

Department of Studies in Microbiology Karnataka State Open University Mukthagangotri, Mysuru-570006, Karnataka, India.



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M.Sc. BOTANY PROGRAMME GUIDE



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 inter disciplinary 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 M.Sc. programmes are routed 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.

ABOUT THE UNIVERSITY

The Karnataka State Open University is recognized by the University Grants Commission under (Open and Distance Learning & Online Learning) Regulation 2017.

Karnataka State Open University was established in June 1996 with a vision 'Higher Education to Everyone, Everywhere'. The University blossomed in the era of globalization in which the economies of the world are being transformed from their original closed self-sustaining structure to the globalized context, where they can expose themselves to the competitive world. This transition forced the arena of knowledge emphasizing itself to more of its application than of accumulation of facts. The Karnataka State Open University, in order to cope with the present global environment, is attempting to integrate interdisciplinary approaches in the dissemination of knowledge with the aim of achieving overall human personality development.

Mysuru is a historical centre possessing a rich cultural heritage which had valiant historical events of different kingdoms and humane social setup of incomparable stature. University has paved the way for realizing the vision at the international arena leading to human welfare. It was started during the year 1996 as a separate entity to cater to the needs of thousands of young aspirants of higher education.

The KSOU is situated at heart of Mysuru city, The University operates in 50 Acre of land in a fully green ambience. The University is offering UG, PG and Ph.D. programs besides diploma and PG Diploma programs in various disciplines. The University is fully equipped with 28 academic departments controlled by the chairpersons and supported by other faculty and non teaching staff. The KSOU is carved mainly with an intention of promoting unprevilaged group of society and hence the fees for all the courses at affordable rate.

Special Features: The Open Distance Learning system is unique and challenging because, the learners hail from a diverse socio-economic background and with a varied learning background. The present conventional university system could not meet the genuine needs of such students who could not pursue their studies in a conventional university for various reasons. In order to give them an opportunity to pursue their studies in Open Distance Learning, this University has been established. The major objective of the University is to generate human resources of top quality with more emphasis laid on the following issues:

- (1) To transform guiding vision into action plan through various measures.
- (2) To generate high quality human resources through skill training.
- (3) To provide opportunity to those who discontinued their studies.
- (4) To provide opportunity to working class to acquire higher knowledge.
- (5) To provide opportunity to pursue higher education at their own places.
- (6) To provide transparent manner of admission.
- (7) To transfer restricted learning to a global-based learning.
- (8) To promote new concept and new direction to higher education.
- (9) To promote multiple imperatives to achieve national development.
- (10) To play critical role in addressing social imperatives.
- (11) To create adequate student-support services for innate capacity building.

Programme Guide

1. **Department:** Department of Studies in Microbiology

2. Chairman's message –

Education has witnessed a rapid and tremendous transformation globally boosting a worldwide demand for online and distance education. Globalization, modern technologies, knowledge explosion, and increased international competition have only fueled the growing demand for distance mode of education delivery.

Botany, also called plant science(s), plant biology or phytology, is the science of plant life and a branch of biology. The study of botany is not only relevant to botanists but also to anyone working with plants, from plant breeders through to nursery growers or agriculturists. Our ability to manage plants in horticulture, agriculture, forestry and for a better environment; are all dependent upon our knowledge of botany. An understanding of botany essentially underpins our society, and human well-being. This course contains the basis of plant science, and is an introduction to plant physiology and taxonomy, covering general botany including morphology and anatomy. People study this course so that they can be better farmers, gardeners, environmental managers and foresters; not to mention scientists, teachers and journalists. At the same time a plethora of job opportunities have been emanated for the formal graduates / post-graduates in the relevant fields. Therefore, this program is offered in the distance mode as a parallel to the programmes offered by conventional mode.

There are many learners, both young and old, who could not afford to join the conventional microbiology degree course due to personal and professional responsibilities. This distance education mode of the M.Sc. in Botany is specially tailored to cater to those category of students who may not afford to attend full time classes like the employed persons, those who may not have secured admission in regular University/college, those who may have discontinued studied but interested to improve career opportunities and most importantly for those who want to gain knowledge in botany.

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. However, the course is modulated to assess the pupils 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.

The scope of plant sciences is immense and multifaceted with applications in various fields like agriculture, industry, diary, medicine, forensics, pharmaceutical, clinical, environment, nanotechnology etc. A career in botany holds tremendous scope and a bright future. Most lucrative and best job opportunities await botanists. After completion of the course these postgraduates have huge opportunities in various research and development laboratories of hospitals, research organizations, pharmaceutical, food, beverage and chemical industries labs, research institutes, industries, teaching filed etc.,

3. About the Department

Introduction

Microbiology has grown leaps and bounds widening its horizons and opening new frontiers of knowledge. The scope of microbiology as a subject is immense due to its ability to control all critical points of many fields like medical, dairy, pharmaceutical, industrial, clinical, research, water industry, agriculture, nanotechnology, etc. A career in microbiology is lucrative option and trained microbiologists are in demand in a vast range of industries and institutes like research and development laboratories of government and private hospitals, research organizations, pharmaceutical, food, beverage and chemical industries. The WTO, international relations between countries and liberalization, privatization and globalization have created conducive atmosphere in the country to establish several industries. At the same time a plethora of job opportunities have been emanated for the formal graduates/post-graduates in the relevant fields. Therefore, this program is offered in the distance mode as a parallel to the programmes offered by conventional mode.

Established in 2012 as one of the department of Faculty of Sciences in KSOU, the Department of Studies in Microbiology offers a Master's of Science programme in Botany. The Department has established state of art infrastructure and provides a good learning environment and focuses on providing students with best learning experience. In addition to the well qualified in-house teaching faculty, resource persons from other universities/institutes are invited to give lectures and seminars. The Department consists well equipped class-rooms and practical laboratories for lectures, exercises and practicums. The curriculum is comprehensive, updated and covers many aspects of microbiology which caters to employability, leadership, and an international outlook. Students also undergo training in basic experimental techniques required for both teaching and research. The Department also provides learners an exposure to research by including a dissertation research projects in the department laboratory or any other institute of their choice.

Vision

To provide excellent learning and knowledge enriching experience to the learners that has a transformative impact on society.

Mission

• To provide education to the learners to embrace the philosophy of learn, earn and return.

- To impart the knowledge and skill to the learners and thereby increase his/her professionalism.
- To create effective human resources by employing the ICT.
- To enhance the capacity of the learners to realize their individual, corporate and social responsibility.
- To impart education such that the learners inculcate moral, civil and ethical values.
 - To provide education at affordable cost to the masses.

Sl. No	Name	Designation	Email Id	Phone Number
1.	Dr. Niranjan Raj S	Assistant Professor	niruraj@gmail.com	9886859350
2.	Dr. Mahadeva Kumar S	Assistant Professor		9743217220
3.	Dr. Syed Baker	Assistant Professor		9845542016
4.	.Dr. Krishnamurthy, C.	Assistant Professor		9964488055
5.	Dr. Ravindra K.N	Assistant Professor		9844101741

a. Staff details with email ID and Phone Number

4. Programmes Offered: M.Sc. in Botany

5. Preamble

Objectives:

- To provide advanced learning of core principles and specialized knowledge in the field of Botany.
- To pursue an efficient and less expensive option to acquire or update knowledge in botany for qualified and willing learners.
- To familiarize the students with necessary laboratory techniques and tools of botany and provide an exposure in research, analytical and presentational skills.
- To acquire competency by adopting advanced scientific methods and exposure in clinical, practical and other research skills.
- To train the learners with appropriate critical thinking and problem-solving skills and aptitude for taking up various botany related job opportunities.

6. Course details

a. *Syllabus* along with paper code, title of the course and credits

DETAILED SYLLABUS

M.Sc. Botany - First Semester

Course Code	Course	Course Title	Credits
HC 1.1	Course 1	Cell and Molecular Biology of Plants	4
HC 1.2	Course 2	Biology and Diversity of Viruses, Bacteria and Fungi	4
HC 1.3	Course 3	Practical 1 and Practical 2	4
SC 1.1	Course 4	Biology and Diversity of Algae, Bryophytes and Ptoridophytes	3
SC 1.2	Course 5	Biology and Diversity of Cymnosperms	3
SC 1.3	Course 6	Paleobotany	3
SC 1.4	Course 7	Lichenology and Mycorrhizal Technology	3
IE -1	Course 8	Interdisciplinary Elective 1	2
	Total		20

Note: Of the four Soft Core (SC) courses, the student may choose any two soft core courses.

M.Sc. Botany - Second Semester

Course Code	Course	Course Title	Credits
HC 2.1	Course 1	Plant Physiology and Biochemistry	4
HC 2.2	Course 2	Taxonomy of Angiosperms	4
HC 2.3	Course 3	Practical 3 and Practical 4	4
SC 2.1	Course 4	Cytogenetics	3
SC 2.2	Course 5	Plant Breeding	3
SC 2.3	Course 6	Economic Botany	3
SC 2.4	Course 7	Pharmacognosy	3
IE -2	Course 8	Interdisciplinary Elective 2	2

Total	20

Note: Of the four Soft Core (SC) courses, the student may choose any two soft core courses.

M.Sc. Botany - Third Semester

Course Code	Course	Course Title	Credits
HC 3.1	Course 1	Plant Development	4
HC 3.2	Course 2	Plant Reproduction	4
HC 3.3	Course 3	Practical 5 and Practical 6	4
SC 3.1	Course 4	Plant Ecology	3
SC 3.2	Course 5	Plant Propagation	3
SC 3.3	Course 6	Genetic Engineering	3
SC 3.4	Course 7	Bioinformatics	3
SEC 1	Course 8	Skill Enhancement Course-1	2
	Total		20

Note: Of the four Soft Core (SC) courses, the student may choose any two soft core courses.

M.Sc. Botany - Fourth Semester

Course Code	Course	Course Title	Credits
HC 4.1	Course 1	Plant Biotechnology	4
HC 4.2	Course 2	Plant Pathology	4
HC 4.3	Course 3	Practical 7 and Practical 8	4
SC 4.1	Course 4	Dissertation/project work	5
SC 4.2	Course 5	Plant Resource Conservation	3
SC 4.3	Course 6	Ethno-Botany and Intellectual Property Rights (IPR)	3
SEC 2	Course 7	Skill Enhancement Course-2	2
	Total		22

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

Interdisciplinary Electives

Plant Biotechnology

Plant-Microbe Interactions

Plant Diversity and Human Welfare

DETAILED SYLLABUS

FIRST SEMESTER

FIRST SEMESTER

HC 1.1 Course 1 Cell and Molecular Biology of Plants 4 Credits

The Dynamic cell: structural organization of the plant cell, specialized plant cell types, chemical foundation, chemical bioenergetics. The cell wall: structure and function, biogenesis and growth. Plasma membrane: structure, models, functions; sites for ATPases, ion carriers, channels and pumps, receptors

Plasmodesmata: structure, role in movement of molecules and macromolecules, comparison with gap junctions. Chloroplast: structure, genome organization; gene expression, RNA editing, nucleo-chloroplastic interactions

Mitochondria: Structure, genome organization, biogenesis. Plant vacuole: Tonoplast membrane, ATPases, transporters, as storage organelle

Nucleus: Structure, nuclear pores, nucleosome organization, DNA structure, A, B and Z forms, replication, damage and repair, transcription, plant promoters and transcription factors, splicing, mRNA transport, nucleolus, rRNA biosynthesis.

Ribosomes: structure, site of protein synthesis, mechanism of translation, initiation, elongation and termination, structure and role of tRNA. Protein sorting: Targeting of proteins to organelles.

Cell shape and motility: The cytoskeleton, organization and Role of microtubules and microfilaments, motor movements, implications in flagellar and other movements

Cell cycle and apoptosis: control mechanisms, role of cyclins and cyclin dependent kinases, retinoblastoma and E2F proteins; Cytokinesis and cell plate formation, mechanisms of programmed cell death.

Other cellular organelles: structure and functions of microbodies, golgi apparatus, lysosomes, endoplastic reticulum.

Techniques in cell biology: Immunotechniques, in situ hybridization to locate transcripts in cell types, FISH, GISH, Confocal microscopy

Nucleic Acids: Carriers of Genetic Information and Structure Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey & Chase, Avery, McLeod & McCarty, Fraenkel-Conrat's experiments).

DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves;

Organization of DNA- Prokaryotes, Viruses, Eukaryotes. RNA Structure Organelle DNA -- mitochondria and chloroplast DNA. The Nucleosome Chromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.

Central dogma and The replication of DNA Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semi- conservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5'end of linear chromosome;

Enzymes involved in DNA replication. DNA proofreading. Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Central Dogma Reverse (RNA viruses etc.),

Genetic code and transcription Genetic code (deciphering & salient features) and wobble hypothesis. Transcription in prokaryotes and eukaryotes. Principles of transcriptional regulation;

Concept of operon Prokaryotes: lac operon. Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes: transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing.

Processing and modification of RNA and translation 15 lectures Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.

Translation: Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNA synthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins, Protein targeting.

References

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HC 1.2 Course 2 Biology and Diversity of Viruses, Bacteria and Fungi 4 Credits

Microbiology

Archaebacteria and eubacteria: general account; ultrastructure, nutrition and reproduction; biology and economic importance;

Cyanobacteria – salient features and biological importance.

Viruses: characteristics and ultrastructure of virions; isolation and purification of viruses; chemical nature, replication, transmission of viruses; economic importance.

Phytoplasma: general characteristics and role in causing plant diseases.

Mycology: General characters of fungi; substrate relationship in fungi;

Cell ultrastructure; unicellular and multicellular organization; cell wall composition;

Nutrition (saprobic, biotrophic, symbiotic);

Reproduction (vegetative, asexual, sexual);

Heterothallism; heterokaryosis; parasexuality;

Recent trends in classification.

Phylogeny of fungi: general account of Mastigomycotina, Zygomycotina, Ascomycotina;

Phylogeny of fungi: general account of Basidiomycotina, Deuteromycotina;

Fungi in industry, medicine and as food;

Fungal diseases in plants and humans;

Mycorrhizae;

Fungi as biocontrol agents.

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HC 1.3Course 3(Practical)Practical 1 and Practical 24 Credits

Practical 1

1. Study of plant cell structure with the help of epidermal peel mount of Onion/ Rhoeo/ Crinum.

2. Demonstration of the phenomenon of protoplasmic streaming in Hydrilla leaf.

3. Measurement of cell size by the technique of micrometry.

4. Counting the cells per unit volume with the help of haemocytometer. (Yeast/pollen grains). 5. Study of cell and its organelles with the help of electron micrographs.

8. Cytochemical staining of: DNA- Feulgen and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.

9. Study the phenomenon of plasmolysis and deplasmolysis.

10. Study the effect of organic solvent and temperature on membrane permeability. 11. Study different stages of mitosis and meiosis.

11. Separation of protein by SDS-PAGE (only demonstration to class by the instructor.

12. Preparation of LB medium and raising E. coli.

13. Isolation of genomic DNA from E. coli.

14. DNA isolation from cauliflower head.

15. DNA estimation by diphenylamine reagent/UV Spectrophotometry.

16. Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication).

17. Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs.

18. Photographs establishing nucleic acid as genetic material (Messelson and Stahl's, Avery et al, Griffith's, Hershey & Chase's and Fraenkel & Conrat's experiments)

19. Study of the following through photographs: Assembly of Spliceosome machinery; Splicing mechanism in group I & group II introns; Ribozyme and Alternative splicing.

Practical 2

1. Phycology: Gloeocapsa, Lyngbya, Pediastrum, Pithophora, Bulbochaete, Nitella, Padina, Turbenaria, Batrachospermum, Ceramium, Amphiroa and Gelidium.

2. Mycology: Albugo, Saprolegnia, Phyllochora, Alternaria and Puccinia. Slide culture technique, fungal spore count using Haemocytometer.

3. Microscopical analysis of a) Spoiled food stuffs b) Spoiled vegetables c) Spoiled fruits

4. Bacteriology, Virology and Lichenology: Bacteriophage-Books / Photographs TMV Viruses-Books/ Photographs. Antibiotic disc assay.

5. Isolation of soil microbes (Bacteria and Fungi) by dilution plating method using selective media and plate counting. Gram staining. Usnea.

6. Bryophytes: Lunularia, Reboulia, Targonia, Aneura, Sphagnum, Bryum.

7. Pteridophytes: Psilotum, Selaginella, Angiopteris, Osmunda, Dicranopteris, Lygodium, Trichamanes, Alsophila, Nephrolepis, Salvinia, Azolla.

8. Gymnosperms: Cupressus, Podocarpus, Araucaria, Pinus, Ephedra .

9. Fossils: Rhynia, Asteroxylon, Sphenophyllum, Ankyropteris, Botryopteris, Heterangium, Lagenostoma, Pentoxylon, Medulosa, Cycadeoidea, Cordaites .

10. Collection techniques for planktonic, epiphytic, and benthic algae

11. Preservation of marine algae and preparation of permanent slides for algae Study of vegetative and reproductive features of important algal groups with the available representatives Chlorophyta Charophyta Euglenophyta Chrysophyta Cryprtophyta, Pyrrhophyta Phaeophyta Rhodophyta

12. Study of vegetative and reproductive features of important bryophytes groups with the available representatives Hepaticae, Anthocerotae and Musci

13. Study of vegetative and reproductive features of important Pteridophyta groups with the available representatives: Psilotales Lycopodiales, Selaginallales Isoetales, Equisetales, Ophioglossales, Marattiales, Osmundales, Filicales, Marsileales and Salviniales

14. Vegetative and reproductive reproductive features of Gymnospermopsida and Gnetopsida with available representatives. Also some paliobotany specimans

15. Study of microbiological lab techniques; preparation of agar culture media; Sterilizations techniques: dry and wet;

16. Methods of isolation and culturing of fungi; colony characters; microscopic observations; mounting fluids; morphology of hyphae and spores; reproductive structures of different genera of fungi. Bacterial cultures;

17. Observation of different fungal substrates on sterile moist chamber incubation (e.g. herbivore dung; decomposing leaf-litter); Observations on ecological succession of fungi; Terrestrial, marine and freshwater fungi.

18. Particle-plating, endophyte isolation and serial dilution techniques (e.g. soil, dung and leaflitter); Qualitative and quantitative estimation of fungi.

19. Collection of infected specimens in the field; Observation of symptoms; Laboratory studies; Hand sections and tease mounts;

20. Study of as many as possible viral, bacterial and fungal diseases of crop plants (cereal, vegetable, fruit, plantation) from surroundings in Goa.

21. Bacterial staining by using simple and Gram stain.

22. Isolation and observation of Rhizobium from root nodule of leguminous plant.

23. Observations on enzyme and antibiotic production in fungi.

24. Submission of 10 dried herbarium specimens of infected plant materials [fungal (4)+ bacterial (3) + viral (3)] collected from nearby habitats and 10 pure cultures of different fungi on slants isolated from various substrates.

25. Electron micrographs/Models of viruses – T4 and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle.

26. Types of Bacteria from temporary/permanent slides/photographs. Water bloom. Electron micrographs or charts of bacteria, binary fission, endospore, conjugation.

27. Gram-staining of root nodule and curd. 4. Micrometry and counting of cells by Haemocytometer

28. Study of phototactic isolation of zoids of Ulva through chart.

29. Microscopic observation of vegetative and reproductive structures of Nostoc, Chlamydomonas, Volvox, Oedogonium, Coleochaete, Chara, Vaucheria, Sargassum/ Ectocarpus, Fucus and Polysiphonia, Procholoron through temporary preparations and permanent slides.

30. Structural details of the following fossil types: Lyginopteris, Medullosa. Rhynia, Lepidodendron, Sphenophyllum, Calamites.

31. Survey of lichen vegetation in the study area: Frequency, density and abundance.

32. Determination of species richness and species diversity.

33. Isolation and maintenance of cyanobionts and phycobionts

34. Isolation and maintenance of mycobionts

35. Analysis of secondary metabolites of lichens.

36. Biological activity of secondary metabolites of the lichens.

37. Culture methods for lichens and lichen symbionts.

38. Root clearing and staining technique to study arbuscular mycorrhizal fungi.

39. Assessment of % root colonization of arbuscular mycorrhizal fungi.

40. Isolation and identification of arbuscular mycorrhizal fungi.

SC 1.1 Course 1 Biology and Diversity of Algae, Bryophytes and Pteridophytes 3 Credits

Phycology: Algae in diversified habitats (terrestrial, freshwater, marine); thallus organization; cell ultrastructure; reproduction (vegetative, asexual, sexual);

Criteria for classification of algae; pigments, reserve food, flagella;

Classification, salitent features of Protochlorophyta, Chlorophyta, Charophyta, Xanthophyta,

Classification, salient features of Bacillariophyta, Phaeophyta and Rhodophyta;

Algal blooms, algal biofertilizers; algae as food, feed and uses in industry.

Bryophyta: Morphology, structure, reproduction and life history; distribution; classification;

General account of Marchantiales, Junger-maniales, Anthoceratales, Sphagnales, Funariales and Polytrichales; economic and ecological importance.

Pteridophyta: Morphology, anatomy and reproduction;

Classification; evolution of stele;

Heterospory and origin of seed habit;

General account of fossil petridophyta;.

Introduction to Psilospida, Lycopsida, Sphenopsida and Pteropsida

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SC 1.2 Course 2Biology and Diversity of Gymnosperms3 Credits

Gymnosperms

Introduction: Gymnosperms, the vessel-less and fruitless seed plants

Structure of their sperms, pollen grains, pollen germination

Complexity of their female gametophyte; evolution of gymnosperms

Classification of Gymnosperms and their distribution in India.

Brief account of the families of Pteridospermales and Lyginopteridaceae

Brief account of the families of Medullosaceae and Caytoniaceae

Brief account of the families of Glossopteridaceae

General account of Cycadeoidales and Cordaitales

Structure and reproduction in Cycadales

Structure and reproduction in Ginkogales

Structure and reproduction in Coniferales and Ephedrales

Structure and reproduction in Welwitschiales and Gnetales

References

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.

2. Wiley, J.M, Sherwood, L.M. and Woolverton, C.J. (2013). Prescott's Microbiology. 9th Edition. McGraw Hill International.

3. Vashishta B.R., Sinha A.K. and Singh V. P. (2008). Botany for Degree Students. Algae. S Chand and Co, New Delhi.

4. Sharma T.A., Dubey, R.C. and Maheshwari, D.K. (1999). A Text Book of Microbiology. S Chand and Co, New Delhi.

5. Sahoo, D. (2000). Farming the ocean: seaweeds cultivation and utilization. Aravali International, New Delhi.

6. Campbell, N.A., Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky P.V. and Jackson, R.B. (2008). Biology, 8th edition. Pearson Benjamin Cummings, USA..

7. Pelczar, M.J. (2001). Microbiology, 5th edition, Tata McGraw-Hill Co, New Delhi.

SC 1.3 Course 3 Paleobotany

3 Credits

Progymnospermopsida:- Free sporing plants with Gymnosperm Wood Anatomy.

Concept of Progymnosperm, Aneurophytales and Archaeopteridales, Protopytiales, Origin of Progymnospermosida

Gymnospermopsida: Heterospory and evolution of seed habit i) Isopory to Heterospory ii)Megasporangium to ovule and seed (Archeosperma, Elkinsia, and Morentia).

Palaeozoic Gymnosperm:- Plants with fern like leaves .

i) Pteridosperms:-

a) Lyginopteridales:Lyginopteridaceae, Medullosaceae,

b)Cycadeoidales-Cycadeoidaceae, Williamsoniaceae,

c) Cycad foliage (Nilssonia, Baenia).

More Diversification in Primitive Gymnosperm: Cordaitales, Glossopteridales, Pentoxylales, General characters of Coniferales(Voltziaceae represented by Ultrichia)Caytoniales, and phylogenenetic consideration of all the orders.

Study of Deccan Intertrappean flora of India. Formation of Deccan traps and Intertraps, age and floristic composition in relation to Pteridophytes(Azolla, its Salvinia, Surangea), Gymnosperms (Mohgaostrobus, Harrisostrobus, Takliostrobus) and (Palmoxylon, Triccoccites, Angiosperms Palmocarpon, Enigmocarpon, Daberocarpon, Sahnianthus, Sahnipushpam).

Introduction; Plant fossils- Preservation, preparation, age determination, geological time scale;

Fossil record- systematics, reconstruction and nomenclature

Paleopalynology-Important features of spores and pollen morphology, their role in stratigraphy and in exploration of coal and oil.

Palaeopalynological studies, microfossils and its application. Paleoecology and paleogeography.

Indian Gonwana-Its stratigraphy and classification (Two fold and three fold). Index fossil.

Applied aspects of paleobotany

References

1. Alam, A. 2015. Text book of Bryophyta. 1/e, I.K. International Publishing House, New Delhi

2. Sporne, KK. 1991. The Morphology of Pteridophytes. BI Publishing, Bombay.

3. Sporne, KR.1965. The Morphology of Gymnosperms. BI Publications, New Delhi.

4. Sharma, OP. 2014. Bryophyta. McGraw Hill Education, New Delhi

5. Parihar, N. S. 1991. Bryophyta. Central Book Department, Allahabad

6. Bhatnagar, SP and Moitra, A.1996.Gymnosperms. New Age International, New Delhi.

7. Parihar, NS. 1996. Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.

8. Boid, H. C. 1982. Bryophyta. Wiley-Eastern.

9. Jon C. Herron and Scott Freeman. 2014. Evolutionary analysis (5th Edition.).

10. Peter H. Raven, George B. Johnson Jonathan B. Losos, Kenneth A. Mason and Susan R. Singer. 2008. Biology. (8th Edition)

11. Peter J. Russell, Stephen L. Wolfe, Paul E. Hertz and Cecie Starr. 2008. Biology: The Dynamic Science, (1st Edition).

SC 1.4 Course 4 Lichenology and Mycorrhizal Technology 3 Credits

Introduction: Photobionts- identification, reproduction, and taxonomy of photobionts; Occurrence within lichens; Mycobionts- Lichenized versus nonlichenized fungi; Bryophilous and folicolous lichens; Thallus morphology and anatomy; Growth forms - crustose lichens, foliose lichens, fruticose lichens; Vegetative structures- Homoiomerous thallus, stratified thallus, cortex, epicortex, and epinecral layer, photobiont layer and medulla, lower cortex, Attachment organs and appendages; Cyphellae and pseudocyphellae; Cephalodia (Photosymbiodemes);

Reproductive structures- sexual reproduction in lichen-forming ascomycetes; Mating systems, dikaryon formation, Ascomal ontogeny, Ascosporogenesis; Ascus structure and function;

Generative reproduction: ascoma, perithecia, apothecia, Thallinocarpia, Pycnoascocarpia, Hysterothecia, Asci, Basidioma;

Vegetative reproduction- aposymbiotic propagules, symbiotic propagules; Systematics of lichenized fungi- History, classification and phylogeny.

Morphogenesis- Acquisition of a compatible photobiont; Recognition and specificity; Structural and functional aspects of the mycobiont–photobiont interface; Genotypes and phenotypes, growth patterns;

Biochemistry and secondary metabolites- intracellular and extracellular products; The fungal origin of the secondary metabolites; Major categories of lichen products; Application to pharmacology and medicine; Harmful properties of lichen substances, lichens in perfume, lichens in dyeing;

Stress physiology and the symbiosis- stress tolerance, limits to stress tolerance; harmful effects of stress, constitutive and inducible stress tolerance, evolution of stress tolerance in lichens; Modes of water uptake, light, temperature, carbon dioxide; The carbon economy of lichens.

Nitrogen, its metabolism and potential contribution to ecosystems, Methods of determination of nitrogen fixation; Nutrients- chemical and physical properties of nutrients and metals; Nutrient requirements, sources of nutrients, accumulation mechanisms, compartmentalization of elements within lichens; Metal toxicity, metal tolerance;

Environmental role of lichens- dispersal, establishment, pedogenesis and biodeterioration; Community structure, succession, ecosystem dynamics; Animal and lichen interactions; Forest management, conservation, environmental monitoring; Lichen sensitivity to air pollution- lichens in relation to sulfur dioxide, oxidants and lichens, hydrogen fluoride and organopollutants

Mycorrhizal fungi: Introduction and classification; Types of mycorrhizas- Arbutoid mycorrhizas, ectomycorrhizas, vesicular arbuscular mycorrhizas or arbuscular mycorrhizas, ectendomycorrhizas, ericoid mycorrhizas, monotropoid mycorrhizas and orchid mycorrhizas; Phoshate solubilisation; Ecological significance of AM fungi; Importance of mycorrhiza in evolution of land plants; Role of mycorrhiza in agriculture, horticulture and forestry.

References

1) Thomas H. Nash , 2008. Lichen Biology, 3rd edn. Cambridge University Press, The Edinburgh Building, Cambridge CB2 8RU, UK

2) Awasthi D.D. 2000. Lichenology in Indian subcontinent: A supplement to "A hand book of lichens". Publisher: M/s Bishen Singh Mahendra Pal Singh, Dehra Dun.

3) Awasthi D. D. 2013). A hand book of lichens , Publisher: M/s Bishen Singh Mahendra Pal Singh, Dehra Dun.

4) Sally E. Smith and David J. Read (2008). Mycorrhizal Symbiosis. 3rd edn. Academic Press, New York.

5) Larry Peterson R., Hugues B. Massicotte, Lewis H. Melville, 2004. Mycorrhizas: Anatomy and Cell Biology, CAB International, UK.

SECOND SEMESTER

HC 2.1 Course 1 Plant Physiology and Biochemistry 4 Credits

A general discussion on phytohormones and plant growth regulators: Definitions; members of phytohormone family; growth promoting and retarding chemicals;

General mode of hormone action; hormone binding proteins; second messengers; gene activation; examples of target cells for hormone action;

Modern techniques for hormone assay.

Auxins : Biosynthesis and degradation/deactivation of IAA; a brief account of the auxin structure and activity relationship; antiauxins and auxin antagonists; mechanism of auxin action - acid growth theory, auxin mutants.

Gibberellins : Chemical and structural characteristics of gibberellins; biosynthesis of GAs, antigibberellins and their site of action, role of gibberellins in cereal seed and gene mediated action. germination, dwarfism and flowering; mode of action of gibberellins, gibberellin mutants.

Cytokinins: Chemical and structural characteristics, biosynthesis and degradation; role of cytokinins in cell division, organogenesis, embryogenesis; mode of action, cytokinin mutants.

Abscisic acid : Chemical and structural characteristic, biosynthesis and degradation; role of ABA in seed maturation, germination, gravitropism and stomatal closure; mode of action, ABA mutants.

Ethylene : Hormonal status; chemical characteristics, biosynthesis and metabolism; Yang cycle; factors regulating ethylene biosynthesis; mode of ethylene action; its role in higher plants, ethylene mutants.

Seed dormancy : Types, control mechanism, chemical and physical manipulative methods of breaking seed dormancy; ecological significance of dormancy.

Flowering : Photoperiodic control, hormonal regulation; nature of floral stimulus; experimental evidence to prove the mobile nature of floral stimulus, ABC model of flowering, second messenger and flowering.

Senescence : Types of senescence, biochemical indices of senescence, physiobiochemical changes occurring during leaf senescence, senescence regulatory genes.

Fruit ripening : Climacteric and nonclimacteric fruits; hormonal regulation of fruit ripening, biochemical changes occurring during fruit ripening.

Stress physiology: Plant responses to biotic and abiotic stress,

Mechanisms of biotic and abiotic stress tolerance,

HR and SAR,

Water deficit and drought resistance, salinity stress, metal toxicity, freezing and heat stress, oxidative stress

References

- 1. Buchanan, B.B. and Gruissem, W. (2015). Biochemistry and molecular biology of plants. Willy Blackwell ASPB USA.
- 2. Campbell, M.K. and Farrell, S.O. (2007). Biochemistry. Thomson Brooks/cole, USA.
- 3. Dey, P.M. and Harborne, J.B. (2000). Plant biochemistry. Academic Press, UK.
- 4. Goodwin, T.W. and Mercer, E.I. (2003). Introduction to plant biochemistry. CBS Publishers & Distributors, New Delhi, India.
- 5. Ross and Salisbury. (2009). Plant Physiology. Cengage Learning (Thompson), New Delhi, India.
- 6. Segel, I.H. and Segel, E. (1993). Enzyme kinetics: Behavior and analysis of rapid equilibrium and steady-state enzyme systems. Wiley-Interscience, USA.
- 7. Taiz, L., Zeiger, E. Mollar, I. M. and Murphy, A. (2015). Plant physiology and Development 6th edition. . Sinauer Associates Inc., USA.
- 8. Hopkins, W.G. and Huner, A. (2008). Introduction to Plant Physiology. 4th edition. John Wiley and Sons.U.S.A.
- 9. Harborne, J.B. (1973). Phytochemical Methods. John Wiley & Sons. New York.
- 10. Heldt, H. W. and Piechulla, B. (2010). Plant Biochemistry. 4th Edition. Paperback. Academic Press.

HC 2.2 Course 2 Taxonomy of Angiosperms

4 Credits

Origin of intrapopulation variation: Population and the environment; ecads and ecotypes

Evolution and differentiation of species – various models.

The species concept: Taxonomic hierarchy, species, genus, family and other categories

Principles used in assessing relationship, delimitation of taxa and attribution of rank.

Salient features of the International Code of Botanical Nomenclature.

Taxonomic evidence: Morphology, anatomy, palynology, embryology, cytology; phytochemistry' genome analysis and nucleic acid hybridization.

Taxonomic tools: Herbarium, floras, histological, cytological, phytochemical, serological, biochemical and molecular techniques; computers and GIS.

Systems of angiosperm classification: Phenetic versus phylogenetic systems;

Cladistics in taxonomy; relative merits and demerits of major systems of classification;

Relevance of taxonomy to conservation, sustainable utilization of bio-resources and ecosystem research.

Concepts of phytogeography: Endemism, hotspots and hottest hotspots; plant explorations; invasions and introduction;

Local plant diversity and its socio-economic importance.

References

- 1. Nalk, V.N., 1984. Taxonomy of Angiosperms. Tata McGraw-Hill Publishing Company Ltd., New Delhi. 304pp.
- Singh, G 1999. PlantSystematics Theory and Practice. Oxford and IBH Publishing Co. Pvt Ltd., New Delhi. 35pp.
- 3. Sharma, O.P. 1958. Plant Taxonomy. Tata McGraw Hill Publishing Company Ltd., New Delhi.482pp.
- 4. Gurucharan Singh. 2008. Plant Sytematics Theory and Practices. Oxford and IBH Publishing Co. Pvt. Td. New Delhi.
- 5. Michael G. Simpson. 2010. Plant Systematics. Elsevier Academic Press.USA.
- 6. Pandey S.N. and Mishra. S.P. 2009. Taonomy of Angiosperms. Ane Books Pvt. Ltd. New Delhi.
- 7. Pandey, B.P. 2012. Taxonomy of Angiosperms. S.Chand and Company Ltd., New Delhi.
- 8. Rajkumar Gupta. 2006. Text book of Systematic Botany. CBS Publishers. New Delhi.
- 9. Subrahmanyam, N.S. 1995. Modern Plant Taxonomy. Vikas Publishing House Pvt. Ltd. NewDelhi.
- 10. Gurucharan Singh. 2010. Plant Sytematics An Integrated Approach. IIIrd ed. Science Publishers.US.
- 11. Plant Systematics. 2nd Edition. McGraw-Hill Book Company. New York. Plant Taxonomy and Biosystematics. Edward Arnold, London. STUESSY, T. F. 2002.
- 12. Pandey.B.P. (1987) Economic Botany.
- 13. Verma. V(1984) Economic Botany.
- 14. Porter.C.L., 1982 Taxonomy of Flowering Plants, Eurasia Publications House, New Delhi

- 15. Bensen, 1957. Plant Classification. Oxford & IBH Publishing Co., NewDelhi.
- 16. Cronquist, A. 1968. Evolution and Classification of Flowering Plants. Thomas & Nelson (Pvt.) Ltd.,London.
- 17. Davis, P.H. and Heywood, V.M.1963. Principles of Angiosperm Taxonomy. Oliver & Boyed –London.
- 18. Henry, A.N. and Chandra Bose, 1980 . An aid to the International Code of Botanical Nomenclature, Today & Tomorrow's Printers & Publishers, Delhi.
- 19. Lawerence, G.H.M. 1961, Taxonomy of Vascular Plants. MacMillan and Co., New Delhi.
- 20. Street, H.E., 1978. Essay in Plant Taxonomy, Academic press, London.
- 21. Bentham, G. 1988. Handbook of British Flora. (7th Ed., revised by A.B. Rendle in 1930). Ashford,Kent.
- 22. Cronquist, A. 1988. The Evolution and Classification of Flowering Plants. (2nd Ed.) New Delhi.482pp.
- 23. Darlington, C.D. and A.P.Wylie. 1955. Chromosome Atlas of Cultivated Plants. Allen and Unwin,London.
- 24. Hutchinson, J. 1973. The Families of Flowering Plants. (3rd Ed.) Oxford Univ. Press.
- 25. Lawerence, G.H.M. 1951. Taxonomy of Vascular Plants. MacMillan, NewYork.
- Rendle, A.B. 1904. Classification of Flowering plants. Cambridge, England. 2nd. Vol.1 930.
- 27. Stace, C.A. 1989. Plant Taxonomy and Biosystematics (2nd Ed.). Edward Arnold. London.
- 28. Takhtajan, A.L. 1997. Diversity and Classification of Flowering Plants. Columbia Univ. Press. New York, 642 pp.
- 29. Woodland, D.W. 1991. Contemporary Plant Systematics. Prentice Hall. New Jersey.
- 30. Pullaiah, T. 2007. Plant Taxonomy. Regency Publications, New Delhi.

HC 2.3 Course 3(Practical) Practical 3 and Practical 4 4 Credits

Practical 3

1. Analysis of plant tissue for water, organic and inorganic content determination of a few macronutrient (K/Na) by Flame photometer

2. Quantitative and qualitative estimation of sugars

3. Qualitative and quantitative determination of amino acids

- 4. Quantitative estimation of protein
- 5. Determination of ascorbic acid content of tissue (DCIP red)

6. Pigments extraction, separation through solvent partitioning and chromatographic techniques

7. Spectrophotometric estimation of chlorophyll

8. Enzyme activity with respect to temperature, pH and substrate concentration.

9. Effect of inorganic nutrients on plant growth

10. Assay of photosynthetic electron transport activity from isolated chloroplast/Algae using DCIP reduction

11. Assay of respiratory electron transport activity from potato using DDCP dye oxidation.

12. Estimation of nitrate/nitrite reductase activity in leaves/algae

13. Seed viability – TTC test

14. Estimation of transpiration through different simple methods.

15. Demonstration of Hill reaction.

16. Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.

17. To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.

18. Comparison of the rate of respiration in any two parts of a plant.

19. Separation of amino acids by paper chromatography.

20. To demonstrate activity of Nitrate reductase in germinating leaves of different plant sources.

21. To study the activity of lipases in germinating oilseeds and demonstrate mobilization of lipids during germination.

22. Demonstration of fluorescence by isolated chlorophyll pigments.

23. Demonstration of absorption spectrum of photosynthetic pigments.

24. Study the taxonomical descriptions for all plant parts Root, Stem, Leaves, Flowers, Fruits and seeds.

25. Study of the morphological and floral characteristic and economic importance of Magnoliaceae, Menispermaceae, Polygalaceae, Caryophyllaceae, Oxalidaceae, Meliaceae, Rhamnaceae, Vitaceae, Sapindaceae, Combretaceae, Lythraceae, Aizoaceae, Rubiaceae, Oleaceae, Gentianaceae, Boraginaceae, Bignoniaceae, Podestemaceae, Loranthaceae, Orchidaceae, Liliaceae, Commelinaceae, Musaceae, Arecaceae, Cyperaceae,Poaceae.

26. Preparation of Artificial keys Herbarium techniques, preparation and submission of 50 herbarium

27.. Floristic studies of selected area

28. To study the economic importance of Cereals, Legumes, Fruits, Spices and Condiments, Fibres, Timber and Vegetable Oil.

Practical 4

1. Mitosis, and study of chromosome morphology through squash preparation, including effect of chemicals on mitosis.

2. Meiosis and study of chiasma frequency through temporary squash preparation.

3. laws through seed ratios. Laboratory exercises in probability and chi-square.

4. Chromosome mapping using point test cross data.

5. Pedigree analysis for dominant and recessive autosomal and sex linked traits.

6. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).

7. Blood Typing: ABO groups & Rh factor.

8. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.

9. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.

10. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Color blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached earlobe.

11. To test PTC tasting ability in a random sample and calculate gene frequencies for the taster and non-taster alleles.

12. Identification of inactivated X chromosome as Barr body and drumstick.

13. Emasculation; preparation of the inflorescence for crossing

14. Estimation of pollen sterility and fertility percentage

15. Pollen germination: in vitro and in vivo viability tests

16. Study of pollen types using acetolysed and non-acetolysed pollens

17. Developmental stages of anther, ovule, embryo and endosperm.

18. Study of floral biology of crops- typical examples of self and cross pollinated plants.

19. Germination test and TTC test.

20. Budding, Grafting and layering.

1. Cereals: Wheat (habit sketch, L. S/T.S. grain, starch grains, micro-chemical tests) Rice(habit sketch, study of paddy and grain, starch grains, micro-chemical tests).

2. Legumes: Soybean, Groundnut, (habit, fruit, seed structure, micro-chemical tests).

3. Sources of sugars and starches: Sugarcane (habit sketch; cane juice- micro-chemical tests), Potato(habit sketch, tuber morphology, T.S. tuber to show localization of starch grains, w.m. starch grains, micro-chemical tests).

4. Spices: Black pepper, Fennel, Curcuma and Clove (habit and sections).

5. Beverages: Tea (plant specimen, tea leaves), Coffee (plant specimen, beans).

6. Sources of oils and fats: Coconut- T.S. nut, Mustard-plant specimen, seeds; tests for fats in crushed seeds.

7. Essential oil-yielding plants: Habit sketch of Rosa, Vetiveria, Santalum and Cymbopogon spp., Mint, Basil, Eucalyptus (specimens/photographs).

8. Rubber: specimen, photograph/model of tapping, samples of rubber products.

9. Drug-yielding plants: Specimens of Ashwagandha, Artemisia, Kalmegh, Phyllanthuds, Satavar, Gilloi, Digitalis, Papaver and Cannabis.

10. Tobacco: specimen and products of Tobacco.

11. Woods: Tectona, Pinus: Specimen, Section of young stem.

12. Fiber-yielding plants: Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fiber and test for cellulose), Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fiber).

13. Demonstration and practice of cultural practices for seed / vegetative / clonally propagated medicinal plants (Mentha arvensis, Satavar, Artemisia, Aloe vera, Stevia, Ashwagandha).

14. Harvesting, drying, storage (Stevia, Kalmegh and Satavar),

15, Harvesting and distillation of Mints, Basil,

16. Extraction of alkaloids / Withanaloids (Belladona, Ashwagandha)

SC 2.1 Course 1 Cytogenetics

3 Credits

Chromatin organization: chromosome structure and packaging of DNA, molecular organization of centromere and telomere; nucleolus and ribosomal RNA genes; euchromatin and heterochromation; karyotype analysis; banding patterns; karyotype evolution;

Specialized types of chromosomes; polytene, lampbrush, B-chromosomes and sex chromosomes, molecular basis of chromosome pairing

Structural and numerical alteratins in chromosomes: origin, meiosis and breeding behavior of duplication, deficiency, inversion and translocation heterozygotes; origin, occurrence, production and meiosis of haploids, aneuploids and euploids; origin and production of autopolyploids; chromosome and chromatid segregation; allopolyploids, types, genome constitution and analysis;

Evolution of major crop plants; inductin and characterization of trisomics and monosomics.

Genetics of prokaryotes and eukaryotic organelles: Mapping the bacteriophage genome; phage phenotypes; genetic recombination in phage;

Genetic transforamtino, conjugatin and transduction in bacteria; genetics of mitochondria and chloroplasts; cytoplasmic male sterility.

Gene structure and expression: Genetic fine structure; cis-trans test; fine structure analysis of eukaryotes; introns and their significance;

RNA splicing: regulation of gene expression in prokaryotes and eukaryotes.

Genetic recombination and genetic mapping: Recombination; independent assortment and crossing over; molecular mechanism of recombination; role of RecA and RecBCD enzymes; site-specific recombination;

Chromosome mapping, linkage groups, genetic markers, construction of molecular maps, correlation of genetic and physical maps; somatic cell genetics – an alternative approach to gene mapping.

Mutations: Spontaneous and induced mutations; physical and chemical mutagens; molecular basis of gene mutations; transposable elements in prokaryotes and eukaryotes; mutations induced by transposons; site-directed mutagenesis;

DNA damage and repair mechanisms; inherited human diseases and defects in DNA repair;

References

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics. 8th edition. John Wiley & sons, India.

2. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. 10th edition. W. H. Freeman and Co., U.S.A.

3. Gupta, P.K. (2018) Genetics. 5th Edition, Rastogi Publications, Meerut.

4. Hartl, D.L. and Jones, E.W. (1999). Essential Genetics, 2nd Edition, Jones and Barlett Publishers, Boston.

5. Jain, H.K. (1999). Genetics: Principles, Concepts and Implications. Science Pub Inc.

6. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. 9th edition. Benjamin Cummings, U.S.A.

7. Singh, R. J. (2016). Plant Cytogenetics, 3rd Edition. CRC Press, Boca Raton, Florida, USA.

8. Singh, R.J. (2017). Practical Mannual on Plant Cytogenetics. CRC Press, Boca Raton, Florida, USA.

9. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. 5th edition. John Wiley & Sons Inc., India.

10. Strickberger, M.W. (1985) Genetics, 3rd Edition. Pearson Printice Hall (printed in India by Anand Sons).

SC 2.2 Course 2 Plant Breeding

3 Credits

Definition, Objectives. Importance of floral biology in plant breeding.

Methods of crop improvement a. Plant Introduction: Definition, types and procedure. Sources of germplasm. Centres of genetic diversity.

Concepts of de Candolle and Vavilov. Primary, secondary and microcenters.

Genetic erosion. Preservation and utilization of germplasm. Gene banks. NBPGR.

Selection: Principles, genetic basis and methods: Mass selection, pure line selection, clonal selection.

Hybridization: Objectives. Procedure. Major achievements. Problems and causes of failure of hybridization. Handling of hybrids - Bulk method and pedigree method of selection. Distant hybridization - Role of interspecific and intergeneric hybridization in crop improvement.

Role of incompatibility and sterility in crop improvement.

Backcross breeding: Theory and procedure.

Inbreeding: inbreeding consequences. Heterosis- Definition. Genetic and physiologic basis. Application in plant breeding.

Steps in the production of single cross, double cross, three way cross, synthetic cross, multilines.

Idiotype breeding: Concept, Achievements: (Wheat – Asana, Donald. Rice – Super Rice).

Polyploidy breeding: induction of autopolyploidy and allopolyploidy. Role of chromosome manipulation. Chromosome addition and substitution lines. Achievements.

Mutation breeding: Principles, objectives, procedure. Induction of mutations: Physical and chemical mutagens - Recurrent irradiation, Split dose irradiation, Combination treatment. Achievements.

Resistance breeding: Principles. Methodology. Basis of resistance: structural biochemical, physiological and genetic. Gene for gene systems of plants. Vertical and horizontal resistance.

Artificial production of epiphytotic conditions and screening procedures for resistance.

Seed production and certification

Centres of crop breeding: International and National.

Plant breeder's rights Act. National Biodivesity Policy.

References

- 1. Arnold, R.W. (1960). Principles of Plant Breeding. Jolin Wily & Sons, Inc, New York.
- 2. Sing, D.D.Plant Breeding: Principles and Methods. Kalyani Publishers, New Delhi.
- 3. Swaminathan, M.S. And Jana.S (1992). Biodiversity. Mac Millan, India Press, Madras.
- 4. Chopra, V.L. 2000. Plant Breeding- theory and practices. Oxford and IBH Publishing Co. Pvt. Ltd.
- 5. Chahal, G.S. and Gosal, S.S. 2002. Principles and procedures of Plant Breeding. Narosa Publishing House, New Delhi.

SC 2.3 Course 3 Economic Botany

3 Credits

Plants for man: cereals and pulses,

Fibres, and oils,

Spices, condiments,

Beverages,

Timber,

Fruit and vegetables

Aromatic and medicinal plants,

Ornamental plants (scientific names and families of at least three

Plants of each category and the parts used);

Origin of cultivated plants & domestication of crop

Plants with case studies (millets rice, finger millets, jute, mustard, potato)

Ethnobotany and its significance in Eastern Himalayass;

Wild edible plants consumed by the ethnic people of Sikkim Himalayas; folk-medicine of the Sikkim Himalayas.

Indian system of medicine (Ayurveda, Unani, Siddha, Homeopathy); Ethnomedicine of Eastern Himalayan communities.

References

1. Chrispeels, M.J. and Sadava, D.E. (1994) Plants, Genes and Agriculture. Jones & Bartlett Publishers.

2. CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow (2016). Aush Gyanya : Handbook of Medicinal and Aromatic Plant Cultivation.

3. Kochhar, S.L. (2016). Economic Botany: A Comprehensive Study. 5th Edition. Cambridge

4. Samba Murty, AVSS and Subrahmanyam, N.S. (1989). a text book of Economic Botany. Wiley Eastern Ltd., New Delhi

5. Sambamurty, AVSS and Subrahmanyam, N.S. (2008). A Textbook of Modern Economic Botany. 1st Edition, Paperback . CBS Publishers & Distributors Pvt.Ltd.; 1st edition (4 September 2008)

6. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.

7. Any local/state/regional flora published by BSI or any other agency.

SC 2.4 Course 4 Pharmacognosy

3 Credits

History and Traditional Systems of Medicine History, Scope and Importance of Medicinal Plants; Traditional systems of medicine; Definition and Scope-

Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments,

Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine.

Unani: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations.

Conservation and Augmentation Conservation of Eendemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethnomedicinal plant Gardens.

Propagation of Medicinal Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.

Ethnobotany and Folk Medicine Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India.

Brief description of selected plants and derived drugs, namely Guggul (Commiphora) for hypercholesterolemia, Boswellia for inflammatory disorders, Arjuna (Terminalia arjuna) for cardioprotection, turmeric (Curcuma longa) for wound healing, antioxidant and anticancer properties, Kutaki (Picrorhiza kurroa) for hepatoprotection, Opium Poppy for analgesic and antitussive, Salix for analgesic, Cincona and Artemisia for Malaria, Rauwolfia as tranquilizer, Belladona as anticholinergic, Digitalis as cardiotonic, Podophyllum as antitumor.

References

1. Akerele, O., Heywood, V. and Synge, H. (1991). The Conservation of Medicinal Plants. Cambridge University Press.

2. AYUSH (www.indianmedicine.nic.in). About the systems—An overview of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy. New Delhi: Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), Ministry and Family Welfare, Government of India.

3. CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow (2016). Aush Gyanya: Handbook of Medicinal and Aromatic Plant Cultivation.

4. Dev, S. (1997). Ethnotherapeutics and modern drug development: The potential of Ayurveda. Current Science 73:909–928.

5. Evans, W.C. (2009). Trease and Evans Pharmacognosy, 16th edn. Philadelphia, PA: Elsevier Saunders Ltd.

6. Jain, S.K. and Jain, Vartika. (eds.) (2017). Methods and Approaches in Ethnobotany: Concepts, Practices and Prospects. Deep Publications, Delhi

7. Kapoor, L. D. (2001). Handbook of Ayurvedic medicinal plants. Boca Raton, FL: CRC Press.8. Saroya, A.S. (2017). Ethnobotany. ICAR publication.

9. Sharma, R. (2003). Medicinal Plants of India-An Encyclopaedia. Delhi: Daya Publishing House.

10. Sharma, R. (2013) Agro Techniques of Medicinal Plants. Daya Publishing House, Delhi.

11. Thakur, R. S., H. S. Puri, and Husain, A. (1989). Major medicinal plants of India. Central Institute of Medicinal and Aromatic Plants, Lucknow, India.

THIRD SEMESTER

HC 3.1 Course 1 Plant Development

4 Credits

Introduction: Unique features of plant development; differences between animal and plant development.

Seed germination and seedling growth: Metabolism of nucleic acids, proteins and mobilization of food reserves;

Tropisms

Hormonal control of seedling growth; gene expression;

Use of mutants in understanding seedling development.

Shoot development: Organization of the shoot apical meristem (SAM);

Cytological and molecular analysis of Sam;

Control of cell division and cell to cell communication; control of tissue differentiation, especially xylem and phloem;

Secretory ducts and laticifers;

Wood development in relation to environmental factors.

Leaf growth and differentiation: Determination; phyllotaxy; control of leaf form;

Differentiation of epidermis (with special reference to stomata and trichomes) and mesophyll.

Root development: Organization of root apical meristem (RAM);

Cell fates and lineages;

Vascular tissue differentiation; lateral roots; root hairs;

Root-microbe interactions.

References

- 1. Ray F. Evert. 2006. Esau's Plant anatomy- Meristems, Cells and Tissue of the Plant Body- their structure, Function and development, John Wiley Edition, Hoboken, NewJersy.
- 2. Pijushroy, (2010).Plant Anatomy, New central Book Agency, Pvt Lit, NewDelhi.
- 3. LarryPeterson,R.,Peterson,C.A.andMelville,L.H.2008.Teaching plant anatomy through creative laboratory exercises. NRC, Canada.
- 4. Charles B. Beck. 2010. An Introduction to plant structure and development. 2010. Cambridge University Press. NewYork.
- 5. Pandey, S.N. and Chadha, A. 1996.Plant anatomy and Embryology.Vikas Publications, NewDelhi.
- 6. Pandey, B.P. (1978). Plant Anatomy, S. Chand & Co., New Delhi.

HC 3.2 Course 2 Plant Reproduction

4 Credits

Reproduction: Vegetative options and sexual reproduction;

Flower development; genetics of floral organ differentiation; homeotic mutants in Arabidopsis and Antirrhinum; sex determination.

Male gametophyte: Structure of anthers; microsporogenesis, role of tapetum; pollen development and gene expression;

Male sterility; sperm dimorphism and hybrid seed production; pollen germination, pollen tube growth and guidance; pollen storage; pollen allegry; pollen embryos.

Female gametophyte: Ovule development; megasporogenesis; organization of the embryo sac, structure of the embryo sac cells.

Pollination, pollen-pistil interaction and fertilization: Floral characteristics, pollination mechanisms and vectors; breeding systems; commercial considerations;

Structure of the pistil; pollen-stigma interactions, sporophytic and gametophytic selfincompatibility (cytological, biochemical and molecular aspects); double fertilization; in vitro fertilization.

Seed development and fruit growth: Endosperm development during early, maturation and dessication stages;

Embryogenesis, ultrastructure and nuclear cytology;

Cell lineages during late embryo development; strogate proteins of endosperm and embryo; polyembryony; apomixes; embryo culture;

Dynamics of fruit growth; biochemistry and molecular biology of fruit maturation.

Latent life-dormancy: Importance and types of dormancy; seed dormancy; overcoming seed dormancy; bud dormancy.

Senescence and programmed cell death (PCD): Basic concepts,

Types of cell death, PCD in the life cycle of plants,

Metabolic changes associated with senescence and its regulation;.

Influence of hormones and environmental factors on senescence

References

1. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms, Vikas Publishing House Pvt. Ltd. New Delhi.

2. Johri, B.M. 1984. 1984. Embryology of Angiosperms. Springer Verlag. Berlin.

3. Maheswari, P. 1980. Recent Advances in the Embryology of Angiosperms.

4. Pandey, A.K. 1997. Introduction to Embryology of Amngiosperms. CBS Publishers and Distributors, New Delhi.

5. Pandey, S.N. and Chadha, A. 2000. Embryology. Vikas Publishing House Pvt. Ltd. New Delhi.

HC 3.3 Course 3(Practical) Practical 5 and Practical 6 4 Credits

1. Study the structures of various Microscopes

2. Study the structure of Microtome

3. Staining methods(Simple/Permanent)

4. Student should submit two number of Permanent slides for practical Examination

5. Study the anomalous, primary and secondary features in selected Monocot and Dicot plants Detailed study of TS, TLS and RLS from various wood for to identify the soft and hardwood

6. Study the anatomical abnormality of C4 and CAM plants (Leaf/Stem).

7. Embryology: Study of pollen morphology Pollen germination experimental study Identify the different types of embryos, polyembryony, endosperm types, types of pollen grains.

8. Any stage of embryo excision from Cucumber seeds.

1. Pollen germination: in vitro and in vivo viability tests

2. Study of pollen types using acetolysed and non-acetolysed pollen

3. Developmental stages of anther, ovule, embryo and endosperm.

4. Study the structures of various Microscopes

5. Study the structure of Microtome

6. Staining methods(Simple/Permanent)

7. Student should submit two number of Permanent slides for practical Examination

8. Study the anomalous, primary and secondary features in selected Monocot and Dicot plants Detailed study of TS, TLS and RLS from various wood for to identify the soft and hardwood

9. Study the anatomical abnormality of C4 and CAM plants (Leaf/Stem).

10. Embryology: Study of pollen morphology Pollen germination experimental study Identify the different types of embryos, polyembryony, endosperm types, types of pollen grains.

11. Any stage of embryo excision from Cucumber seeds.

1. Pollen germination: in vitro and in vivo viability tests

2. Study of pollen types using acetolysed and non-acetolysed pollen

3. Developmental stages of anther, ovule, embryo and endosperm.

1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.

2. Determination of pH of various soil and water samples (with pH meter, universal indicator/Lovibond comparator and/or pH paper strip)

3. Analysis for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency from two soil samples by rapid field tests.

4. Determination of organic matter of different soil samples by Walkley & Black rapid titration method.

5. Comparison of bulk density, porosity and rate of infiltration of water in soils of three habitats.

6. Determination of dissolved oxygen of water samples from polluted and unpolluted sources.

7. Study of morphological adaptations of hydrophytes and xerophytes (four each).

8. Study of biotic interactions of the following: Stem parasite (Cuscuta), Root parasite (Orobanche) Epiphytes, Predation (Insectivorous plants).

9. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus, by species area curve method (species to be listed).

10. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law.

11. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus.

12. Field visit to familiarise students with ecology of different sites.

- 1. Vegetative propagation: Types of Cuttings
- 2. Vegetative propagation: Types of Grafting
- 3. Vegetative propagation: Types of Budding
- 4. Vegetative propagation: Types of Layering
- 5. Propagation by modified stems and
- 6. Propagation by modified Roots

7. Micropropagation: Preparation of media, preparation of explants, culture, initiation of shoot, multiplication (demonstration)

8. Pot & green house implants (demonstration)

1. Isolation of Plasmid DNA from E.coli

2. Digestion of DNA using restriction enzymes and analysis by agarose gel electrophoresis

- 3. Ligation of DNA fragments
- 4. Interpretation of sequencing gel electropherograms
- 5. Designing of primers for DN Aamplification
- 6. Amplification of DNA by PCR

- 7. Demonstration of Southern blotting
- 1. Nucleic acid and protein databases.
- 2. Sequence retrieval from databases.
- 3. Sequence alignment.
- 4. Sequence homology and Gene annotation.
- 5. Construction of phylogenetic tree.
- 6. Comparative analysis of different databases in metabolomics

7. More Practical may be added depending on the local habitats and available facilities

SC 3.1 Course 1 Plant Ecology

3 Credits

Climate, soil and vegetation patterns of the world: Life zones; major biomes and major vegetation and soil types of the world.

Vegetation organization: Concepts of community and continuum; analysis of communities (analytical and synthetic characters); community coefficients; interspecific associations, ordination; concept of ecological niche.

Vegetation development: Temporal changes (cyclic and non-cyclic); mechanism of elcological succession (relay floristics and initial floristic composition; facilitation, tolerance and inhibition models); changes in ecosystem properties during succession.

Ecosytem organization: Structure and fucntions;

Primary production (methods of measurement, global pattern, controlling factors);

Energy dynamics (trophic organization, energy flow pathways, ecological efficiencies);

Litter fall and decomposition (mechanism, substrate quality and climatic factors);

Global biogeochemical cycles of C, N, P and S; mineral cycles (pathways, processes, budgets) in terrestrial and aquatic ecosystem.

Biological diversity: Concept and levels;

Role of biodiversity in ecosystem functions and stability;

Speciation and extinction; IUCN categories of threat; distribution and global patterns;

Terrestrial biodiversity hot spots; inventory.
References

1. Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5th edition.

2. Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.

3. Sharma, P.D. (2010). Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.

4. Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach. Oxford University Press. U.S.A.

5. Kormondy, E.J. (1996). Concepts of ecology. PHI Learning Pvt. Ltd., Delhi, India. 4th edition.

SC 3.2 Course 2 Plant Propagation

3 Credits

Propagation of horticultural plants- by seeds- Seed development and viability,

Seed dormancy, seed health, seed testing and certification

Growing seedlings in indoor containers and field nurseries, seed bed preparation, seedling transplanting;

Advantages and disadvantages of seed propagation.

Vegetative propagation- organs used in propagation- natural and artificial vegetative propagation;

Methods- cutting, layering, grafting and budding;

Advantages and disadvantages of vegetative propagation;

Micropropagation

Plant disorders including nutrition, pests and diseases, and chimaeras

Ornamental ferns and their propagation;

Herbaceous perennials, Annuals & Biennials:

Important Genera and Species, their importance in garden designs.

References

1. Lewis, Hill. (1985). Secrets of Plant Propagation. American Horticultural Society. Storey Books,

2. Dirr, M.A. (2009). Manual of Woody Landscape Plants. (6th ed) Champsign, II: Stipes Pub.

3. Kock, H., Arid, Paul., Ambrose, J. and Waldron G.(2008). Growing Trees from Seeds. Richmond Hill : Firefly Books Publ.

4. Toogood ,A. R. (1999). Plant Propagation. American Horticultural Society Practical Guides. DK Publ, pp 320.

5. Hartmann, H.I. and Kester, O.T. (2015). Plant Propagation: Principles and Practices. 8th Edition. Pearsons

6. Sadhu, M. K. (1994). Plant Propagation. First edition .John Wiley & Sons.

7. Phillips, Harry R. (1995). Growing and Propagating wild Flowers. The University of North Carolina Press,

SC 3.3 Course 3 Genetic Engineering

3 Credits

DNA replication: DNA replication in prokaryotic organism- Initiation, elongation, and termination,

DNA replication in eukaryotes – origin, replication form, replication proteins, Comparative account of DNA replication in prokaryotes and eukaryotes, DNA replication proteins

DNA damage and repair: Types of DNA damage, factors for DNA damage, Repair system: Single base change, direct repair, mismatch repair, SOS response.

Gene expression and regulation: Transcriptional, translational and post-translational regulation

Tools of rDNA technology: DNA manipulation enzymes- Nucleases, polymerases, ligases, kinases and phosphatases

Methods of gene isolation.

Molecular probing: Recombinant DNA libraries (gDNA and cDNA, oligonucleotide probes)

Nucleic acid hybridization (southern, northern, dot-blot and slot-blot); antibodies as probe for proteins (immunoblotting or western blotting, immunoprecipitation, southwestern screening).

Splicing of foreign DNA into cloning vector: Vectors for prokaryotes; ligation.

Introduction of foreign DNA into host cell: Transformation; transfection; transgenesis

Isolation of genes or protein products from clones: Expression vectors-Characteristics; vectors producing fusion proteins

Polymerase chain reaction: The basic techniques and its modifications; applications of PCR in molecular biology

Sequence alignment and phylogenetic trees: Pairwise (dot-matrix method, dynamic programming method, Word or k-tuple method) and

Multiple alignment, Local and global alignment, significance of alignment, phylogeny and phylogenetic trees.

Genomics: Definition; Structural, functional and comparative genomics.

Proteomics: Description of protein structure; classification of proteins on the basis of structure and sequence similarity; prediction of a protein structure.

References

1. Benjamin Lewin, Gene VII, Oxford University Press, (2000).

2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter, Molecular biology of the Cell, 4th Edition. Garland publishing Inc. (2002).

3. Darnell, Lodish and Baltimore, Molecular Cell Biology, Scientific American Publishing Inc. (2000).

4. Watson. J.D, Baker.T.A, Bell.S.P, Gann.A. Levine.M. Losick.R, Molecular Biology of Gene, 5th Edition. The Benjamin/Cummings Pub.Co.Inc. (2003).

5. David Frifielder, Stanely R. Maloy, Molecular biology and Microbial genetics. 2ndEdition, Jonesand Barlett Publishers. (1994).

6. BrownT.A., Gene Cloning and DNA analysis. 2nd Edition, ASM press. (2004).

7. Sandy Primrose. Principles of Gene Manipulation and Genomics. 7th Ed., Blackwell Publishers. (2006).

8. Glick BR and Pasternak JJ, Molecular Biotechnology, 2nd Ed.ASM press. (2003).

9. Uldis N. Streips, Ronald E. Yasbin. Modern Microbial Genetics. 2nd Edition Wiley-Liss, Inc.(2002).

10. Desmond S. T. Nicholl. An Introduction to Genetic Engineering. Cambridge University Press; (2008)

SC 3.4 Course 4 Bioinformatics

3 Credits

Introduction to bioinformatics, over view and exploring and querying (search and retrieval) available bioinformatics resources NCBI, PUBMED, EBI, EMBL, gene bank etc.

Pair wise alignment of protein and DNA sequences using algorithm software to deduce homology nd interpretation of data.

Database searches for homology using BLAST and FASTA and interpretation of the results to derive biological significance of the queried DNA/protein sequences.

Prediction of structure of proteins by homology modeling approach using SWISSMODEL and SWISS-PDB.

Models of molecular Evolution, Selection of best-fitting models,

Methods of Phylogeny reconstruction: Phenetic vs. Cladistic, Neighbor Joining, UPGMA, Maximum Parsimony, Maximum Likelihood, Bayesian Inference,

Software for Phylogenetic Analyses, Consistency of Molecular Phylogenetic Prediction.

Structural Bioinformatics in Drug Discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design,

Microbial genome applications, Crop improvement.

References

1. Arthur M. Lesk. (2003). Introduction to Bioinformatics, Oxford University Press, Indian edition.

2. Des Higgins and Willie Taylor. (2000). Bioinformatics, Sequence, structure and databanks. A practical approach. Oxford University Press, Indian edition, Second impression, New Delhi.

3. Imtiaz Alam Khan. (2005). Elementary bioinformatics. Pharma Book Syndicate, Hyderabad.

4. Irfan Ali Khan and Attiya Khanum (eds.). (2005). Basic concepts of Bioinformatics, Ukaaz Publications, Hyderabad.

5. Irfan Ali Khan and Attiya Khanum (eds.). (2004). Introductory Bioinformatics. Ukaaz Publications, Hyderabad.

6. Krane Dan, E. and Raymer M.L. (2004). Fundamental concepts of Bioinformatics. Pearson education. New Delhi. Second Indian reprint.

7. Rastogi, S.C., Medirattta, N. and Rastogi. P. (2004). Bioinformatics, methods and applications, genomics, proteomics and drug discovery, Prentice hall of India, pvt. Ltd., New Delhi.

8. Baxevanis, A. D. and Ouellettee, B. F. F. (2002). Bioinformatics: A Practical Guide to the analysis of Genes and Proteins. (2nd Ed.), New York, John Wiley & Sons, Inc. Publications.

9. Attwood, T. K. and Parry-Smith, D. J. (2001). Introduction to Bioinformatics Delhi. Pearson Education (Singapore) Ptd. Ltd.

SEC-1: Biofertilizers

2 Credits

General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis. Azospirillum: isolation and mass multiplication – carrier based inoculant, associative effect of different microorganisms. Azotobacter: classification, characteristics – crop response to Azotobacter inoculum, maintenance and mass multiplication.

Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation.

Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

Organic farming – Green manuring and organic fertilizers, Recycling of bio- degradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.

References:

1. Dubey, R.C. (2005). A Text book of Biotechnology S.Chand & Co, New Delhi.

2. John Jothi Prakash, E. (2004). Outlines of Plant Biotechnology. Emkay Publication, New Delhi.

3. Kumaresan, V.(2005). Biotechnology, Saras Publications, New Delhi.

4. NIIR Board. (2012). The complete Technology Book on Biofertilizer and organic farming. 2nd Edition. NIIR Project Consultancy Services.

5. Sathe, T.V. (2004) Vermiculture and Organic Farming. Daya publishers.

6. Subba Rao N.S. (2017). Biofertilizers in Agriculture and Forestry. Fourth Edition. Medtech.

7. Vayas, S.C., Vayas, S. and Modi, H.A. (1998). Bio-fertilizers and organic Farming Akta Prakashan, Nadiad

FOURTH SEMESTER

HC 4.1 Course 1 Plant Biotechnology

4 Credits

Recombinant DNA technology: Gene cloning- Principles and technique; vectors- types (cloning & expression; plasmid & viral) and their properties;

Construction of DNA libraries (gDNA and cDNA); splicing of insert into the vector; screening of DNA libraries and introduction of the recombinant DNA into the host cells.

Genetic engineering of plants: Aims, strategies for development of transgenics (with suitable examples);

Agrobacterium-the natural genetic engineer; T-DNA and transposon mediated gene tagging.

Microbial genetic manipulation: Bacterial transformation, selection of recombinants and transformants,

Genetic improvement of industrial microbes and nitrogen fixers, fermentation technology.

Genomics and proteomics: Molecular markers for introgression of useful traits; high throughput sequencing; functional genomics; Protein profiling and its significance.

DNA synthesis; DNA sequencing; basic polymerase chain reaction and applications of PCR; DNA fingerprinting.

Plant tissue culture: Basic concepts; Principles and scope; tissue culture media; callus induction and cell suspension; aspects of morphogenesis; haploid and triploid production; production of somatic embryos

Applications of plant tissue culture; protoplast isolation and culture; production of cybrids

Transgenic production: Methods to introduce gene in plants; selection of transformed plants/explants

Salient achievements in crop biotechnology

Bioinformatics: Introduction, History, Definition and applications of bioinformatics;

Database: Sequences (nucleotide and amino acid); nomenclature- IUPAC symbols,

Nomenclature of DNA & protein sequences, directionality of sequences, types of sequences used in bioinformatics;

Definitions, types and classification of databases- Primary Databases, Secondary databases, Literature database and Taxonomy database.

References

1. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.

2. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

3. A. Slater, N.W. Scott and M.R. Fowler (2008). Plant Biotechnology. Second Edition. Oxford.

4. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons, U.K.

5. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.

6. Chrispeels, M.J. and Sadava, D.E. (1994). Plants, Genes and Agriculture. Jones & Bartlett Publishers.

7. N. Santosh and A. Madhavi. (2010). Practical Book of Biotechnology and Plant Tissue Culture. S. Chand & Co.

HC 4.2 Course 2 Plant Pathology

4 Credits

History:Milestones in phytopathology with particular reference to India. Major epidemics and their social impacts.

Historical developments of chemicals, cultural and biological protection measures.

Altered metabolism of plants under biotic and abiotic stresses. Koch's Postulates

Epidemiology and forcasting of plant diseases

Principles of Plant pathology

i. Principles of plant pathology-Importance, nature, classification and general symptoms of plant diseases.

ii. Pathogenecity of microorganisms and pathogenesis.

iii. Host parasite relationship and Interaction; Signal transduction.

Defence mechanism in host plants against pathogens -morphological or structural defence mechanism;Biochemical defence mechanisms - role of phenolic compounds, enzymes and toxins

Principles and methods of plant disease control -cultural methods, chemical methods, Biological control, transgenic approach for plant disease control, integrated pest management (IPM), Biopesticides.

A Detailed study of the Diseases of the following crops caused by fungal pathogens with effective control measures.

Diseases of Cereals: Seedling blight of cereals, Smut of wheat, Foot rot of wheat, Covered smut of Barley, False smut of rice, Downey mildew of jowar, Green ear disease of Bajra, Ergot of Bajra, Downey mildew of maize.

Diseases of Vegetable crops with special reference to the important diseases of thefollowing: Chilli, Brinjal, Tomato, Onion, Bhindi. General knowledge of post harvest diseases of fruits and vegetables and their control.

Diseases of Oil Seed Crops viz. Linum, Seasamum, Groundnut, Mustard and Sunflower

Diseases of Fruit Trees-With special reference to important diseases of the following Citrus, Apple, Mango, Banana and Grapes.

Bacterial diseases of plants - Bacterial blight of rice, Tundu disease of wheat, Angular leaf spot of cotton, stalk rot of maize, Fire blight of Apple, Bacterial soft rot of fruits and Vegetables.

Viral Diseases of Plant: Bunchy top of Banana, Leaf curl of Papaya, Yellow vein mosaic of Bhindi. Mosaic of Cucurbits, Viral diseases of Tobacco, Potato and Tomato.

Mycoplasma/Phytoplama (PPLO) Diseases of Plants: Citrus greening, Rice yellow dwarf: Little leaf of Brinjal, Sandal Spike.

Nematode Diseases of Plants: General knowledge of plant parasitic nematodes and important nematode diseases viz.Root knot of Vegetables, Ear cockle of wheat.

References

- 1. Agrios, G.N. (1997). Plant Pathology, 4th edition, Academic Press, U.K.
- 2. Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India.
- 3. Mehrotra R S and Ashok Agrawal. Plant Pathology. Tata Mc Graw Hill ,6th reprint (2006).
- 4. K. S. Bilgrami, H. C. Dube. A textbook of modern pathology. 6th Edition, Vani Educational Books, a division of Vikas, (1984).
- 5. Plant Pathology. Elsevier Science Publishing Co Inc 2005. George Nicholas Agrios

6. K.R. Aneja Experiments in Microbiology, Plant Pathology and Biotechnology . New Age Publications 2017

HC 4.3 Course 3 (Practical) Practical 7 and Practical 8 4 Credits

1. (a) Preparation of liquid and solid MS medium. (b) Demonstration of in vitro sterilization of seeds and germination in MS media containing petri plates. (c) in vitro selection and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc.

2. Callus formation in tobacco and rice using MS medium containing phytohormones.

3. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs.

4. Isolation of protoplasts and protoplast culture using photographs

5. Construction of restriction map of circular and linear DNA from the data provided.

6. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment.

7. Study of steps of genetic engineering for production of Bt cotton, Golden rice, Flavr Savr tomato through photographs.

8. Isolation of plasmid DNA.

9. Restriction digestion and gel electrophoresis of plasmid DNA.

- 1. Demonstration of Koch's postulates in fungal, bacterial and viral plant pathogens.
- 2. Study of important diseases of crop plants by cutting sections of infected plant material-Albugo, Puccinia, Ustilago, Fusarium, Colletotrichu
- 3. Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton,
- 4. Viral diseases: TMV, Vein clearing,
- 5. Fungal diseases: Early blight of potato, Black stem rust of wheat and White rust of crucifers.
- 1. Visit any unattended area with natural vegetation

2. Use Quadrat method to evaluate the minimum size of the quadrat required for vegetation study

3. Find out the minimum number of quadrats need for analyzing the vegetation structure in the study area

4. Find out the alpha-diversity of plants in the area

1) Survey and collection important ethno botanical plants by using questionnaire and interview.

2) Preliminary phyto- chemical analysis of medicinal plants.

3) Study of biological functional properties of crude drugs – Anti microbial activity.

4) Study of methods of in-situ or ex-situ conservation of important medicinal plants.

5) Study of techniques used in Pharmacognosy - organoleptic, anatomy and chemical methods.

6) A visit to a Tribal area to conduct field work and collect ethno botanical information / data.

7) Listing of Crude drugs in Pansali shops (local crude drugs shops) and their identification (little known drugs only).

8) Visit to nearby Western Ghats and Sacred Groves.

SC 4.1 Course 1 Dissertation/project work 5 Credits

SC 4.2 Course 2 Plant Resource Conservation

3 Credits

Biosystematics principles, practice, limitations and scope ;phenotypic plasticity ;

Biodiversity: general concept, importance, assessment of variation and isolation.

Distribution of endemic plant families in the southern hemisphere of the globe.

Conservation: Principles, categories of threatened plants (IUCN),

Strategies of conservation,

Red Data Book.

Protected areas- Sanctuaries, National parks, Biosphere reserves.

Wetlands and Mangroves

Coral Reefs- Types, importance, artificial reefs,

Botanic Garden, Herbaria and Botanical Survey of India.

Seed Banks; In-vitro repositories; Cryobanks,

Molecular markers in Plant Systematics and phylogenetic analysis: Nuclear ribosomal DNA, Chloroplast DNA and Mitochondrial DNA.

Ethics of Conservation – Values of Biodiversity, Biopiracy, Hybridized plants, GM crops (benefits& criticism),

Economic Value of Biodiversity & Legal, Ethical and Conservation issues related to uses of biodiversity, Global Conservation Issues.

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.

5. Akerele, O., Heywood, V. and Synge, H. (1991). The Conservation of Medicinal Plants. Cambridge University Press.

SC 4.3 Course 4 Ethno-Botany and Intellectual Property Rights (IPR) 3 Credits

Ethno-botany: Introduction, concept, scope and objectives; Ethno-botany as an interdisciplinary science; The relevance of ethno-botany in the present context;

Ethnic groups; Ethno-botany- Major and minor ethnic groups of India and their life styles; Forest Vs. ethnic groups; Plants in tribal life with reference to Magico-religious rituals and social customs; Sacred groves.

Methodology used in the study of Ethnobotany and Ethno pharmacology: Field work, Herbarium, Ancient Literature, Archaeological findings, temples and sacred places, protocols.

Preliminary phytochemical analysis of ethno-botanical important medicinal plants.

Role of ethno-botany in modern Medicine with special examples; Medico-ethno- botanical Sources in India with special reference to Karnataka; Tribals Vs. Agriculture: Shifting, Podu and Jhum cultivation; Role of ethnic groups on surrounding environment;

Crop genetic sources; Endangered taxa and forest management (participatory forest management); Ethno- botany as a tool to protect interests of ethnic groups; Sharing of wealth concept with few examples from India.

Study of Intellectual Property Rights – patents, trademark, geographical indication, copyright; IPR and Traditional Knowledge; Bio-piracy of traditional knowledge;

Ethno botany and legal aspects; National and international organizations and treaty related to traditional knowledge – WIPO, TKDL, TRIPS, CBD, Nagoya protocol etc.,

Ethno botany as a source (recent) of already known drugs: a) Withania as an antioxidant and relaxant b) Sarpagandha in brain ailments c) Becopa and Centella in epilepsy and memory development in children d) Phyllanthus fraternus in diabetic and viral jaundice e) Artemisia as a powerful cerebral anti malarial agent and its possible use in tuberculosis.

References

1) Jain, S.K. 1995. Manual of Ethno-botany, Scientific Publishers, Jodhpur.

2) Jain, S.K. 1981. Glimpses of Indian. Ethno-botany, Oxford and I B H, New Delhi

3) S.K. Jain 1989. Methods and approaches in ethno-botany. (ed.) Society of ethno botanists, Lucknow, India.

4) Jain, S.K. 1990. Contributions of Indian ethno-botany. Scientific Publishers, Jodhpur.

5) Colton C.M. 1997. Ethno botany – Principles and applications. John Wiley and sons –

6) Rama Ro, N and A.N. Henry (1996). The Ethno-botany of Eastern Ghats in Andhra Pradesh, India. Botanical Survey of India. Howrah.

7) Rajiv K. Sinha – Ethno-botany The Renaissance of Traditional Herbal Medicine – INA – SHREE Publishers, Jaipur-1996

8) Faulks, P.J. 1958. An introduction to Ethno-botany, Moredale pub. Ltd. London

SEC-2: Herbal Technology

2 Credits

Herbal Technology: Definition and scope; Herbal medicines: history and scope; Traditional systems of medicine, and overview of AYUSH (Traditional Indian Systems of Medicine); Cultivation - harvesting - processing - storage of herbs and herbal products.

Value added plant products: Herbs and herbal products recognized in India; Major herbs used as herbal medicines, nutraceuticals, cosmeticals and biopesticides, their Botanical names, plant parts used, major chemical constituents.

Pharmacognosy - Systematic position, botany of the plant part used and active principles of the following herbs: Tulsi, Ginger, Curcuma, Fenugreek, Indian Gooseberry, Catharanthus roseus, Withania somnifera, Centella asiatica, Achyranthes aspera, Kalmegh, Giloe (Tinospora), Saravar. Herbal foods, future of pharmacognosy.

lectures Analytical pharmacognosy: Morphological and microscopic examination of herbs, Evaluation of drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds). Plant gene banks, Cultivation of Plants and their value added processing / storage / quality control for use in herbal formulations, Introductory knowledge of Tissue culture and Micro propagation. of some medicinal plants (Withania somnifera, neem and tulsi),

References:

1. Agarwal, P., Shashi, Alok., Fatima, A. and Verma, A. (2013). Current scenario of Herbal Technology worldwide: An overview. Int J Pharm Sci Res; 4(11): 4105-17.

2. Arbe r, Agnes. (1999). Herbal Plants and Drugs. Mangal Deep Publications, Jaipur.

3. Varzakas, T., Zakynthinos, G, and Francis Verpoort, F. (2016). Plant Food Residues as a Source of Nutraceuticals and Functional Foods. Foods 5 : 88.

4. Aburjai, T. and Natsheh, F.M. (2003). Plants Used in Cosmetics. Phytotherapy Research 17 :987-1000.

5. Patri, F. and Silano, V. (2002). Plants in cosmetics: Plants and plant preparations used as ingredients for cosmetic products - Volume 1. ISBN 978-92-871-8474-0, pp 218.

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7. Evans, W.C. (2009): Trease and Evans PHARMACOGNOSY. 16th Edition, SAUNDERS / Elsevier.

8. Sivarajan, V.V. and India, B. (1994). Ayurvedic Drugs and Their Plant Sources.. Oxford & IBH Publishing Company, 1994 - Herbs - 570 pages.

9. Miller, L. and Miller, B. (2017). Ayurveda & Aromatherapy: The Earth Essential Guide to Ancient Wisdom and Modern Healing. Motilal Banarsidass,; Fourth edition .

10. Kokate, C.K. (2003). Practical Pharmacognosy. Vallabh Prakashan, Pune.

7. Any other information: Nil

* * * * *

Study materials are developed by eminent professers, experts and specialists in the field.

			Counselli	Maximum Marks			. .
Course Code	Semester and Course	Credits	ng/PCP hours*	Internal Assessment	Term- End Examinat ion	Total	Exami nation durati on
HC 1.1 HC 1.2 HC 1.3 SC 1.1 SC 1.2 EL-1	Semester - I Course 1 Course 2 Course 3 (Practical)	4 4 4 3	12 12 120 09	20 20 20 20	80 80 80 80	100 100 100 100	3 3 3 3
	Course 2 Inter Disciplinary course – I Semester - I Total	3 2 20	09 06 168	20 10 110	80 40 440	100 50 550	$3 1^{1/2}$
HC 2.1 HC 2.2 HC 2.3 SC 2.1 SC 2.2 EL-2	Semester - II Course 1 Course 2 Course 3 (Practical) Course 1 Course 2 Inter Disciplinary course – II Semester - II Total	4 4 3 3 2 20	12 12 120 09 09 06 168	20 20 20 20 20 10	80 80 80 80 80 40 440	100 100 100 100 100 50 550	$ \begin{array}{c} 3 \\ 3 \\ 3 \\ 3 \\ 1^{1/2} \end{array} $
HC 3.1 HC 3.2 HC 3.3 SC 3.1 SC 3.2 SEC-T	Semester - III Course 1 Course 2 Course 3 (Practical) Course 1 Course 2 Skill Enhancement course – T Semester – III Total	4 4 3 3 2 20	12 12 120 09 09 09 06 168	20 20 20 20 20 20 10 110	80 80 80 80 80 40 440	100 100 100 100 100 50 550	$3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 1^{1/2}$
HC 4.1 HC 4.2 HC 4.3 HC 4.4 SC 4.1 SEC-P	Semester - IV Course 1 Course 2 Course 3 (Practical) Dissertation Course 1 Skill Enhancement course – P Semester – IV Total	4 4 5 3 2 <u>22</u> 82	12 12 120 15 09 06 <u>174</u> 678	20 20 20 20 20 10 110 440	80 80 80 80 40 440 1760	100 100 100 100 50 550 2200	$3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 1^{1/2}$

CBCS Course Matrix

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.

Interdisciplinary Electives

SL No	Department	Sub Code	l 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	ELC01	Personal Financial Planning	ELC02	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	ELMCND –01	Healthy lifestyles and	ELMCND-02	Nutraceuticals and

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

Credit System for the Programmes

The University follows the 'Credit System' for all its Programmes. Each credit is of 30 hours of study comprising of all learning activities such as studying the self-learning material, participating in the counseling/contact classes, preparing assignment, visiting library/ industry/ institution, interacting through audio-visual related mode and preparing for exams. Thus, a four credit course involves 120 study hours, a six credit course involves 180 study hours and so on. This helps the students to understand the academic efforts she/ he will have to put in order to successfully complete the programme.

Maximum Period for Completion of Programme

Normally, the Candidate is expected to complete the programme within the minimum period as laid down by the University for a Specific Program. However, a student who, for whatever reasons is not able to complete the program within the normal or minimum duration prescribed for the program may be allowed a period of two years beyond the normal period to clear the backlog to be qualified for the degree. The general formula therefore is N+N years (N=⁻ Normal / minimum duration prescribed for completion of the program) and will be revised from time to time as per the UGC norms.

8.CHOICE BASED CREDIT SYSTEM (CBCS)

Choice based credit system (CBCS) is an internationally acknowledged system. Therefore the entire higher education in India is transforming itself to this uniform grading system. The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. This will benefit the students to move across institutions within India to begin with and across countries.

The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the University Grants Commission has formulated the guidelines to be followed.

The choice based credit system not only offers opportunities and avenues to learn core subjects but also exploring additional avenues of learning beyond the core subjects for holistic development of an individual. The CBCS will undoubtedly facilitate us bench mark our courses with best international academic practices.

Advantages of the choice based credit system: \Box

- Shift in focus from the teacher-centric to student-centric education.
- Student may undertake as many credits as they can cope with (without repeating all courses in a given semester if they fail in one/more courses). □
- CBCS allows students to choose inter-disciplinary, intra-disciplinary courses, skill oriented papers (even from other disciplines according to their learning needs, interests and aptitude) and more flexibility for students).

 \Box CBCS makes education broad-based and at par with global standards. One can take credits by combining unique combinations. For example, Physics with Economics, Microbiology with Chemistry or Environment Science etc. \Box CBCS offers flexibility for students to study at different times and at different institutions to complete one course (ease mobility of students). Credits earned at one institution can be transferred.

Outline of Choice Based Credit System:

1. Core Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

2. Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other

discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

- 2.1 Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective.
- 2.2 Dissertation/Project: An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.
- 2.3 Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.

P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective. 3. Ability Enhancement Courses (AEC): The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement; i. Environmental Science and ii. English/MIL Communication. These are mandatory for all disciplines. SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. 3.1 Ability Enhancement Compulsory Courses (AECC): Environmental Science, English Communication/MIL Communication. 3.2 Skill Enhancement Courses (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge. □ Introducing Research Component in Under-Graduate Courses Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper.

4. Instructional Delivery System

The instructional methodology used in this University is different from that of conventional Universities. The Open University system is more learners oriented, and is geared to cater to the needs of motivated students, assuming that the student is an active participant in the teaching-learning process. The University follows multi-channel approach for instruction. Instruction to student is imparted through various modes such as print, audio/video and supported by counseling face to face, electronic mode etc. MSc Programme has blending of both personal contact programme and counseling. The theory and practical classes will be arranged as per the specifications of UGC-ODL & OL Regulations 2020, at the KSOU headquarter/ recognized study centers. The students shall compulsorily attend practical classes and reap the benefit of requisite skills.

- Self-Learning Material (SLM): The Study material prepared by highly experienced academicians/subject experts will be part of instructional delivery. The study material is learner centric with illustrations, case studies, experience etc., and will help you acquire knowledge and skill.
- **Personal Contact Programme (PCP):** The PCP will be arranged by the university at the notified center. Dedicated faculty will be pressed into action to render quality services.
- **Counseling:** The University will arrange counseling by way face to face and electronic mode. The details relating to PCP and counseling will be uploaded to the University website at appropriate time.

5. Evaluation

Evaluation system comprises of:

i. Internal assessment (IA) with a weightage of 20 marks.ii. Term-end examination with a weightage of 80 marks.

i. Internal Assessment:

Internal Assessment for M.Sc. programmes has assignments, seminars, field visits, tests, seminars which are integral parts of distance learning. The main purpose of internal assessment is to test the students' comprehension of the learning materials acquired through the studies and also to understand the performance of the student.

- 1. Assignments are to be submitted during the year of admission only. Student will not have any opportunity of submitting the Assignments in subsequent years. In case a student fails to submit the assignments he/she will be assessed only for the theory marks of 80.
- 2. The questions for assignments will be made available in the University official website.
- 3. The students of M.Sc. Programmes are informed to submit the assignment to the **Chairpersons of respective Departments, KSOU, Mysuru**. The last date for submission shall be notified in the assignment circular which will be uploaded in the website.
- 4. The University has the right to reject the assignments received after due date. Students are therefore, advised to submit them before the due date.
- 5. The students shall write assignments in blue books.
- 6. The students should preserve the photocopies of all the assignments.
- 7. There is no provision for revaluation of Internal Assessment related component.

ii. Term-end Examination

The University will conduct term-end exam as per calendar of events. No provision for supplementary examination.

		Theory	Practical		
	Marks	Minimum	Marks	Minimum	
Internal	20	Nil	10	Nil	
Assessment					
Term End	80	32	40	16	
Examination					
Total	100	40	50	20	
Course (Paper)		40		20	
exemption					
Aggregate for pass		40%		40%	

Scheme of Examination per course / paper of M.Sc. Programmes

16. Student Support Services

The University has created learners friendly support services which enable them to pursue students without any inconvenience. The students support service is considered to be excellent in the headquarters while proper measures have been taken up to provide such services at the Regional centre /Learners Support Centre.

REGIONAL CENTRES AND LEARNER'S SUPPORT CENTRES

The University is committed to cater to the academic requirements of the students. KSOU has established Regional Centres across the state to facilitate interactions between students and University on all aspects of academia (see Annexure-II).

KSOU functions in 3 tier system in student support services Viz., Headquarters

Regional Centres

Learner Support Centre (Study Centre).

The headquarters controls all the activities of Regional Centres and study centres. The Regional Centres led by the Regional Directors, engage in admission process, issue of study material, besides the management of counseling/PCP and also continuous assessment. The regional centres update all the information to the students from time to time, as and when university initiates. Candidates can select the convenient Regional Centers and Learner Support Centers.

LIBRARY AT HEADQUARTERS, MYSURU:

THE KARNATAKA STATE OPEN UNIVERSITY LIBRARY CATERS TO THE NEED OF THE STUDENTS, RESEARCH SCHOLARS, FACULTY MEMBERS AND NON-TEACHING STAFF OF THE UNIVERSITY SINCE 1996. THE PRIMARY MISSION OF THE LIBRARY IS TO SUPPORT THE EDUCATIONAL AND RESEARCH PROGRAMMES OF THE UNIVERSITY BY MAXIMIZING ACCESS TO INFORMATION. IN ORDER TO FULFILL THE OBJECTIVES OF THE UNIVERSITY, THE LIBRARY AIMS TO DEVELOP A COMPREHENSIVE COLLECTION OF DOCUMENTS USEFUL FOR THE FACULTY AND THE RESEARCH COMMUNITY. SINCE THEN THERE IS CONSISTENT GROWTH OF THE MULTI-DISCIPLINARY RESOURCE COLLECTION OF THE LIBRARY. AT PRESENT THE LIBRARY HAS IN STOCK OVER 1,04,169 OF VOLUMES ON SHELVES COVERING A WIDE VARIETY OF SUBJECTS. BOOKS ON VARIOUS SUBJECTS ARE ADDED BY PROCURING AS PER THE REQUIREMENTS OF THE STAFF AND STUDENTS. REALIZING THE IMPORTANCE OF THE PERIODICALS AND THEIR UTILITY TO THE RESEARCH SCHOLARS AND THE TEACHERS, THE UNIVERSITY IS SUBSCRIBING TO PERIODICALS. THE LIBRARY IS RECEIVING OVER 100 PERIODICALS IN PRINT AND ONLINE MODE ON VARIOUS SUBJECTS. APART FROM THE CONVENTIONAL BOOK RESOURCES; IT COMPRISES A GOOD NUMBER OF REFERENCE BOOKS, ENCYCLOPAEDIA, REPORTS, THESES, DISSERTATIONS, AUDIO VISUAL MATERIALS, CD/DVDS, ETC. PRESENTLY IT HAS MORE THAN 100 NATIONAL AND INTERNATIONAL JOURNALS.

MEMBERSHIP SERVICES:

- All the students of the University can become members of the library after getting their Student Identity Card issued from the University authorities at the time of Admission.
- To get membership, they have to fill Membership Application and submit it along with 2 Passport Size Photos and 1 Stamp Size Photo, Total 3 Photos for Under Graduates and Post Graduate students.
- Borrowers Tickets will be issued on payment of a Refundable Caution Deposit of Rs. 250/- for Under Graduates and Post Graduate students.
- Users can Borrow One Book per Card. The issued books can be retained for a period of 60 days, and after the due date, penalty of Rs.1/- per book per day will be levied.
- The students should return the books and borrowers card 30 days before the commencement of the Annual Examinations. In case they fail to return the same, the Admission ticket for the Examination will not be issued.
- As per University guidelines students have to produce their Identity Card and compulsorily surrender their Borrowers Tickets to the Library Authorities for obtaining No Due Certificate (NDC) of the Library.

LIBRARY SERVICES:

- Well equipped and maintained library facilities are provided at the Headquarters, Regional Centres and the Learner Support Centres.
- Reference and Referral Service, Current Awareness Service, Users' Orientation Service, Bibliographic Service, Newspaper Clipping Service, Photocopy Service, etc. provided to the users.

- The Library has a well-equipped computer lab with internet facility to cater to the needs of the users.
- The library functions from 10:00 a.m. to 5:30 p.m. on all working days.
- During contact programmes and university examinations, the Library will be kept open from 8:00 a.m. to 8:00 p.m. and on Government Holiday's library functions from 10:00 a.m. to 5:30 p.m.
- The housekeeping operations and catalogue is computerized using NewGenLib integrated library management software.
- Web based Online Public Access Catalogue is provided to the users.
- The Library website provides access to e-journals, e-Books, old question papers, etc. and link to the Online Public Access Catalog (OPAC) of the Library [http://ksoumysore.edu.in/library.html].

For any information regarding the library services please send your queries and feedback to **e-mail id:** <u>ksoulibrary@gmail.com</u> and contact Telephone No. 0821-2510953, Ext: 525/526.

HEALTH CENTRE:

The University has established a Health Centre to attend to the urgent and immediate need of the students' during their stay in the campus. Only OPD facility is available and regular doctor and other staff will be on duty.

HOSTELS:

The University provides separate hostel facility for men and women in KSOU Mysuru campus.

MEN'S HOSTEL:

KSOU Mens' Hostel is located in KSOU campus. It consists of 33 rooms. Each room can accommodate 5 students. Thus, this facility will be available to 165 students at a time. The students who wish to avail this facility shall pay 70/- per day.

WOMEN'S HOSTEL:

KSOU cottages, located in the University campus, reserved to the girl students. Each cottage can house 12 students. Totally University is having 09 cottages. Thus, 108 students can stay in these cottages at a time. The student who is willing to avail this benefit shall pay Rs.70/- per day.

The University is extending this facility within its limits. The accommodation will be provided depending on the availability by following the

policy of 'First Come-First Serve'. The students of the hostel/ cottages shall maintain decency and decorum in the campus, no damage to the properties of the University shall be caused. Any violation will attract disciplinary action and penalty. Those who do not get the accommodation shall make their own arrangements. To avail Hostel/ cottage facility and payment of tariff, contact the Office of the University Guest House during working hours. For details **contact-9844159004**

Other amenities

- Well maintained cafeteria
- State Bank of India with its ATM facility
- Post Office
- Wi-fi Facility
- Well maintained play ground
- Pure drinking water facility

SPECIAL CONCESSION FOR WOMEN STUDENTS:

Women Candidates coming under the category of Below Poverty Line (BPL), seeking admission to UG/PG will be given 25 percent concession in the Tuition Fee. The applicant should submit the active BPL card issued by the competent authority at the time of admission. Such candidates are required to enclose a copy of the BPL Card containing the photo and the name self-attested, along with the application and original documents.

CONDITIONS:

- Annual income of students/ father/ mother/ guardian/ husband should not exceed Rupees One Lakh.
- Income/Caste certificate issued by concerned Tahasildar shall be submitted.
- Scholarship is available to II & III B.A./B.Com, students who have successfully completed their Previous Year examination with 50% marks in the first attempt.
- Students should be below the age of 30 years.
- Those who apply for this scholarship should not have applied for any scholarship anywhere else.
- Students will be selected for scholarship based on their merit.
- Students should submit prescribed filled in application form along with relevant documents to the Deputy Registrar (Admissions), Karnataka State Open University, Mukthagangothri, Mysuru -570 006 within the stipulated time,

COMPETITIVE EXAMINATION TRAINING CENTRE:

The KSOU competitive examination training Centre offers training and guidance to various competitive examinations. The Competitive Examination Coaching Centre is providing free coaching for aspirants of competitive exams. For details contact **821-2515944**.

PLACEMENT CELL

THE UNIVERSITY HAS A PLACEMENT CELL WHICH PROVIDES PLACEMENT ASSISTANCE. PLACEMENT FAIRS ARE CONDUCTED BY THE UNIVERSITY TO PROVIDE PLACEMENT ASSISTANCE TO STUDENTS. THE CELL WILL HAVE CONTINUOUS LIAISON WITH DIFFERENT INDUSTRY/COMPANIES. ARRANGEMENT WILL BE MADE TO SECURE PLACEMENT FOR MERITORIOUS CANDIDATES.

KSOU APP

KARNATAKLA STATE OPEN UNIVERSITY HAS DEVELOPED AN APP WHICH CAN BE DOWNLOADED FROM THE GOOGLE PLAYSTORE. THE APP PROVIDES ALL THE RELAVENT INFORMATIONS SUCH AS COURSES, ADMISSIONS, CLASSES, AND EXAMINATIONS. SOFT COPY OF THE STUDY MATERIAL CAN ALSO BE DOWNLOADED FROM THE APP ALONG WITH PREVIOUS QUESTION PAPERS AND ASSIGNMENTS.

KSOU CONNECT

KSOU CONNECT IS A WEB BASED INTERACTIVE PLATFORM DEVELOPED BY THE UNIVERSITY. IT IS USED TO CONDUCT ONLINE CLASSES, COUNSELLING SESSION AND SPECIAL LECTURES.STUDENTS WILL GET A LINK WHICH ENABLES THEM TO JOIN THE SESSIONS.

VIDEO LECTURES

FEW DEPARTMENT OF STUDIES AND RESEARCH HAVE DEVELOPED FEW VIDEO LECTURES WHICH WOULD BE UPLOADED IN THE YOUTUBE CHANNEL.

KSOU RADIO

KSOU HAS SETUP RADIO STATION TO PROVIDE RADIO PROGRAMMES FOR THE BENEFIT OF THE STUDENTS. AUDIO TAPES RELATED TO VARIOUS PROGRAMMES SHALL BE BROADCASTED AT SCHEDULED TIME.

CMKKY

KSOU IS A TRAINING PARTNER TO CHIEF MINISTERS KOUSHALYA KARNATAKA YOJANE (CMKKY). KSOU IMPARTS TRAINING TO ALL ITS FINAL YEAR / SEMESTER STUDENTS WHO HAVE ENROLLED FOR VARIOUS CLASSES. FOR MORE DETAILS STUDENTS CAN CONTACT DR. SUMATI RAMAKRISHNA GOWDA DIRECTOR CMKKY.

17. Quality Initiatives

In an endeavor to step up the quality of services rendered by the university, Centre for Internal Quality Assurance has been constituted as per the UGC order.

National Mission on Education through Information and Communication Technology (NMEICT).

The National Mission on Education through Information and Communication Technology (NMEICT) has been envisaged as a Centrally Sponsored Scheme to leverage the potential of ICT, in teaching and learning process for the benefit of all the learners in Higher Education Institutions in any time anywhere mode. This was expected to be a major intervention in enhancing the Gross Enrolment Ratio (GER) in Higher Education by 5 percentage points during the XI Five Year Plan period.

The three cardinal principles of Education Policy viz., access, equity and quality could be served well by providing connectivity to all colleges and universities, providing low cost and affordable access-cum-computing devices to students and teachers and providing high quality e-content free of cost to all learners in the country. NMEICT encompasses all the three elements. The Mission has two major components:

- 1. Providing connectivity, along with provision for access devices, to institutions and learners;
- 2. Content generation.

It seeks to bridge the digital divide, i.e. the gap in the skills to use computing devices for the purpose of teaching and learning among urban and rural teachers/learners in Higher Education domain and empower those, who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. It plans to focus on appropriate pedagogy for e-learning, providing facility of performing experiments through virtual laboratories, on-line testing and certification, on-line availability of teachers to guide and mentor learners, utilization of available Education Satellite (EduSAT) and Direct to Home platforms, training and empowerment of teachers to effectively use the new method of teaching learning etc.

Karnataka State Open University (KSOU) has adopted National Mission on Education through Information and Communication Technology (NMEICT) a flagship initiative of Ministry of Human Resource Development aims to leverage the potential of Information and Communication Technology (ICT) in teaching and learning process by high quality, personalized and interactive knowledge modules over the internet for all the learners EIs) in anytime, anywhere mode. The Karnataka State Open University has created separate cell for the NMEICT and Virtual Labs. Adopted ICT initiatives of are as follows:

- 1. SWAYAM: Massive Open Online Courses
- 2. SWAYAMPRABHA: View digital courses on TV
- 3. National Digital Library: e-content
- 4. e-PG Pathshala: Gateway for e-books upto PG
- 5. Shodhganga: A reservoir of Indian Theses
- 6. e-ShodhSindhu: e-journals
- 7. e-Yantra: Engineering for better tomorrow
- 8. FOSSEE: Free/Libre and Open Source Software for Education
- 9. Virtual Labs: Web-enabled experiments designed for remote operation
- 10. University Enterprise Resource Planning (SAMARTH)
- 11. VIDWAN: Expert Database and National Research Network
- 12. IRINS: Indian Research Information Network System
- 13. Shodh Shudhhi (PDS): Plagiarism Detection Software

SWAYAMPRABHA:

SWAYAM Prabha is an initiative of the Ministry of Human Resources Development to provide 32 High Quality Educational Channels through DTH (Direct to Home) across the length and breadth of the country on 24X7 basis. It has curriculum-based course content covering diverse disciplines. This is primarily aimed at making quality learning resources accessible to remote areas where internet availability is still a challenge. The DTH channels are using the GSAT-15 satellite for programme telecasts. Karnataka State Open University has provided Opportunity to access relevant channels in the Cauvery Auditorium for the benefits of learners during their stay in the personal Contact Programme.

VIRTUAL LABS:

Virtual Labs will provide to the students the result of an experiment by one of the following methods (or possibly a combination). Modelling the physical phenomenon by a set of equations and carrying out simulations to yield the result of the particular experiment. This can at-the-best, provide an approximate version of the 'real-world' experiment. Providing measured data for virtual lab experiments corresponding to the data previously obtained by measurements on an actual system. Remotely triggering an experiment in an actual lab and providing the student the result of the experiment through the computer interface. This would entail carrying out the actual lab experiment remotely. Virtual Labs will be made more effective and realistic by providing additional inputs to the students like accompanying audio and video streaming of an actual lab experiment and equipment. For the 'touch and feel' part, the students can possibly visit an actual laboratory for a short duration.

Karnataka State Open University has recognised Nodal Center for Virtual Labs under the leadership of National Institute of Technology, Surathkal and established well equipped V Labs Nodal Center at Science Bhavan which can cater the needs of KSOU learners of to access the experiments developed by NITK.

E-CONTENT DEVELOPMENT:

The UGC e-Content scheme aims at developing high quality e-Content, as well as expertise for generating such content over the long term. The scheme provides financial assistance and technical support to teachers and other experts based in colleges and universities for the development of e-Content. The e-Content development and the associated web based learning described here do not seek to replace traditional teaching and learning, but are expected to supplement them. The inclusion of e-Content in learning is now inevitable and the UGC initiative is designed to meet the new challenges, and to help India take the lead in this newly emerging field. The **Karnataka State Open University** has initiated development of e-content proposal under the NMEICT.

Centre for Internal Quality Assurance (CIQA):

KSOU has established the Centre for Internal Quality Assurance (CIQA) as per UGC Open & Distance Learning Regulations 2017 to maintain quality in the service provided to the stakeholders and to assure quality standards are maintained in all its academic and administrative activities. The committee for CIQA interacts with the stakeholders and initiates various measures to promote quality of services at every stage i.e. from the enrolment of students till they accomplish their goals in their academic pursuit.

Research and Development Cell

The Karnataka State Open University has established Research and Development cell in the University to promote quality research and academic development. The cell is actively engaged in enhancing the researches in the university. It provides academic support to the faculty members research scholars and students of the university in writing articles and publishing. Further it also encourages the departments to conduct workshops, seminars and conferences.

18. Information and Guidance Cell

Relevant information on issues like programmes offered by the University, admissions, study materials, contact program, examinations, results, marks cards, certificates, hostel facility etc. will be provided to the students who visit the University. 'Public Relation Officers' will be present in the 'Information and Guidance Cell' situated near the main entrance of the admission block. Students can contact them either in-person or through phone and obtain required information. The contact numbers are 98453-63573 and Admission Block 94494- 89749.

Guidance and Counseling:

The student career is a complex and sensitive matter. Students of the twenty first century are facing new challenges and difficult situations. There is dire need to guide and counseling them in different areas. It may be academic, skill development, career oriented, life skills. placement, higher studies, and others. The University has established full-fledged guidance and Counseling Cell to assist the students.

Interactive Platform:

The University is initiating action to utilize the advantage of information and technology development to meet the learners' needs.KSOU has developed a user-friendly and easy to navigative website which is very informative and stuents can access all relevant information from the regularly updated website. In addition, a student app KSOU Student app is also developed which can be accessed through the cell phones, which provides all necessary infroamtion to the students at the right time. A well designed online interactive platform KSOU Connect is developed for the delivery of online classes and other meetings. Virtual class rooms and laboratories have been created.

19. Grievance Redressal Cell

In an endeavor to provide better and timely services to the students, the Karnataka State Open University has established a Grievance Redressal Cell led by coordinators as per the University Grants Commission (Redress of Grievances of Students) Regulations, 2019. The cell addresses the problems faced by the students, with regard to academic, student support services and examinations. The students are advised to submit their grievance in writing or by telephonic call to the committee. The Committee is comprised of the following coordinators:

20. Other Information Change of Address

If the address given by the student at the time of admission is changed, he/she should write a letter about the change of address to **The Deputy Registrar (Admission), KSOU, Mysuru.** The student should confirm, from the concerned officer, whether the change of address has been entered in the Admission Register or not. It is very important because the study materials, information and application forms etc. sent to the student from time to time, can reach the student only if the address given is correct.

Change of Name

Students are required to submit the following documents to The Deputy Registrar (General) in order to change their names while pursuing their courses:

- Requisition letter for Change of Name.
- Photo Copy of the Judgment (Decree) from the court, containing the declaration of change of name.
- Two stamp size recent photographs

- Fee paid details of SBI
- Attested Photo copy of the SSLC Marks Card / Cumulative Record.
- Attested Photo copy of the PUC Marks Card.
- Attested Photo copy of the Student I.D. Card.
- Attested photo copy of Admission fees details
- Advertised copy of News Paper.

The changed name will come into effect after University Notification.

Duplicate/ Renewal of Identity Card

If the original Identity Card is lost, students are required to pay a fee of Rs.300/- through SBI. The following records have to be submitted in order to obtain duplicate Identity Card:

- a Student should write a letter to the Deputy Registrar (Admission), KSOU, Mysuru-6.
- b. A photocopy of previous Identity card (if available), Attested copy of marks card, photo and attested photo proof of Aadhaar Card, office copy of the fee paid details should be enclosed.
- c. The University will issue the Identity Card to the students admitted for first year B.A/B.Com/B.Lib.Sc/M.Lib.Sc./M.A/M.Com/M.Sc degree programme. The students admitted to Second year/Final year of B.A/B.Com/M.A/M.Com/M.Sc. Degree programme shall preserve the Identity Card and fee paid details of admission and examination.
- d. During the examination students shall invariably produce the Identity Card along with fee paid details of admission and examination to the invigilator. The University shall not be held responsible if students are denied permission to write the examination due to non- production of the above mentioned documents.

Letter Correspondence

The students may contact **the concerned officer by phone /e-mail/ letter/online mode through website/app** to get necessary clarification and information during their study period. On such occasions students should mention their name, address, enrollment number, subject of study, medium of instruction and **Phone/ Mobile Number** without fail. This will help to solve the problems quickly. It is mandatory on the part of students to reply to the letters sent by the University on matters pertaining to admission, non- remittance of prescribed fee, study material, written assignments, exam, exam results etc. If students do not respond to the University letters on time in matters mentioned above, the problems cannot be solved quickly for which the University will be not be held responsible.

Issuing of Transfer Certificate

Transfer Certificate will not be issued to students directly. It will be sent to the institutions where the students pursuing his/her further studies. However the students have to obtain No Due Certificate from the University before applying for Transfer Certificate. It will not be issued for any other purpose other than education purpose.

Student has to submit the prescribed application form and also pay the prescribed fee along with the following documents to **The Deputy Registrar** (Admission), Karnataka State Open University, Mukthagangothri, Mysuru-06.

- 1. Student must fill the prescribed Application format and submit it along with prescribed fee paid challan of Rs 500/- and attested copies of S.S.L.C., and all the relevant degree marks cards of concerned program M.Sc. Programmes Marks Cards and Identity Card.
- 2. T.C. will not be issued if there are any changes in the Name, Roll No., Class Declaration, Subjects etc., in the Marks Cards issued for the students by the University unless proper clarification is sought.

21. Digital Initiatives for Higher Education – UGC

a. Swayam

The University will launch a few programmes online as per the directives of UGC / MHRD. For this purpose University has procured DD Free Dish and installed for accessing SWAYAM Prabha Channels. These channels will be used by the teachers while teaching the courses to have a blended learning process mainly to improve the quality of learning.

b. Digital Monitoring Cell

University has established "Digital Monitoring Cell" to review the current use of digital resources and also periodical suggestions will be given to enhance their utilization further.

c. National Academic Depository Cell

National Academic Depository (NAD) is an online store house of academic awards (degrees, diplomas, mark sheets etc.,) lodged by the boards/ academic institutions/ eligibility assessment bodies in a digital format that has been launched on 9th July, 2017 by Hon'ble President of India. It is a 24x7 online mode for making available academic awards and helps in validating its authenticity, safe storage and easy retrieval. University has established NAD cell to carry out the activities in this regard. Students shall register to the NAD.

d. National Digital Library

The National Digital library of India (NDL) is a project under Ministry of Human Resource Development, India. The objective is to integrate several national and international digital libraries in one single web-portal. The NDL provides free access to many books in English and the Indian languages. Hence, students are advised to join National Digital Library at https://ndl.iitkgp.ac.in/ to access more than 80 lakh digital resources without any cost.

e. Massive Open Online Courses (MOOCs)

The University Grants Commission, under the ambit of MHRD, has facilitated the Open Universities to conduct short term programme online. The candidates may visit the website of KSOU / UGC to avail the benefits of such MOOCs.

Annexure I

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-೭೩: ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ ಮತ್ತು ಪ್ರೇರಣೆಗಳು.

ಘಟಕ-೭೪: ನವೋದಯ ಪೂರ್ವ, ನವೋದಯ- ಬಿ.ಎಂ.ಶ್ರೀ., ಕುವೆಂಪು, ದ.ರಾ.ಬೇಂದ್ರೆ, ಶಿವರಾಮಕಾರಂತ, ಮಾಸ್ತಿವೆಂಕಟೇಶ್ ಅಯ್ಯಂಗಾರ್, ಕೆ.ಎಸ್. ನರಸಿಂಹಸ್ವಾಮಿ.

ಘಟಕ-2೫: ಪ್ರಗತಿಶೀಲ ಮತ್ತು ನವ್ಯ: ಅನಕೃ, ಕಟ್ಟೀಮನಿ, ನಿರಂಜನ, ಚದುರಂಗ, ವಿ.ಕೃ. ಗೋಕಾಕ, ಅಡಿಗ, ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ಶಾಂತಿನಾಥ ದೇಸಾಯಿ, ಅನಂತಮೂರ್ತಿ, ಯಶವಂತ ಚಿತ್ತಾಲ, ಲಂಕೇಶ್, ತೇಜಸ್ವಿ, ವೈದೇಹಿ, ವೀಣಾ ಶಾಂತೇಶ್ವರ, ವಿಜಯಾದಬೈ.

ಘಟಕ-೭೬: ಬಂಡಾಯ ಮತ್ತು ದಲಿತ:

ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ, ಬಿ.ಟಿ. ಲಲಿತಾನಾಯಕ, ಸಾರಾ ಅಬೂಬಕ್ಕರ್, ದೇವನೂರು ಮಹಾದೇವ, ಸಿದ್ಧಲಿಂಗಯ್ಯ, ಅರವಿಂದ ಮಾಲಗತ್ತಿ, ಮೊಗಳ್ಳಿ ಗಣೇಶ.

ಬ್ಲಾಕ್-೨೦: ಆಧುನಿಕ ಕನ್ನಡ ಕಾವ್ಯ ಮತ್ತು ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು

ಘಟಕ–೭೭: ಕಾವ್ಯ ಪ್ರಕಾರಗಳು: ಭಾವಗೀತೆ, ಸುನೀತ, ಶೋಕಗೀತೆ, ಪ್ರಗಾಥ.

ಘಟಕ-೭೮: ಕಥನ ಕಾವ್ಯ, ಖಂಡ ಕಾವ್ಯ, ಮಹಾಕಾವ್ಯ.

ಘಟಕ-೭೯: ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು: ಕಥೆ, ಕಾದಂಬರಿ, ನಾಟಕ ಜೀವನ ಚರಿತ್ರೆ.

ಘಟಕ-೮೦: 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

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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

೮. ಆಧುನಿಕ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳು: ಪ್ರಧಾನ ಸಂಪಾದಕರು, ಎ. ರಂಗಸ್ವಾಮಿ, ಲೇ. ಡಾ. ಜಿ.ಆರ್. ತಿಪ್ಪೇಸ್ವಾಮಿ, ಪ್ರಸಾರಂಗ, ಕರಾಮುವಿ, 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 AutobiographyRam Mohan Roy: Letter to Lord AmherstMacaulay: Minutes on Indian EducationVivekananda: 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
- सम्च्य 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. Schvider.H : The History of Civilization
- 4. Swain.J.E. : A History of World Civilization
- 5. Breasted.J.H. : History of Egypt
- 6. Jastorow.M : The Civilization of Babylonia and Austria
- 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: 1¹/₂and 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	a) b)	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 - FathepurSikri–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:

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- Marco Canneo, Jasmina: The world heritage sites of UNESCO TheTreasure 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 ad 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, discussions	assignments,	Industrial	visits	and	practical	exercises,

- 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.
- 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

- 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
- 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 B_{12} .

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 Chakraborthy 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 vectorsplasmids, 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 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 dietfor 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 FatSoluble & 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 guidesand balanced diets.

BLOCK 2: PLANNING OF DIET

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

Unit 6: Objectives of diet therapy- Regular diet and rationale for modifications in energyand 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 medicalethics. 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 nutritionalcare 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 publishingcompany, Bombay.

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Srilakshmi – 2012"Dietetics", 4th edition, New age international publisher, Chennai

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.Kisalaya publication, New Delhi
- 4. R.N.Tikka (2002) Physical Geography. KedarnathRamnath&co, Meerut
- 5. Willian D. Thornbury (1997) Principle of Geomorphology. New Age Internatinal (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, NewAge International publishers.

3. Dubey, R.C. and Maheshwary, D.K. Text book of Microbiology. S.chand and company (1999).

4. Powar, C.B. and Daginawal, 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, Jonesand Bartlett Publishers. Sudbury. Massachusetts, (2001).

9. Black J.G. Microbiology-Principles and Explorations. JohnWiley &Sons Inc. New York, (2002).

10. Pelczar, MJ 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 q, 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 Jersy.
- 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 Ecycling, 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.
- Smith, B. E. (2013). Green Computing: Tools and Techniques for Saving Energy, Money, and Resources. CRC Press.

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, Trichomonus, 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 Diphyllobothrium. 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-hostparasites 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:

 <u>Smith John L.</u> (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-೧೫೨: ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ವಿಭಾಗಕ್ರಮ. ಬ್ಲಾಕ್-೩೯: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಭಟಕ-೧೫೩: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ ರೂಪಗಳು; ಚಂಪೂ, ವಚನ, ರಗಳೆ, ಷಟ್ಪದಿ, ಸಾಂಗತ್ಯ ಇತ್ಯಾದಿ. ಘಟಕ-೧೫೪: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪರಿಕಲ್ಪನೆಗಳು; ಚರಿತ್ರೆ-ಮರಾಣ, ಧರ್ಮ-ಕಾವ್ಯಧರ್ಮ, ಹಿಂಸೆ-ಅಹಿಂಸೆ, ಮಾರ್ಗ-ದೇಶಿ, ಲೌಕಿಕ-ಆಗಮಿಕ, ವಸ್ತುಕ-ವರ್ಣಕ, ಪ್ರಭುತ್ವ-ಪ್ರತಿರೋಧ.

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

ಪಂಪ, ರನ್ನ, ಮೊನ್ನ, ೧ನೆ ಚಾವುಂಡರಾಯ, ನಾಗವರ್ಮ ೨ನೆಯ ಚಾವುಂಟರಾಯ, 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, ಸಂಚಿ ಹೊನ್ನಮ್ಮ, ನಂಜುಂಡ, ರತ್ನಾಕರವರ್ಣಿ, ಮುದ್ದಣ, ಕೆಂಪುನಾರಾಯಣ.

ಪರಾಮರ್ಶನ ಗಂಥಗಳು

- 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
- 2. 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 ಕೈಪಿಡಿ: 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

<u>हिंदी सिनेमा</u>

- सिनेमा का उद्भव और विकास
- मूक चलचित्र और दादा साहब फाल्के य्ग
- दूसरा पढाव, सवाक चलचित्र अथवा आलमआरा
- रंगीन सिनेमा का य्ग
- सामाजिक सिनेमा एक विवेचन
- धर्म एवं सांस्कृतिक सिनेमा एक विवेचन
- राजनैतिक सिनेमा एक विवेचन
- आर्थिक सिनिमा एक विवेचन
- हास्य एवं व्यंग्य सिनेमा एक विवेचन
- बाल सिनेमा
- सिनेमा एवं संवेदना

- सिनेमा एव 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
- बॉलिव्ड पाठ विमर्श के संदर्भ- ललित जोशी, वाणी प्रकाशन, नई दिल्ली
- फ्लैशबैक, प्रभुनाथ आज़मी, 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 Shastry – 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.

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

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

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 F	raming of the	Indian Cons	titution.
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- 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: Papular 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.
- Betteille, Andre. 1974. Social Inequality, New Delhi: Oxford University Press.
- Betteille, 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

HoysalaVamsha, 1950

12. Annual Reports of the Department of Archaeology, Mysore 1939 – 4613. Settar

S: Hoysala Temples

14. Marg: In Praise of Hoysala Art

15. Narasimhachar R; Lakshmidevi Temple at Doddagaddhavalli

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: 1¹/₂and 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 Programes: 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: Structue 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 Chakraborthy 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 Semiconservative 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, sp2 and sp3
	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, MajorMultipurpose 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 - MATHEMATICES

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.
- 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 bateria, 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. EldorA.Paul. SoilMicrobiology. EcologyandBiochemistry.VIEdition:Academic Press, (2007).

2. EugeneL. Madsen. Environmental Microbiology:FromGenomestoBiogeochemistry. IEdition,Wiley-BlackwellPublishing. (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 Techinques

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 Jersy.
- 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 Ecommerce, 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

3. DEPARTMENT –FOOD AND NUTRITION SCIENCE

4. OEL-2: NUTRITIONAL MANAGEMENT IN DISASTER CONDITIONS

5. BLOCK- I: NATURAL / MANMADE DISASTERS

- 6. Unit-1: Emergency Situations-Famine, Drought, Flood, Earthquake, Cyclone, War, Civil and Political Emergencies.
- 7. Unit-2: Nutrition in Emergencies, Nutritional Problems and Communicable Diseases.
- 8. Unit-3: Feeding Programs during Emergencies.
- 9. Unit-4: Assessment and monitoring of Nutritional Status and relief measures during emergencies.

10. BLOCK- I: NUTRITIONAL RELIEF AND REHABILITATION

- 11. Unit-5: Assessment of Food needs in emergency situations, Food Distribution Strategy, Local food rehabilitation.
- 12. Unit-6: Special Foods/ Rations for Nutritional Relief, Organizations for Mass Feeding/ Food Distribution, and Supplementary Feeding.
- 13. Unit-7: Transportation, Storage, Feeding Centres, Sanitation, Hygiene and Identifying Reaching the Vulnerable Group.

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

15. REFERENCES:

- 16. 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