Politics. Landon: Sage publication.

DEPARTMENT - SOCIOLOGY

Study of Indian Society -02 Credits

Course Description

Every science has its own classical theories, which stand as eternal in their explanatory power and prowess to transcend the time and region. This course intends to introduce the learners to the classical period of sociology which is not just a bundle of theories but a consistent

tradition and formative period, even contemporary theories cannot eschew from being inspired. After studying this course, following learning outcomes can be expected.

Course Objectives

1. To appreciate the organizational framework of Indian society
2. To appreciate the aspects unity and diversity of Indian society
3. Examine the social issues in contemporary India

Learning Outcomes

Following outcomes are expected from the learners after successfully completing the course. Learner can/has

LOC-1: sociological insights about the social structural and organizational aspects of Indian society

LOC-2: present the changes in institutional framework of Indian society

LOC-3: recognize the causes for major social issues and present realistic remedies

Course Content

Block-1 Social Organizations

Unit-1 Unity and Diversity-Problem of Integration

Unit-2 Caste-Characteristics and Recent Changes

Unit-3 Marginalization-SC, ST, OBC and Minorities

Unit-4 Changes in Family and Concerns of the Aged

Block-2 Social Issues in Contemporary India

Unit-5 Environmental Sanitation and Ecological Degradation

Unit-6 Educated Unemployment and Employability

Unit-7 Social Unrest-Terrorism, Naxalism, Communalism and Corruption

Unit-8 Child Rights and Right to Education (RTE)

References

- Ahuja, Ram. 2002. Study of Social Problems. Jaipur & New Delhi: Rawat Publications
- Atal, Yogesh. 1979. The Changing Frontiers of Caste. National Publishing House: Delhi
- Beteille, Andre. 1971. Caste, Class and power. Berkeley: University of California.
- Beteille, Andre. 1974. Social Inequality, New Delhi: Oxford University Press.
- Beteille, Andre. 1992. Backward Classes in Contemporary India. New Delhi: Oxford University Press.
- Berreman, G.D. 1979. Caste and Other Inequalities: Essays in Inequality. Meerut: Folklore Institute.
- Dube, Leela. 1997. Women and Kinship, Comparative Perspectives on Gender Southern South Asia.
- Das, Veena. 2006. Oxford Handbook of Indian Sociology. New Delhi: Sage
- Dube, S C. 1990. Study of Indian Society. New Delhi: National Book Trust
- Jha, Hetukar. 2015. Sanitation in India. Delhi: Gyan Books.
- Karve, Iravathi. 1990. Kinship Organization in India.
- Pais, Richard. 2015. Sociology of Sanitation. Delhi: Kalpaz Publications.
- Pathak, Bindeshwar. 2015. Sociology of Sanitation. Delhi: Kalpaz Publications.
- Singer, Milton & Cohen, Bernards. 1996. Structure and change in Indian Society. Jaipur: Rawat
- Singh, Yogendra, Modernization of Indian Tradition. Jaipur & New Delhi: Rawat
- Srinivas, M N. 1995. Social Change in Modern India: Orient Blackswan
- Srinivas, M. N. 1962. Caste in Modern India and Other Essays. Asia Publishing House: Delhi

DEPARTMENT – ANCIENT HISTORY AND ARCHEOLOGY

AHA
OE 2.1

Cultural History of Hoysalas (OE)

Block - 1

Early Kings

- Unit - 1 Archeological and Literary Sources
Unit - 2 Theories of Origin of Hoysalas – Sala – Nripakama – Ereyanga

Block - 2

Important Rulers

- Unit - 3 Vishnuvardhana - VeeraNarasimha – I
Unit - 4 Ballala – II - Narasimha – II - Narasimha III and Ballala – III

Block - 3

Cultural Contributions

- Unit - 5 Hoysala polity - Economy
Unit –6 Hoysala Society – Religion – Education - literature

Block - 4

Art and Architecture

- Unit - 7 Hoysala Architecture
Unit – 8 Hoysala Art

References:

1. Epigraphia Carnatica: Relevant Volumes
2. Derrett Duncan, M.J: The Hoysalas, 1957
3. Dhakey M.A: Encyclopedia of Indian Temple Architecture
4. Desai P.B: History of Karnataka
5. Foekema Gerard: A Complete Guide to Hoysala Temples
6. Gopinatha Rao T.A: Elements of Hindu Iconography, Vols
7. Kelleson Collyer: The Hoysala Artists – Their Identity Style
8. Krishna Murthy M.S: The Hoysala Art, Kuppam, 2007
9. Padmnabha K: Hoysala Sculptures : A cultural Study
10. Sheik Ali B (Ed): The Hoysala Dynasty , 1972
11. William Cohelo: The Hoysala Vamsha, 1950
12. Annual Reports of the Department of Archaeology, Mysore 1939 – 46
13. Settar S: Hoysala Temples
14. Marg: In Praise of Hoysala Art
15. Narasimhachar R; Lakshmidēvi Temple at Doddagaddhavalī
16. Shastri KAN: The Cholas, 17. Shastri KAN: History of South India

DEPARTMENT - EDUCATION

IDC - 2 HIGHER EDUCATION

BLOCK - 1 HIGHER EDUCATION – ORGANIZATION AND TEACHING – LEARNING

Unit-1 Higher Education

Unit-2 Teaching Learning in Higher Education – I

Unit-3 Teaching-Learning in Higher Education – II

Unit-4 Problems and Innovations in Higher Education

BLOCK - 2 HIGHER EDUCATION – SOCIO-PSYCHOLOGICAL AND MANAGEMENT DIMENSIONS

Unit-5 Socio-Psychological Background of College Students

Unit-6 Problems of College Students

Unit-7 Higher Education – Management Dimensions

Unit-8 Higher Education Teacher

References:

1. Shills Edward (1989) 'The modern university Liberal Democracy'.
2. Abraham, Abu (1988) The Penguin, Book of Indian cartoons, New Delhi.
3. Chandra, Bipan (1984) Communalism Modern India, New Delhi.
4. Chauhan S.S (1989) Innovations in Teaching Learning Process, New Delhi, Vikas.
5. Srivastva A.B and Sharma K.K (1985) Elementary Statistics in Psychology and Education, New Delhi, Sterling Publishers Pvt. Ltd.,

DEPARTMENT - COMMERCE

Elective Course – EL2.1: Entrepreneurship Development

- **Objective:** To enable the Students to understand about the different aspects of Entrepreneurship Development.
- **Pedagogy:** A Combination of Lectures, Group Discussion, Assignments.
- **Credits:** 2 ; Examination Duration: 1½ and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

Block I

- **Unit -1: Entrepreneur and Entrepreneurship:** Introduction - Evolution – Characteristics – Distinction between Entrepreneur and Manager – Functions – Types – Entrepreneur - Concept of Entrepreneurship – Growth of Entrepreneurship in India – Role of Entrepreneurship in Economic Development
- **Unit – 2: Women Entrepreneurship:** Introduction - Concept – Statistical Evidence – New Age Women – Functions – Growth - Problems – Recent trends in Development of Women Entrepreneurship.
- **Unit -3: Rural Entrepreneurship:** Introduction - Meaning – Need – Rural Industrialisation in Retrospect – Problems – Development of Rural Entrepreneurship – NGOs and Rural Entrepreneurship.

- **Unit -4: Conceptual Models of Entrepreneurship:** Introduction - Models of John Kao – Udai Pareek and Nadakarni– NISIET.

Block II

- **Unit – 5: Factors Affecting Entrepreneurial Growth And Competencies:** Introduction - Economic Factors – Non-Economic Factor – Government Actions - Entrepreneurial Competencies: Meaning – Major Entrepreneurial Competencies – Developing Competencies.
- **Unit -6: Entrepreneurial Motivation and Mobility:** Introduction - Motivation – Motivation Theories – Motivating Factors – Achievement Motivation – Factors Influencing Mobility – Occupational Mobility – Locational Mobility.
- **Unit – 7: Entrepreneurship Development Programmes:** Introduction - Need for EDPs - Objectives of EDPs – Course Contents and Curriculum of EDPs – Phases of EDPs – Evaluation of EDPs.
- **Unit -8: Institutional Support System for Entrepreneurship:** Introduction - DICs – SISIs – SIDCOs – NISIET – EDIT – NIESBU – TCOs- A Broad Overview of Central and State Level Financing Institutions.

Books Recommended for Reference

- a. Vasanth Desai, The Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House.
- b. A. N Desai, Entrepreneurship Management, Ashish Publishing House.
- c. Chandra Prasanna, Project Preparation, Appraisal and Implementation, Tata McGraw Hill.
- d. Khanka, S.S, Entrepreneurial Development, S. Chand Publications.
- e. Prasanna Chandra, Projects: Planning, Analysis, Selection, Implementation and Review, Tata McGraw Hill.

DEPARTMENT - MANAGEMENT

E-COMMERCE

Credits: 2

Module 1: E-commerce and its Technological Aspects:

Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Electronic Market, Electronic Data Interchange, Internet Commerce, Benefits and limitations of E-Commerce, Produce a generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture.

Module 2: Electronic Data Interchange: Benefits of EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System: Study and examine the use of Electronic Payment system and the protocols used, Study Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.

References:

1. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.
2. Ravi Kalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
3. Efraim Turban, Jae Lee, David King, H.Michael Chung, "Electronic Commerce–A Managerial Perspective", Addison-Wesley.

4. Elias M Award, "Electronic Commerce from Vision to Fulfilment", 3rd Edition, PHI, Judy Strauss, Adel El-Ansary, Raymond Frost, "E-Marketing", 3RDEdition, Pearson Education

DEPARTMENT - BIO CHEMISTRY

Basics of Bioorganic chemistry for Biology graduates.

Introduction to Organic chemistry: Classification of organic compounds, unique characteristics, IUPAC nomenclature of organic compounds (including bifunctional).

Reaction mechanisms: Classification of organic reactions: substitution, addition, elimination and rearrangement with one example for each. Concepts of the following – carbon anions, carbon cations, free radicals, carbenes, nucleophiles and electrophiles.

Cycloalkanes: Reactivities and relative stability, Bayer's strain theory. Sachse-Mohr theory. Boat and chair form of cycloalkanes. Axial and equatorial bonds.

Arenes: Structure of Benzene—resonance and molecular orbital theories. Aromaticity. Mechanism of Nitration and Friedel-Craft's reaction. Electronic interpretation of the orienting influence of substituents in the electrophilic substitution of Toluene, Chlorobenzene, Nitrobenzene and Phenol. Polynuclear hydrocarbons—Resonance structures of Naphthalene, Anthracene and phenanthrene.

S_N1 and S_N2 reactions, mechanism with an example for each. Concept of elimination reactions. Example –n-butyl chloride.

Alcohols: Classification, monohydric, alcohols-distinguishing reactions for primary, secondary and tertiary alcohols.

Trihydric alcohols: Glycerol, Properties, (KHSO₄, HNO₃, Oxalic acid and HI)

Phenols: Acidity of phenols, Effect of substitution on acidity

Stereochemistry: Stereoisomerism, types, Fischer-projection formulae, asymmetric carbon atom, molecular dissymmetry, chirality, optical isomerism: ex. Glyceraldehyde, Lactic acid, Tartaric acid. Nomenclature of enantiomers. D- and L- system, Recemisation and resolution.

Heterogeneous and Homogenous hydrogenation of oils.

Selected References:

1. Basic Principles of Organic Chemistry, Roberts and Caserio, W. A. Benjamin, Inc. (1964).
2. Organic Chemistry, Morrison and Boyd, Allyn and Bacon Inc (1992).
3. Principles of Inorganic chemistry by Cotton & Wilkinson, Wiley (1999).
4. Textbook of Organic chemistry by Ahluwalia V K & Madhuri G Narosa publications (2001).
5. Physical chemistry by Castellan G W, Narosa Publications (2004).
6. Physical chemistry by Chakraborty D K, Narosa Publications (2004).

DEPARTMENT - BIOTECHNOLOGY

MBT EL-2 FUNDAMENTAL OF BIOTECHNOLOGY

Scope and Introduction to Biotechnology History & Introduction to Biotechnology What is Biotechnology? Definition of Biotechnology, Traditional and Modern Biotechnology, Branches of Biotechnology

Plant, Animal Biotechnology, Marine Biotechnology, Agriculture, Healthcare, Industrial Biotechnology, Pharmaceutical Biotechnology, Environmental Biotechnology.

Applications Biotechnology Applications of Biotechnology in Agriculture : GM Food, GM Papaya, GM Tomato, Fungal and Insect Resistant Plants BT Crops, BT Cotton and BT Brinjal Pros and Cons Biotechnological applications in Crop and Livestock Improvements Modifications in Plant Quality Golden Rice, Molecular Pharming, Plant Based Vaccines Ethics in Biotechnology and IPR 15 lectures

Food and Fermentation Biotechnology Food Biotechnology Biotechnological applications in enhancement of Food Quality Unit Operation in Food Processing Quality Factors in Pre processed Food Deterioration and its Control Rheology of Food Products Microbial role in food products Yeast, Bacterial and other Microorganisms based process and products Fermentation Technology Definition, Applications of Fermentation Technology Microbial Fermentations Overview of Industrial Production of Chemicals (Acetic Acid, Citric Acid and Ethanol), Antibiotics, Enzymes and Beverages

Molecular Biology - Replication DNA Replication in Prokaryotes and Eukaryotes Semi-conservative DNA replication, DNA Polymerases and its role, E.coli Chromosome Replication, Bidirectional Replication of Circular DNA molecules. Rolling Circle Replication, DNA Replication in Eukaryotes DNA Recombination – Holliday Model for Recombination Transformation

Mutation and DNA Repair Definition and Types of Mutations. Mutagenesis and Mutagens. (Examples of Physical, Chemical and Biological Mutagens) Types of Point Mutations, DNA REPAIR Photo reversal, Base Excision Repair, Nucleotide Excision Repair, Mismatch Repair, SOS Repair and Recombination Repair.

Genetic Engineering Experimental evidences for DNA and RNA as Genetic Material. Genetic Engineering in Ecoli and other Prokaryotes, Yeast, Fungi and Mammalian Cells Cloning Vectors-Plasmids (pBR 322, pUC) Vectors for Plant and Animal Cells, Shuttle Vectors, YAC Vectors, Expression Vectors Enzymes- DNA Polymerases, Restriction Endonucleases, Ligases, Reverse Transcriptase's, Nucleases, Terminal Transferees, Phosphatases Isolation and Purification of DNA (Genomic, Plasmid) and RNA,, Identification of Recombinant Clones

DEPARTMENT - CHEMISTRY

Block-1	Title: Physical parameters of molecules
----------------	--

Unit-1	Thermodynamics: First and second laws of thermodynamics. Concept of entropy and free energy, entropy as a measure of unavailable energy. Entropy and free energy changes and spontaneity of process.
Unit-2	Chemical kinetics: Rate and order of reaction. Factor affecting the rate of reaction. And determination Order of reaction. Energy of activation and its determination. Brief account of collision and activated complex theories.
Unit-3	Ionic equilibria: pH scale, buffer solutions, calculation of pH of buffer solutions, buffer capacity and buffer index, buffer mixtures.
Unit-4	Electrochemistry: Electrolytic conductance, specific, equivalent and molar conductance, ionic mobility and transference number, factors affecting the electrolytic conductance, Arrhenius theory of strong and weak electrolytes, assumptions of DebyeHuckel theory of strong electrolytes.

Block-2	Title: Organic molecules
Unit-5	Introduction to organic chemistry, atomic orbitals, sigma and pi bond formation-molecular orbital (MO) method, sp, sp ² and sp ³ hybridization, bond length, bond dissociation energies and bond angles
Unit-6	Electronegativity and polarity of the bonds. Classifications and reactions of organic compounds (with examples).
Unit-7	Biological importance of natural products: Amino acids, proteins, carbohydrates (cellulose, starch, glycogen), lipids (fats and oils, phospholipids), nucleic acids, steroids, alkaloids, vitamins, flavonoids.
Unit-8	Applications of synthetic products: Dyes, drugs, polymers (plastics), soaps and detergents, pesticides and pheromones.

DEPARTMENT – CLINICAL NUTRITION AND DIETETICS

OEL - 2: NUTRACEUTICALS AND HEALTH FOODS

2 Credits

BLOCK 1. NUTRACEUTICALS:

Unit - 1: Introduction to Nutraceutical

Unit - 2: Use of Nutraceuticals in Traditional Health Sciences

Unit – 3: Functional Foods

Unit – 4: Development of Nutraceutical and Functional Foods

BLOCK 2: FUNCTIONAL FOODS AND NUTRACEUTICALS OF PLANT, ANIMAL AND MIRCIBIAL ORIGIN

Unit - 5: Prebiotics and Probiotics

Unit - 6: Bio Active Peptides and Phyto- Chemicals

Unit - 7: Fats and Oils- Omega 3 Fatty Acids:

Unit - 8: Sugar Substitutes / Sweeteners

REFERENCES:

- Tai Hu Guan, (2018), text book of Nutraceuticals and Health, Scitus Academics Publisher, Wilmington DE 19804, United States of America.
- Wildman REC, (2016), Handbook of Nutraceuticals and Functional Foods, 2nd edition, CRC Press publishers, Boca Raton, Florida (USA).
- Athapol Noomhorm, Imran Ahmad, Anil Kumar Anal (2014), Functional Foods and Dietary Supplements Processing, Effects and Health Benefits, first edition, published by John Wiley & Sons, Ltd. UK 111 River Street, Hoboken, NJ 07030-5774, USA
- Wildman REC, (2001) Handbook of Nutraceutical and Functional Foods, CRC Press, USA. Ghosh D et al, (2012) Innovations in Healthy and Functional Foods, CRC Press, USA. Pathak YV (2011) Handbook of nutraceuticals Volume 2, CRC Press, USA.

DEPARTMENT - COMPUTER SCIENCE

ELMCS- 02: E -Commerce

BLOCK-1

UNIT-1: Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Electronic Market, Electronic Data Interchange, Internet Commerce, Benefits and limitations of E-Commerce, Produce a generic framework for E-Commerce,

UNIT-2: Architectural framework of Electronic Commerce, Web based E Commerce Architecture. Consumer Oriented E Commerce E-Retailing: Traditional retailing and e retailing, Benefits of e retailing,

UNIT-3: Key success factors, Models of e retailing, Features of e retailing. E services: Categories of e-services, Web-enabled services, matchmaking services,

UNIT-4: Information-selling on the web, e entertainment, Auctions and other specialized services. Business to Business Electronic Commerce

BLOCK-2

UNIT-5: Electronic Data Interchange: Benefits of EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System:

UNIT-6: Study and examine the use of Electronic Payment system and the protocols used, Study Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.

UNIT-7: Security in E Commerce Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server. Issues in E Commerce Understanding Ethical,

UNIT-8: Social and Political issues in E-Commerce: A model for Organizing the issues, Basic Ethical Concepts, Analyzing Ethical Dilemmas, Candidate Ethical Principles Privacy and Information Rights: Information collected at E-Commerce Websites, The Concept of Privacy, Legal protections Intellectual Property Rights: Types of Intellectual Property protection, Governance.

References:

1. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.
2. RaviKalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
3. Efraim Turban, Jae Lee, David King, H.Michael Chung, "Electronic Commerce–A ManagerialPerspective", Addison-Wesley.
4. Elias M Award, "Electronic Commerce from Vision to Fulfilment", 3rd Edition, PHI, Judy Strauss, Adel
5. El-Ansary, Raymond Frost, "E-Marketing", 3RDEdition, Pearson Education.

DEPARTMENT - GEOGRAPHY

ELMG –02 Regional Geography of Karnataka (Credits – 2)

Block-1

Physical setting - Location, Administrative divisions, Geology, Physiographic divisions of the Karnataka; Climate and Rivers; Soils and Vegetation; Irrigation in Karnataka, Major Multipurpose River Valley Projects, Major water problems and Issues - Yetthinahole, Linganamakki, Mekedatu, Krishna-Cauvery valley-linking Rivers.

Block-2

Agriculture - Major of Crops: Rice, Jowar, Ragi, Wheat, Oil seeds, Sugarcane, Cotton, Tobacco and Coffee; Minerals Resources - Iron ore, Manganese, Bauxite, Copper, Gold; Major Power Projects - Hydel, Thermal and Atomic Energy power plants; Industries - Cotton Textile, Silk Textile, Sugar, Iron and Steel, Cement and Paper industries, Industrial Regions of Karnataka; Transportation - Roads, Railway, Water way, Ports/Harbors and Airways; Population - growth, distribution and density

References:

1. Directorate of Information and Tourism,
Government of KarnatakaKarnataka State

- Gazetteer
2. Mallappa, P., (2014) Geography of Karnataka, Chethana book publishers, Mysuru
 3. N.B.K Reddy & G.S. Murthy, (1967) Regional Geography of Mysore State
 4. R.P. Misra, (1973) Geography of Mysore
 5. Ranganath, (2018) Geography of Karnataka, Mysore Book House, Mysuru

DEPARTMENT - MATHEMATICS

Combinatorics and Graph Theory (ELMM –02) 2 Credits

Block-I: Permutations and Combinations, Pigeon-hole principle, Principle of inclusion and exclusion.

Block-II: Graphs, Vertices of graphs, Walks and connectedness, Degrees, Operations on graphs, Blocks – Cutpoints, bridges, Block graphs and Cutpoint graphs. Trees - Elementary properties of trees,

Books for Reference:

1. C. L. Liu – Elements of Discrete Mathematics, McGraw-Hill, 1986.
2. Kenneth H. Rosen – Discrete Mathematics and its Applications, McGraw-Hill, 2002.
3. F. Harary – Graph Theory, Addition Wesley Reading Mass, 1969.
4. N. Deo – Graph Theory With Applications to Engineering and Computer Science, Prentice Hall of India, 1987.
5. K. R. Parthasarathy – Basic Graph Theory, Tata McGraw-Hill, New Delhi, 1994.
6. G. Chartand and L. Lesniak – Graphs and Diagraphs, wadsworth and Brooks, 2nd Ed.,
7. Clark and D. A. Holton – A First Look at Graph Theory, Allied publishers.
8. D. B. West – Introduction to Graph Theory, Pearson Education Inc.,2001, 2nd Ed.,
9. J. A. Bondy and U. S. R. Murthy – Graph Theory with applications, Elsevier, 1976.

DEPARTMENT - MICROBIOLOGY

Microbes in Sustainable Agriculture and Development

- i. Soil Microbiology: Soil as Microbial Habitat, Soil profile and properties,
- ii. Soil formation, Diversity and distribution of microorganisms in soil.
- iii. Microbial Activity in Soil and Green House Gases- Carbon dioxide, methane, nitrous oxide, nitric oxide – production and control
- i. Mineralization of Organic & Inorganic Matter in Soil: Mineralization of cellulose, hemicelluloses, lignocelluloses, lignin and humus, phosphate, nitrate, silica, potassium .
- ii. Microbial Control of Soil Borne Plant Pathogens: Biocontrol mechanisms and ways, Microorganisms used as biocontrol agents against Microbial plant pathogens, Insects, Weeds.
- iii. Biofertilization, Phytostimulation,
- iv. Bioinsecticides: Plant growth promoting bacteria, biofertilizers – symbiotic (Bradyrhizobium, Rhizobium, Frankia),
- v. Non Symbiotic (Azospirillum, Azotobacter, Mycorrhizae, MHBs, Phosphatesolubilizers,algae),

- vi. Novel combination of microbes as biofertilizers, PGPRs
- i. Secondary Agriculture Biotechnology: Biotech feed, Silage, Biomanure, biogas, biofuels – advantages and processing parameters.
- ii. GM crops: Advantages, social and environmental aspects, Bt crops, golden rice, transgenic animals.

References:

1. Eldor A. Paul. Soil Microbiology. Ecology and Biochemistry. VI Edition: Academic Press, (2007).
2. Eugene L. Madsen. Environmental Microbiology: From Genome to Biogeochemistry. I Edition, Wiley-Blackwell Publishing. (2008).
3. Agrios, G.N. Plant pathology. Harcourt Asia Pvt. Ltd. (2000).
4. Buchanan. B.B., Gruissem, W. and Jones, R.L Biochemistry and Molecular Biology of Plants. I.K. International Pvt. Ltd. (2000).
5. Mehrotra R S and Ashok Agrawal. Plant Pathology. Tata Mc Graw Hill ,6th reprint (2006).
6. K. S. Bilgrami, H. C. Dube. A textbook of modern pathology. 6th Edition, Vani Educational Books, a division of Vikas, (1984).
7. K.R. Aneja .Experiments in Microbiology, Plant Pathology and Biotechnology . New Age Publications. 2017

DEPARTMENT - PHYSICS

MP-EL2: Waves and Optics

BLOCK-A:

- Unit-1: Superposition of Two Collinear Harmonic oscillations:** linearity & superposition principle. (i) Oscillations having equal frequencies and (ii) oscillations having different frequencies (Beats).
- Unit-2: Waves Motion- General:** Transverse waves on a string, travelling and standing waves on a string, normal modes of a string, group velocity, phase velocity, plane waves, Spherical waves, wave intensity.
- Unit-3: Fluids:** Surface tension: synclastic and anticlastic surface - excess of pressure - application to spherical and cylindrical drops and bubbles. viscosity - rate flow of liquid in a capillary tube - Poiseuille's formula - determination of coefficient of viscosity of a liquid.
- Unit-4: Sound:** Simple harmonic motion - forced vibrations and resonance intensity and loudness of sound, intensity levels, musical notes, musical scale, acoustics of buildings: reverberation and time of reverberation, absorption coefficient, Sabine's formula - measurement of reverberation time.

BLOCK-B:

- Unit-5: Wave Optics:** electromagnetic nature of light, definition and properties of wave front, Huygen's Principle.
- Unit-6: Interference:** Interference: division of amplitude and division of

wavefront. Young's double slit experiment, interference in thin films: parallel and wedge-shaped films, Newton's Rings: measurement of wavelength and refractive index.

Unit-7: Diffraction: Fraunhofer diffraction- single slit and double Slit, multiple slits and diffraction grating, Fresnel diffraction: half-period zones, zone plate, Fresnel diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.

Unit-8: Polarization: Transverse nature of light waves, plane polarized light – production and analysis, circular and elliptical polarization.

DEPARTMENT -PSYCHOLOGY

EL-2 Psychology in Everyday Life 2 Credits

Block 1: Applications of Psychology-I

Unit 1: Psychology as a Profession

Unit 2: Memory Improving Techniques

Unit 3: Stress and Emotional Management

Unit 4: Personality Development

Block 2: Applications of Psychology-II

Unit 5: Psychology in Educational Settings

Unit 6: Psychology in Health Setting

Unit 7: Psychology in Organizational Setting

Unit 8: Adjustment to Family and Work Place

References:

1. Charles G.Morris. Albert A. Maisto Psychology an Introduction , Prentice Hall. New Jersey.
2. Feldman, A. R., Understanding Psychology IV th Ed, 1996, McGraw Hill, New Delhi.
3. Morgan, King, Weisz & Schopler, Introduction to Psychology-V11 Ed, 1993, Tata McGraw Hill, New Delhi.
4. Ernest R Hilgard, Richard C Atkinson , Rita L Atkinson Introduction to Psychology Oxford Publication, New Delhi.

DEPARTMENT -INFORMATION TECHNOLOGY

ELMIT –02 E-Commerce (2 Credits)

Block 1: Fundamentals of E-commerce

Unit 1 : Introduction to E-commerce

What Is E-commerce? The Difference Between E-commerce and E-business, Technological Building Blocks Underlying E-commerce: the Internet, Web, and Mobile Platform, Major Trends in E-commerce, Unique Features of E-commerce Technology

Unit 2 : Types of E-commerce:

Business-to-Consumer (B2C) E-commerce, Business-to-Business (B2B) E-commerce. Consumer-to-Consumer (C2C) E-commerce, Mobile E-commerce (M-commerce), Social E-commerce, Local E-commerce E-commerce: A Brief History, Understanding E-commerce: Organizing Themes, Academic Disciplines Concerned with E-commerce

Unit 3 : E-Commerce Infrastructure

The Internet, Technology Background , Internet – Key Technology concepts, TCP/IP, IP addresses, Domain names, DNS and URLs, Client Server Computing, Cloud computing model, Mobile platform

Unit 4 : Internet and Web

Hypertext, HTML, XML, Web servers and clients, Web browsers, Communication tools – E mail, messaging apps, online message boards, Internet Telephony

Block 2: Construction of E-commerce presence

Unit 5: E-commerce presence – Building an e-commerce idea, Systematic approach, Choosing software and hardware, E-commerce site tools

Unit 6: E-commerce security E-commerce System environment, Security threats, Technology solutions

Unit 7: E-commerce payment systems : Management policies, E-commerce payment systems, Electronic billing presentment and payment

Unit 8: E-commerce Business Strategies : E-commerce business models, Major B2C Business models, B2B Business models,

References:

1. Laudon, Kenneth C., and Carol Guercio Traver. *E-Commerce 2020-2021*. Pearson, 2020.
2. Laudon, Kenneth C., and Carol Guercio Traver. *E-commerce Essentials*. Pearson, 2014

DEPARTMENT - BOTANY

Plant Diversity and Human Welfare

Plant Diversity and its Scope Levels of biodiversity: Genetic, Species and Ecosystem; Agrobiodiversity and cultivated plant taxa and related wild taxa.

Values and uses of Biodiversity, Methodologies for valuation, Ethical and aesthetic values, Uses of plants; Ecosystem services.

Loss of Biodiversity Loss of biodiversity- causes and implications, Hot spots of biodiversity, extinction of species, projected scenario for biodiversity loss.

Management of Plant Biodiversity Organizations associated with biodiversity management, IUCN, UNEP, WWF, UNESCO, NBPGR; Methodology for execution;

Biodiversity legislation; Information management and communication.

Conservation of Biodiversity, Role of Plants in Relation to Human Welfare Conservation of genetic, species and ecosystem diversity,

In situ and ex situ conservation strategies, India's biodiversity and its conservation Social approaches to conservation,

Biodiversity awareness programmes, Sustainable development.

Importance of forestry their utilization and commercial aspects; Avenue trees; Ornamental plants of India; Alcoholic beverages; Fruits and nuts; Wood and its uses; their commercial importance.

References

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
2. Singh, J.S., Singh, S.P. and Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.
3. Reddy, K.V. and Veeraiah, S. (2010). Biodiversity and Plant Resources. Aavishkar publication, New Delhi.
4. Heywood, V. H. and Watson, R. T. (1995). Global biodiversity and Assessment. Cambridge University Press.

DEPARTMENT –FOOD AND NUTRITION SCIENCE

OEL-2: NUTRITIONAL MANAGEMENT IN DISASTER CONDITIONS

BLOCK- I: NATURAL / MANMADE DISASTERS

Unit-1: Emergency Situations-Famine, Drought, Flood, Earthquake, Cyclone, War, Civil and Political Emergencies.

Unit-2: Nutrition in Emergencies, Nutritional Problems and Communicable Diseases.

Unit-3: Feeding Programs during Emergencies.

Unit-4: Assessment and monitoring of Nutritional Status and relief measures during emergencies.

BLOCK- I: NUTRITIONAL RELIEF AND REHABILITATION

Unit-5: Assessment of Food needs in emergency situations, Food Distribution Strategy, Local food rehabilitation.

Unit-6: Special Foods/ Rations for Nutritional Relief, Organizations for Mass Feeding/ Food Distribution, and Supplementary Feeding.

Unit-7: Transportation, Storage, Feeding Centres, Sanitation, Hygiene and Identifying Reaching the Vulnerable Group.

Unit-8: Public Nutrition Approach to Tackle Nutritional and Health Problems in Emergencies, food security.

REFERENCES:

Jaspars, S. & Young, H. (1996), General Food Distribution in Emergencies: from Nutritional Needs to Political Priorities. Good Practice Review 3. 1996. Relief and Rehabilitation Network, Overseas Development Institute. London.

Young H., Jaspars S., Brown R., Frize J. & Khogali H (2001), Food Security and Assessments in Emergencies: A Livelihoods Approach. Humanitarian Practice Network, Overseas Development Institute. London

ANNEXURE-III

A. Question Paper Pattern

BC-2.1

**II Semester, M.Sc. Biochemistry
Examination Feb 20 - -**

Time: 3 Hours

Max. Marks:

80

Instruction: Answer all the sections.

Section A

Answer any **FOUR** questions from the following

4 × 5 = 20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Section B

Answer any **THREE** questions from the following
30

3 × 10 =

- 7.
- 8.

- 9.
- 10.
- 11.

Section C

Answer any **TWO** questions from the following

2 × 15 =

30

- 12.
- 13.
- 14.
- 15.

B. Model Question Paper

BC-2.1

KARNATAKA STATE OPEN UNIVERSITY
M.Sc. II-Semester Examination, Feb-20 - -

BIOCHEMISTRY **BC-2.1: FUNCTIONAL BIOMOLECULES**

Time: 3 Hours

Max. Marks: 80

Instructions: Answer all the sections.

SECTION - A

Answer any **FOUR** questions of the following

4x5=20

1. Explain the process of Glycosylation of proteins
2. Write the principle and procedure involved in dialysis
3. Explain Anfinsen's experiment
4. Discuss the salient features of the Watson-Crick model of DNA
5. Explain the structure and functions of syndecan
6. Give a reaction for the determination of N-terminal residue of a protein.

SECTION – B

Answer any **THREE** questions of the following

3x10=30

7. A). Write a note on the tertiary structure of myoglobin

(5 + 5)

- B). Name the important pectic polysaccharides and mention one function for each.
8. A). How is a peptide bond formed? Explain the characteristics of a peptide bond.
B). Differentiate between the two varieties of β -pleated sheets. (5 + 5)
9. A). Explain the use of X-ray crystallography in the determination of 3D structure of proteins.
B). Discuss the topology of DNA. (5 + 5)
10. A). Explain the procedure for acid hydrolysis of peptides. Mention its applications and drawbacks.
B). Give an account on the computer based algorithms for prediction of secondary structure of proteins. (5 + 5)
11. A). Describe the ionic interactions in macromolecules
B). Write a note on helix-turn-helix and its interaction with DNA. (5 + 5)

SECTION – C

Answer any **TWO** questions from the following

2x15= 30

12. A). Explain the uses of carbohydrates in tissue engineering.
(10)
B). Give an account on the helix breaking and helix forming amino acid residues. (5)
13. A). Explain Merrifield's solid phase synthesis of peptides. Add a note on the importance of chemical synthesis of peptides.
(10)
B). Write the principle of Mass spectrometry and Tandem mass spectrometry. (5)
14. A). Explain the methods used in the determination of S-S bonds and their positions in proteins.
(10)
B). Discuss the role of enzymes in protein sequencing. (5)
15. A). Mention the types of RNA and explain the clover leaf model of tRNA with a neat labeled diagram. (10)

B). What are palindromic sequences? Explain their importance.

(5)

Note: The question papers of all courses are available in the University website.
(www.karnatakastateopenuniversity.in)