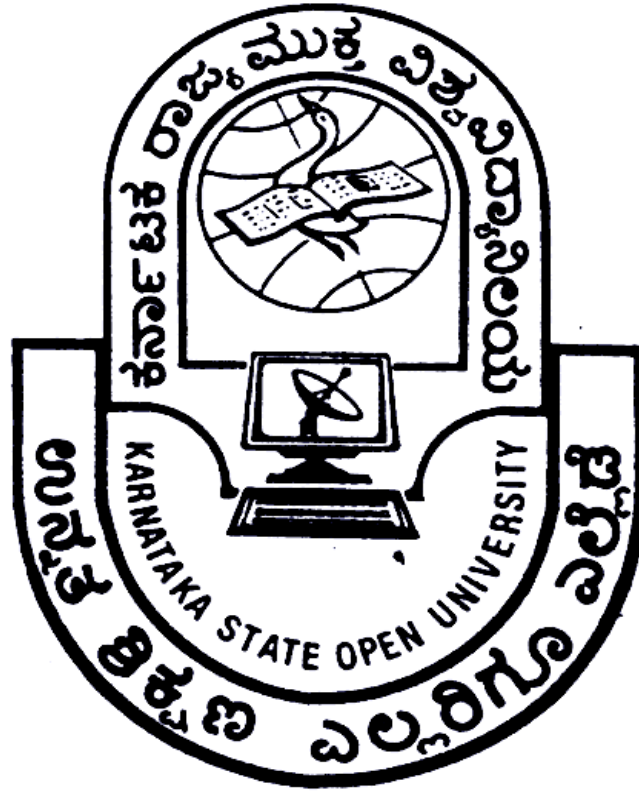# KARNATAKA STATE OPEN UNIVERSITY

PROGRAMME GUIDE

M.Sc in Physics

DEPARTMENT OF POST GRADUATE STUDIES AND RESEARCH IN PHYSICS

Mukthagangothri, Mysore – 570 006

VICE-CHANCELLOR'S MESSAGE

Dear Learner,

The family of KSOU welcomes you to pursue the academic programmes you have chosen to achieve not only academic excellence but also to fulfill the desire of your career. The University established by the Act of State Legislature, it has created wonderful academic ambience. The programmes offered by the university have been recognized by University Grants Commission. Therefore, the degrees are valid for employmentopportunities across the country. The 'core values' of the University is derived from its vision **'Higher Education to Everyone, Everywhere'.** The ultimate touchstone of providing 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. Different schools headed by Directors offer academic programmes in Humanities, Commerce, Education, Science and Social 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.A./M.Com/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 byprint, limited audio visual and Counselling/Personal Contact Programme. As a learner, you will have greater opportunity to gain knowledge and skill through these mechanisms. The academic counsellors will play a strategic role and enable you from the enrolment 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 Programmes awarded through distance mode are on 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, and Private Sector etc. It also enables you to pursue higher education in other educational institutions. 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 endeavours.

<div align="right">

Prof. Vidyashankar .S

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MESSAGE FROM DEAN (ACADEMIC)

Dear Learner,

As you know education imparts knowledge and skills which empowers all to build civilized society. The education policy of the government provides a greater opportunity to accelerate Gross Enrolment Ratio (GER). Higher education is imparted both by conventional system and ODL system. The ODL system operates under access, flexibility and success.

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

The programmes offered by KSOU are strictly in conformity with quality and standards set by regulatory bodies UGC/AICTE etc.,

The KSOU operates on dictum quality first and students foremost. Further the university is highly committed to provide need based education to the door steps of the students. The Eminent teaching faculty and dedicated non-academic staffs in various departments and student support services create conducive environment for teaching learning. I am confident that, as a learner in the university, you will enjoy good experience in the system.

I wish you all the best in your academic endeavours.

Prof. Ashok Kamble

CHAIRMAN'S MESSAGE

Dear Learner,

  Physics is an exciting intellectual adventure that inspires people and expands the frontiers of knowledge about Nature. It generates the primary knowledge needed for the future technological advancements that will continue to drive the economic engines of the world. It also contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries. It extends and enhances the understanding of other science disciplines such as the earth, agricultural, chemical, biological and environmental science etc. Physics improves the quality of life by providing the basic understanding necessary for developing new instrumentation and techniques for medical applications such as computer tomography, magnetic resonance imaging, positron emission tomography, ultrasonic imaging, and laser surgery etc.

Physicists are in demand in a vast range of industries as well as research and development laboratories. They can also become faculty members in Universities, Colleges or teachers in Schools etc.

  The Department of Physics, Karnataka State Open University offers Master's (M.Sc.) programme in Physics which creates platforms to the learners to gain knowledge and skill required so as to enable him/her to be professional. It is my pleasure to welcome you to the Department.

  Wish you all the best.

Chairman
Department of Physics

1. DEPARTMENT OF STUDIES IN PHYSICS

The Department of Studies in Physics was established in the year 2012 and offers a Master's degree programme in Physics. The Department of Physics comes under the domain of School of Sciences.

The Department is equipped with the necessary infrastructure and provides a good learning atmosphere. The Self Learning Materials for each and every course of the programme are developed with the help of faculty members of other esteemed universities. The SLMs are written in a simple and elucidate manner; so that the learner finds it very easy to understand the concepts.

The Department has well equipped class-rooms and laboratories; for lectures and practical classes respectively. The learners are also advised to attend the Contact Programme for getting better exposure to the relevant programme. In addition to the well qualified in-house teaching faculty; resource persons from other universities/institutes are invited to give lectures during the Contact Programme.

a. **Faculty Details**

a. **Department of Physics**

Sl. No.	Name of the Faculty	Designation	Qualification	Specialization	Expe-rience in Years	Mobile Number
1	Sri. S.V. Niranjana	Assistant Professor & Chairperson	M.Sc.	Physics	8	9535284356
2	Dr. M.B. Nanda Prakash	Assistant Professor (Contract Basis)				
	Dr. K.S. Pruthvi Rani	Assistant Professor (Contract Basis)				

2. PROGRAMME: MASTER OF SCIENCE (M.Sc.)

The M.Sc. Physics programme offered by the Department is a two year programme spread over four semesters of six months each. In each semester 4 credit hours are mandatorily kept for practical classes. Well trained and dedicated faculty and resource persons help the learners to master the subject.

All in all, the program equips the learners for numerous exciting and fruitful careers in Physics.

2.1 Duration of Programme: The duration of the programme is Two years.

OBJECTIVES

➢ To provide an advanced learning of core principles and specialized knowledge in the field specific.

➢ To pursue a well-organized and less expensive option abreast with latest knowledge.

➢ To impart skills to the learners that is required to diagnose the problems.

➢ To train the learners with professional fragrance who can assume the task in the domain subject.

➢ To improve the subject knowledge of the aspirants and to make them acquainted with necessary laboratory techniques.

➢ To produce trained learners with appropriate critical thinking and problem-solving skills and aptitude for taking up various job opportunities.

3. DELIVERY MECHANISM

The delivery mechanism followed in this University is different from that of conventional universities. The Open University system is more learners centric, and is geared to cater to the needs of motivated students assuming that the student is an active participant in the teaching-learning process. Instruction to student is imparted through-

* Printed Self-Learning Material.
* Audio – visuals.
* Counseling/PCP

a. SLM by Print Media

SLM takes the role of a teacher in distance education system. The study material in English provided to you along with this programme guide are called self-learning material as it facilitates learning on your own. The study material is exhaustive and easyto understand. The SLM have been divided into blocks and units. Each block has one credit value which denote 30 hours of study for one block, be it studying, discussing with counselors, attending classes, writing assignment and so on. Objectives are given in the beginning of each unit which tells what is expected of you by learning that unit. Check your progress questions are given in content so that you can measure your progress while studying the material. References are given at the end of each unit which gives you sources for furtherance of your study.

b. Audio-visuals

In an endeavor to impart education to reach the unreached, the university has a systemto provide information by audio-visuals. The study material will be broadcasted by FMradio and other channels. The limited visuals are also pressed in to action to clarify many issues during teaching learning process.

c. Counseling/ PCP

The university delivers the instructions **in English** through counseling/PCP; counseling may be weekend, while the PCP will be conducted for a period of 5 to 6 days at stretch. Well experienced teachers working in the department and from other universities will deliver lectures; thereby they clear many intricacies which may occur on the SLM. The academic counselors will help you to prepare yourself not only to face the examination with confidence besides, you carrier.

4. CBCS STRUCTURE AND EVALUATION SYSTEM

Students of M.Sc. Physics are assessed by both internal assessment and term end examination. The weightage given are 20 and 80 percent respectively. The internal assessment covers the assignment and test. The assignment will be sent by the university besides uploading the same in the website. Students are to refer suggested books/research papers and submit it to the concerned within the time allotted.

The term end examination will be conducted to assess the knowledge skill and attitude of the student on the curriculum.

SEMESTER I:

Sem	Nature	Course Code	Course Title	Credits	Counseling/PCP Hours	Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	Duration of Exam (hours)
						Max. Marks			Minimum Passing marks		
I	HC	MP-1.1	Classical Mechanics	4	12	20	80	100	08	32	3
	HC	MP-1.2	Mathematical Methods of Physics	4	12	20	80	100	08	32	3
	HC	MP-1.3	Atomic and Molecular Physics	4	12	20	80	100	08	32	3
	SC	MP-1.4	Electronics	3	10	20	80	100	08	32	3
	HC	MP-1.5A	Electronics lab	2 / 4	60	10	40	100	04	16	4
		MP-1.5B	Computer lab-1 (LaTeX)	2	60	10	40		04	16	4
	IE	MP-EL1	Mechanics	2	06	10	40	50	04	16	$1\frac{1}{2}$
		Total		**21**	**172**	**110**	**440**	**550**	**44**	**176**	**-**

SEMESTER II:

Sem	Nature	Course Code	Course Title	Credits	Counselling/PCP Hours	Max. Marks			Minimum Passing marks		Duration of Exam (hours)
						Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
II	HC	MP-2.1	Quantum Mechanics	4	12	20	80	100	08	32	3
	HC	MP-2.2	Electrodynamics	4	12	20	80	100	08	32	3
	HC	MP-2.3	Thermal Physics and Statistical Mechanics	4	12	20	80	100	08	32	3
	SC	MP-2.4	Optics, Photonics and Lasers	3	10	20	80	100	08	32	3
	HC	MP-2.5A	Optics lab	2	60	10	40	100	04	16	4
		MP-2.5B	Computer lab-2 (C-programming)	2	60	10	40		04	16	4
	IE	MP-EL2	Waves and Optics	2	06	10	40	50	04	16	$1\frac{1}{2}$
			Total	**21**	**172**	**110**	**440**	**550**	**44**	**176**	**-**

For Semester III:

Sem	Nature	Course Code	Course Title	Credits	Counselling/PCP Hours	Max. Marks Internal Assessment	Max. Marks Term end exam	Max. Marks Total Marks	Minimum Passing marks Internal Assessment	Minimum Passing marks Term end exam	Duration of Exam (hours)
III	HC	MP-3.1	Nuclear Physics-1	4	12	20	80	100	08	32	3
	HC	MP-3.2	Condensed Matter Physics-1	4	12	20	80	100	08	32	3
	SC*	MP-3.3	Numerical Computational Methods	3	10	20	80	100	08	32	3
		MP-3.4	Accelerator Physics	3	10	20	80	100	08	32	3
		MP-3.5	Material Science	3	10	20	80	100	08	32	3
	HC	MP-3.6A	Nuclear Physics lab-1	2 (4)	60	10	40	100	04	16	4
		MP-3.6B	Condensed Matter Physics lab-1	2	60	10	40		04	16	4
	SEC	MP-3.7	Python Programming (Theory)	2	06	10	40	50	04	16	$1\frac{1}{2}$
			Total	**20**	**170**	**110**	**440**	**550**	**44**	**176**	**-**

*Candidate has to choose any two Courses among MP-3.3, MP-3.4 and MP-3.5.

SEMESTER IV:

Sem	Nature	Course Code	Course Title	Credits	Counselling/PCP Hours	Max. Marks			Minimum Passing marks		Duration of Exam (hours)
						Internal Assessment	Term end exam	Total Marks	Internal Assessment	Term end exam	
IV	HC	MP-4.1	Nuclear Physics-2	4	12	20	80	100	08	32	3
	HC	MP-4.2	Condensed Matter Physics-2	4	12	20	80	100	08	32	3
	SC**	MP-4.3	Spectroscopy	3	10	20	80	100	08	32	3
		MP-4.4	Atmospheric Physics	3	10	20	80	100	08	32	3
		MP-4.5	Dissertation	3	10	20	80	100	08	32	3
	HC	MP-4.6A	Nuclear Physics lab-2	2	4	60	10	40	100	04	16	4
		MP-4.6B	Condensed Matter Physics lab-2	2		60	10	40		04	16	4
	SEC	MP-4.7	Python Programming (Practical)	2	06	10	40	50	04	16	$1\frac{1}{2}$
			Total	**20**	**170**	**110**	**440**	**550**	**44**	**176**	**-**

**Candidate has to choose any two Courses among MP-4.3, MP-4.4 and MP-4.5.

Note:
- HC-Hard Core; SC-Soft Core; EL-Interdisciplinary Elective; SEC-Skill Enhancement Course.
- Total Marks of the M.Sc. Physics Program (Semester I to Semester IV) = 2200.Total Credits of the M.Sc. Physics Program (Semester I to Semester IV) = 82.

Interdisciplinary Electives

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

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

Note:

    A. I and II Semester Open elective (Interdisciplinary Electives) syllabus are attached in Annexure – I and Annexure - II respectively.

    B. The Students may contact respective department chairperson in case of any queries regarding open elective course. The contact details available in the university website.

Course: MP 1.1- Classical Mechanics

BLOCK-1.1A:

Unit-1: Fundamentals: Newton's laws of motion, frames of references, free body diagrams, projectile motion with and without air resistance, Oscillations- Simple harmonic motion, damped and driven harmonic motions.

Unit-2: Conservation laws: Mechanics of a particle and system of particles, conservation of energy and momentum, elastic and inelastic collisions, constraints, generalized coordinates and generalized momenta.

Unit-3: Lagrangian formulation: D' Alembert's principle and Lagrange's equations of motion, Hamilton's principle of least action, Lagrange's equations from Hamilton's principle, velocity dependent potentials.

Unit-4: Applications of Lagrangian formulation: Computing Lagrange's equations, Lagrangian under coordinate transformation, conservation theorems and symmetry properties, determination of equations of motion for-Atwood machine, simple pendulum, bead sliding on a rotating wire in a force-free region.

BLOCK-1.1B:

Unit-5: Central force problem: Central force, equations of motion and first integrals, Binet's equation, classification of orbits, Virial theorem, condition for closed orbits, Kepler problem of inverse square force.

Unit-6: Scattering theory: Scattering in a central force field, differential and total scattering cross section, impact parameter, lab frame and center of mass frame, Rutherford scattering.

Unit-7: Hamiltonian formulation: Legendre transformations and the Hamilton's equations of motion, cyclic coordinates and conservation theorems, Routh's procedure, Hamilton's equations from variational principle, applications of Hamiltonian formulation.

Unit-8: Canonical transformations: Point transformations, general canonical transformation, the symplectic condition, invariants of canonical transformations, generating functions, classical Gauge transformations, applications of canonical transformations.

BLOCK-1.1C:

Unit-9: Poisson brackets: Poisson brackets and other canonical invariants, equations of motion and conservation theorems in Poisson bracket formulation, angular momentum.

Unit-10: Hamilton-Jacobi theory: Hamilton-Jacobi equation, harmonic oscillator using Hamilton-Jacobi method, Hamilton's characteristic function, ignorable coordinates and the Kepler problem.

Unit-11: Rigid body dynamics-1: Degrees of freedom, center of mass, orthogonal transformations, Euler angles, Euler's theorem, finite rotations, infinitesimal rotations, Coriolis effect.

Unit-12: Rigid body dynamics-2: The angular momentum and kinetic energy of motion about a point, inertia tensor and principal axis transformations, Euler equations of motion, torque free motion of rigid body, heavy symmetrical top with one point fixed.

BLOCK-1.1D:

Unit-13: Small Oscillations: Simple harmonic oscillations, eigen value equation and principal axis transformation, frequencies of free vibration and normal coordinates, free vibrations of linear triatomic molecule, forced vibrations.

Unit-14: Special Theory of relativity: Galilean relativity, Michelson-Morley experiment, Special theory of relativity-postulates, Lorentz transformation, Consequences: Length contraction, time dilation and velocity addition theorem.

Unit-15: 4-vectors: Minkowski space: space-like, time-like and world line. Proper time and proper length, 4-velocity, 4-acceleration, 4-momentum, and 4-force.

Unit-16: Relativistic dynamics: Relativistic motion of a particle, rest energy and relativistic energy of the particle. Mass-energy equivalence, Evidences of mass-energy equivalence. Principle of general theory of relativity.

References:

1. Goldstein h., poole c. And safko j., classical mechanics, 3rd edn., pearson education, new delhi. 2002.

2. Upadhaya J.C., classical mechanics, himalaya publishing house, mumbai. 2006.

3. Srinivasa raok.n., classical mechanics, universities press, hyderabad. 2003.

4. Takwaler.g. And puranik s., introduction to classical mechanics, tata mcgraw, new delhi,1991.

Course: MP 1.2- Mathematical Methods of Physics

BLOCK-1.2A:

Unit-1: Vector Analysis: Vector differentiation: Gradient, divergence, curl and Laplacian, Vector integration: Line, surface, and volume integrals, Gauss, Green's and Stokes' theorems, Generalized curvilinear coordinates: Cartesian, spherical polar and cylindrical polar coordinate systems.

Unit-2: Tensors: Rank of a tensor, transformation of coordinates, Contravariant and covariant tensors, Raising and lowering of indices, Tensor algebra: outer product and inner product, Line element and metric tensor, Christoffel symbols.

Unit-3: Linear Algebra 1: Linear dependence and independence of vectors, Dimension, Basis, change of basis, Subspace, Isomorphism of vector spaces, Linear operators, Matrix representative of a linear operator in a given basis, Effect of change of basis, Invariant subspace.

Unit-4: Linear Algebra 2: Fundamentals of Matrix algebra, Cramer's rule, Eigenvalues and eigenvectors of matrices, Cayley-Hamilton theorem, The Schur canonical form, Diagonalization of a normal matrix, Schur's theorem.

BLOCK-1.2B:

Unit-5: First Order Differential Equations: Degree and order of differential equations, variable separable equations, exact differentials, homogeneous equations, linear first order equations- Examples of physical problems.

Unit-6: Second Order Differential Equations: Second order linear differential equations with constant coefficients, Euler-Cauchy equations, Series solutions-Frobenius' method.

Unit-7: Partial Differential Equations: First order equations-general form and solutions, Second order partial differential equations, Boundary conditions, Non-linear PDE: Laplace and Poisson equations, Wave equation, heat flow and diffusion equations.

Unit-8: Integral equations: Fredholm and Volterra equations of first and second kind, Transformation of differential equation to integral equations, solving integral equations -Integral transform method and Neumann series method.

BLOCK-1.2C:

Unit-9: Fourier Transforms: General form of integral transforms, Fourier transform, Fourier cosine and sine transforms, Fourier integral, Inverse Fourier transform, Fourier convolution theorem.

Unit-10: Complex algebra-1: Complex numbers and functions in complex domain, Cauchy- Riemann conditions, Analytic functions and their derivatives.

Unit-11: Complex algebra-2: Cauchy integral theorem, Cauchy integral formula, Taylor and Laurent expansions, Singularities- poles and branch points, Residue theorem.

Unit-12: Gamma and Beta functions: Gamma functions-infinite limit and definite integral form, Beta functions, Relation between gamma and beta functions.

BLOCK-1.2D:

Unit-13: Legendre functions: Legendre differential equation, Legendre polynomial, recurrence relations, Rodrigue's formula, orthogonality, Generating function and its significance, Spherical harmonics (qualitative).

Unit-14: Bessel functions: Bessel differential equations, Bessel functions of first kind, generating function, recurrence relations, orthogonality.

Unit-15: Laguerre functions: Generating function, Rodrigues formula, orthogonality and recurrence relations.

Unit-16: Hermite functions: Hermite differential equations, recurrence relations, Rodrigues formula, orthogonality and normalization.

References:

1. Mathematical methods for physicists, 4th. Edn. G.B.Arfken and H.J.Weber, Academic Press, New York (Prism Books, Bangalore, India).
2. Mathematical methods for Physics and Engineering, Riley, Hobson and Bence, Cambridge University Press, Low Price Edition.
3. Mathematical physics, B.D. Gupta, Vikas Publishing House Pvt. Ltd. Bangalore.
4. Vector Analysis and an Introduction to Tensor Analysis, (Schaum's Outline Series) M.R.Spiegel, Tata McGraw-Hill, New Delhi.
5. Mathematical physics, P.K.Chattopadhyay, Wiley Eastern, New Delhi.
6. Mathematical Methods in the Physical Sciences, M.L.Boas, 2nd. Edn., Wiley, New York.

Course: MP 1.3- Atomic and Molecular Physics

BLOCK-1.3A:

Unit-1: Bohr's atomic model of one electron atom, Correction for finite nuclear mass, Rydberg constant.

Unit-2: Wilson-Sommerfeld quantization rules: Planck's quantization of energy, Bohr's quantization of angular momentum, de-Broglie's interpretation of quantization rule, Bohr's correspondence principle, shortcomings of Bohr-Sommerfeld theory.

Unit-3: Spectroscopic notations, Orbital magnetic dipole moment, Larmor precession, Space Quantization, Electron spin, Vector Atom model, Stern – Gerlach experiment.

Unit-4: Spin-orbit interaction, relativistic correction, Fine structure, Lamb shift.

BLOCK-1.3B:

Unit-5: Spectroscopic terms: L-S coupling, j-j coupling, Landè interval rule, Selection rules.

Unit-6: Normal and Anomalous Zeeman effect: magnetic interaction energy, splitting of levels in hydrogen atom, transition from weak to strong field.

Unit-7: Stark effect: weak field effect and strong field effect, quantum mechanical treatment of Stark effect.

Unit-8: Hyperfine structure: isotope effects, nuclear spin and hyperfine splitting, intensity ratio, determination of nuclear spin.

BLOCK-1.3C:

Unit-9: Introduction to molecular spectra, Pure rotational spectra: Salient features, Molecular requirements, Rigid rotator model, intensity of rotational levels, isotope effect on rotational spectrum, non-rigid rotator.

Unit-10: Vibrational-Rotational Spectra: Salient features, Molecule as a harmonic oscillator, Molecule as anharmonic oscillator, Vibrational frequency and force constant for anharmonic oscillator, isotope effect on vibrational levels, molecule as vibrating rotator.

Unit-11: Raman Spectra: Introduction to Raman Spectra, Experimental arrangement for Raman Spectra, Classical theory of Raman Effect, Quantum theory of Raman Effect, Vibrational Raman Spectrum, Pure Rotational Raman Spectrum.

Unit-12: Electronic Spectra: Salient features, formation, Born-Oppenheimer Approximation, Vibrational Structure of Electronic Band system in both Emission and Absorption, Rotational structure of Electronic bands, Rotational Structure of three-branch bands, Franck- Condon principle.

BLOCK-1.3D:

Unit-13: Structure of atoms, Periodic properties of atoms, half and completely filled valence, Chemical bond: 18 electron rules, Parameters of molecular structure: bond energies, bondlengths and bond angles.

Unit-14: Atomic and molecular orbitals, electron dot structures, and the octet rule, Molecular geometry, hybridization, Bond polarity, Multiple bonds, Multicentred bonds, introductionto Metals, theories of metallic bonds.

Unit-15: Ionic bonds: properties of ionic bonds, ionic lattice energies and crystal lattice geometry. Factors favouring the ionic bonds.

Unit-16: The simplest covalent bonds: properties, polar and non-polar covalent bonds, ionic characters in covalent compounds, non-covalent interactions: the hydrogen bond, dipolar

References:

1. Introduction to Atomic Spectra – H. E. White.

2. Physics of atoms and molecules – B. H. Bransden, C J. Joachain

3. Modern Atomic Physics (Vol I)-B Cagnac and J C Pabey

4. Fundamentals of Molecular Spectroscopy – C. N. Banwell, E. M. McCash.

5. Spectra of Diatomic Molecules (Vol. 1) – G. Herzberg.

6. Lasers and Non-linear Optics – B. B. Laud.

7. Lasers: Theory and Applications – K. Thyagarajan, A. K. Ghatak

8. Atomic and Molecular Spectra: Lasers- Raj Kumar

Course: MP 1.4- Electronics

BLOCK-1.4A:

Unit-1: Fundamentals of Semiconductors: Classification of solids, Semiconductors, Applications of semiconductors: LDR, thermistor. Intrinsic and extrinsic semiconductors, Fermi level in semiconductors. Formation of p-n junction.

Unit-2: PN junction: Junction diode, its operation and applications. Zener diode, its operation and applications. Rectifiers and regulators. Principal and working of LED, and solarcells.

Unit-3: Transistors: n-p-n and p-n-p transistors, CB, CE and CC configurations. Biasing of transistor and various modes of operations. Transistor biasing: DC and AC load line analysis, Q-point and h-parameters. Transistor as a switch. Transistor amplifier in CE configuration and its properties.

Unit-4: Advanced semiconductor Devices: Construction and working of Field Effect Transistor and Metal Oxide Semiconductor Field Effect Transistor, Silicon Controlled Rectifier, Uni Junction Transistor.

BLOCK-1.4B:

Unit-5: Operational Amplifiers: Differential amplifiers, block diagram of operational amplifiers, properties of ideal and practical op-amps, IC-741, DC offset and offset null, differential and common modes of operation.

Unit-6: Applications of Op-amp: Inverting and non-inverting amplifiers using op-amp, Addition and subtraction operations using op-amp, active high pass and low pass filters using op-amp, op-amp integrator and differentiator.

Unit-7: Oscillators: Feedback concepts, positive and negative feedback, Barkhausen criteria and signal generation, Phase shift and Wein bridge oscillators using op-amp, astable multivibrator using op-amp.

Unit-8: Number Systems: Decimal, Binary, Octal and Hexadecimal number systems, and the interconversion among them. Addition and Subtraction in binary, octal and hexadecimal number systems. Subtraction of binary number using 1's complement and 2's complement method.

BLOCK-1.4C:

Unit-9: Digital electronics: Basic logic gates, construction using diodes and transistors, Universal gates, realization of basic and exclusive gates using universal gates, Half and full adder using basic and universal gates, Half and full subtractor using basic and universal gates,

Unit-10: Boolean algebra: Basic postulates and fundamental theorems of Boolean algebra, Combinational logic: Standard representation of logical functions-SOP and POS, Minimization of logical functions using K-maps, don't care condition in K-map.

Unit-11: Basic measurement instruments: DC/AC ammeter, voltmeter and ohm-meter, Measurement of inductance (Anderson's bride), measurement of capacitance (De Sauty's bridge) and measurement of frequency (Wein's bridge).

Unit-12: Oscilloscope: Block Diagram, CRT, vertical deflection, horizontal deflection. screens for CRT, oscilloscope probes, measurement of voltage, frequency and phase by oscilloscope.

References:

1. Electronic Devices and Circuit Theory- Robert Boylestad and Louis Nashelsky, 10th Edition, 2009, Pearson Publications.
2. Op-Amps and Linear Integrated Circuits -Ramakant A. Gayakwad, Fourth Edition, 2015, PearsonPublications.
3. Principles of Electronics- V.K.Mehtha and Rohit Mehta, S.Chand Publications.

Course: MP 1.5A-Electronics lab

(Any eight of the following)

1. Op-amp inverting and non-inverting amplifiers (Both DC and AC).
2. Summing and difference amplifiers using op-amp.
3. Op-amp as differentiator and integrator.
4. Active high pass and low pass filters using op-amp.
5. Astable multivibrator using op-amp.
6. Phase shift and Wein bridge oscillators using op-amp.
7. Construction and verification of basic logic gates using diodes and transistors.
8. Realization of basic and exclusive gates using universal gates
9. Realization of half and full adders using basic/universal gates
10. Realization of regulated power supply.
11. Active filters: low pass (single pole).
12. Active filters: high pass (double pole).
13. Voltage follower.
14. Colpitts' oscillator.

COURSE: MP 1.5B-Computer Lab -1 (LaTeX)

To be demonstrated in the computer Lab:

1. Use of Linux commands: Create, rename, copy and delete files, kinds of files and folders,permissions and changing permissions.
2. Using the plotting program gnuplot,
3. Using Octave for computations.
4. Using Open office, Preparing power point presentation

All the following computer lab experiments:

1. Typeset a paragraph using Latex with text effects, special symbols, lists.
2. Typeset using Latex: Arrays and Tables with multicolumn.
3. Typeset using Latex: Equations, with superscripts, subscripts and mathematical symbols.
4. Inserting figures into Latex document
5. Gnuplot commands, plotting simple trigonometric and algebraic functions, plotting data from afile.
6. Applying least-squares fit to the data points. Including a graph in a Latex file.
7. Using the mathematics package octave to compute functions, matrices, Eigen-values, inverseand roots.

SEMESTER II

Course: MP 2.1- Quantum Mechanics

BLOCK-2.1A:

Unit-1: Basics: Linear vector spaces, Dirac notations, inner product and outer product, Orthonormal basis, Gram-Schmidt theorem, Schwarz inequality, Operator algebra, eigenvalue problem.

Unit-2: Limitations of Classical Physics: failure of classical physics in explaining black body radiation, Photoelectric effect, Compton effect, specific heats of solids and their explanation using quantum hypothesis.

Unit-3: Wave-particle duality: de-Broglie hypothesis, phase velocity and group velocity, wave packet, wave function, statistical interpretation, probability, normalization, position, momentum and energy operators.

Unit-4: Uncertainty principle: general description of uncertainty principle, minimum uncertainty wave function, position-momentum and energy-time uncertainty principle.

BLOCK-2.1B:

Unit-5: Schrodinger Equation: Time independent Schrodinger equation, stationary states, time evolution of wavefunction, free particle, step potential.

Unit-6: Particle in a box: Potential barrier and well, finite potential barrier and tunnelling effect, infinite square well potential and finite square well potential.

Unit-7: Harmonic oscillator: Schrodinger equation for Harmonic oscillator – solutions by differential equation method and operator method, zero-point energy, Dirac delta potential.

Unit-8: Hydrogen atom: Schrodinger equation in spherical coordinates, hydrogen atom- wavefunction of electrons, hydrogen spectrum.

BLOCK-2.1C:

Unit-9: Symmetry in Quantum Mechanics: symmetries, conservation laws, degeneracy, discrete symmetry, parity and time reversal symmetry

Unit-10: Identical particles: Identical particles in classical and quantum mechanics, interchange symmetry, exchange degeneracy, symmetrisation postulate, symmetric and antisymmetric wavefunctions: two particle, three particle and many particle systems, Pauli's exclusion principle.

Unit-11: Angular momentum-1: Orbital angular momentum, Commutation relations, eigenstates and eigenvalues, matrix and geometrical representation of angular momentum.

Unit-12: Angular momentum-2: Spin angular momentum, Stern-Gerlach experiment, general theory of spin, spin ½ and Pauli matrices, total angular momentum.

BLOCK-2.1D:

Unit-13: Perturbation theory: Time independent perturbation theory, non-degenerate perturbation theory, Stark effect, Degenerate perturbation theory.

Unit-14: Fine structure: Spin-orbit coupling, Relativistic correction, fine structure of hydrogen, Zeeman effect.

Unit-15: Scattering theory-1: Scattering cross section, Lab and center of mass frame, scattering amplitude of spinless particles.

Unit-16: Scattering theory-2: Scattering amplitude and differential cross section, Born approximation.

References:
1. Griffiths D.J., introduction to electrodynamics, 5th edn., prentice-hall of india, new delhi, 2006.

2. Sakurai JJ. And Tuan S.F. (editor), modern quantum mechanics, addisonwesley, india, 1999.

3. Shankar R., principles of quantum mechanics, 2nd edn., plenum press, new york, 1984.

4. Schiff l.i., quantum mechanics, 3rd. Edn., mcgraw-hill, kogakusha ltd., new delhi, 1968.

5. L.I.Schiff, Quantum mechanics 3rd. Edn. McGraw-Hill Kogakusha Ltd. New Delhi 1968.

6. E.Merzbacher, Quantum mechanics, John Wiley, New York

7. Richtmyer, Kennard and Lauritsen, Introduction to Modern Physics

Course: MP 2.2- Electrodynamics

BLOCK-2.2A:

Unit-1: Electrostatics: Gauss's law and its applications, Electric potentials due to dipole and charged sphere. Laplace and Poisson equations, Laplace equation in one, two and three dimensions.

Unit-2: Uniqueness theorem, Method of images and application to infinite conducting plane, Multipole expansion of electric potential, electric field of a dipole.

Unit-3: Dielectrics: induced dipoles and Polarization, field of a polarised object, bound charges and field inside dielectric material, Electric displacement -Gauss law in dielectrics and boundary condition, Linear dielectrics.

Unit-4: Biot-Savart's law, Ampere's law and their applications, Magnetic vector potential and its multipole expansion, Magnetic field inside matter.

BLOCK-2.2B:

Unit-5: Ohm's law and motional emf, Electromagnetic induction: Faraday's law, energy stored in magnetic fields.

Unit-6: Maxwell's equations: Maxwell's correction to Ampere's law, Maxwell's equations in- free space and matter, boundary conditions.

Unit-7: Potential formulation: scalar and vector potentials, Gauge transformations- Coulomb Gauge and Lorentz Gauge.

Unit-8: Electromagnetic waves: Wave equations, boundary condition- reflection, transmission and polarisation. Electromagnetic waves in vacuum.

BLOCK-2.2C:

Unit-9: Electromagnetic waves in matter- Normal and Oblique incidence, Fresnel's equations, Brewster's law.

Unit-10: Absorption of electromagnetic waves and dispersion Normal and anomalous dispersion—Clausius - Mossotti relation, wave guides- rectangular waveguide and coaxial transmission line.

Unit-11: Radiation- continuity equation and Poynting's theorem, power radiated by an accelerated point charge- Larmor formula.

Unit-12: Lenard's generalization of Larmor formula- Energy loss in bremsstrahlung and linear accelerators, Radiation reaction—Abraham -Lorentz formula.

BLOCK-2.2D:

Unit-13: Dipole radiation- power radiated by oscillating electric dipole and oscillating magnetic dipole.

Unit-14: Retarded potentials, Lienard- Wiechert Potentials, fields due moving point charge.

Unit-15: Relativistic electrodynamics: charge and fields as observed in different frames, covariant formulation of electrodynamics -electromagnetic field tensor transformation of fields, relativistic potentials.

Unit-16: Dynamics in electromagnetic fields, Lagrangian formulation of the motion of a charged particle in an electromagnetic field.

References:

1. Griffiths D.J., Introduction to electrodynamics, 5th Edn., Prentice-Hall of India, New Delhi, 2006.
2. Jackson J.D., Classical electrodynamics, 2nd Edn., Wiley-Eastern Ltd, India, 1998.
3. Born M. and Wolf E., Principles of optics, 6th Edn., Pergamon Press, Oxford, 1980.
4. Matveev A.N., Optics, Mir Publishers, Moscow, 1988.
5. Laud B.B., Electromagnetics, Wiley Eastern Limited, India, 2000.

Course: MP 2.3- Thermal Physics and Statistical Mechanics

BLOCK-2.3A: Thermodynamics

Unit-1: Fundamentals of thermodynamics, Kinetic theory of ideal gas, Heat and heat capacity, specific heat (definition), laws of thermodynamics and their consequences.

Unit-2: Phase equilibrium: Phase transitions, surface effects in condensation, phase equilibrium, Clausius-Clapeyron equation and its applications, Van der Waal's equation of state.

Unit-3: Thermodynamic potentials: entropy and energy as thermodynamic potentials, free energy, enthalpy, Gibbs' free enthalpy, grand potential, Maxwell's relations, specific heats from thermodynamic relations.

Unit-4: Irreversible thermodynamics- Onsager's reciprocal relation, thermoelectric phenomenon, Peltier effect, Seebeck effect, Thomson effect, non-equilibrium systems.

BLOCK-2.3B: Classical Statistical Mechanics

Unit-5: Phase space, ergodic hypothesis, average values in phase space, density distribution in phase space, Liouville's theorem in Classical statistics, statistical equilibrium.

Unit-6: Probability: concept of probability, microstates and macrostates, general expression for probability, statistical definition of entropy, Maxwell-Boltzmann distribution, Gibbs' paradox, Sackur-Tetrode equation.

Unit-7: Ensemble: Microcanonical, Canonical and grand canonical ensembles, mean value and fluctuations.

Unit-8: Partition functions: definition, partition function of a classical ideal gas, translational, vibrational and rotational partition functions, Boltzmann theorem of equipartition of energy. Application to specific heats.

BLOCK-2.3C: Quantum Statistical Mechanics

Unit-9: The postulates of quantum statistical mechanics. Indistinguishable particles in quantum mechanics, Symmetry of wave functions.

Unit-10: The Liouville theorem in quantum statistical mechanics, condition for statistical equilibrium

Unit-11: Ensembles in quantum mechanics, The quantum distribution functions (BE and FD).

Unit-12: The Boltzmann limit of Boson and Fermion gases, the derivation of the corresponding distribution functions

BLOCK-2.3D: Applications of Quantum Statistical Mechanics

Unit-13: Equation of state of an ideal Fermi gas (derivation not expected), application of Fermi- Dirac statistics to the theory of free electrons in metals.

Unit-14: Diamagnetism, Paramagnetism. Degeneracy and magnetic susceptibility.

Unit-15: Application of B-E statistics - photon gas, derivation of Planck's law, comments on the rest mass of photon, Thermodynamics of Black body radiation. Bose-Einsteincondensation.

Unit-16: Brownian motion: Langevin equation, Random walk problem, diffusion and Einstein relation for mobility.

References:

1. Agarwal b.k. And eisner m., statistical mechanics, new age international publishers, 2000.
2. Roy s.k., thermal physics and statistical mechanics, new age international pub., 2000.
3. Huang k., statistical mechanics, wiley-eastern, 1975.
4. Laud b.b., fundamentals of statistical mechanics, new age international pub.,2000.
5. Schroeder d.v., an introduction to thermal physics, pearson education new delhi, 2008.
6. Salinas s.r.a., introduction to statistical physics, springer, 2004.

Course: MP 2.4- Optics, Photonics and Lasers

BLOCK-2.4A:

Unit-1: Interference (two beams): Coherent sources, General theory of interference of two monochromatic waves, intensity distribution, Michelson interferometer, Circular fringes,Visibility of fringes.

Unit-2: Interference (Multibeam): reflection from a plane parallel plate, Newton's rings, Multiple beam interference, Fabry- Perot interferometer- etalon construction, resolving power and its applications. Interference filters.

Unit-3: Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction- at a single slit, circular aperture, resolving power, diffraction grating.

Unit-4: Fresnel's half period zones, diffraction at circular apertures, Integral theorem of Helmholtz and Kirchhoff, Fresnel-Kirchhoff diffraction formula- conditions for Fraunhofer and Fresnel diffraction.

BLOCK-2.4B:

Unit-5: Lasers: spontaneous and stimulated emission, properties of lasers- directionality, monochromaticity, coherence- spatial and temporal, Einstein's coefficients. Absorption and Emission Cross sections.

Unit-6: Threshold condition (population inversion), Threshold for 3 and 4 level laser systems.

Unit-7: Line broadening- natural broadening and doppler broadening, Cavity modes- longitudinal and transverse modes in a rectangular cavity.

Unit-8: Q-switching, Mode locking- active and passive. Cavity dumping.

BLOCK-2.4C:

Unit-9: Lasers: Ruby laser, He-Ne laser, CO_2 laser, Nd- YAG laser, Nd- Glass laser, Dye lasers.

Unit-10: Laser Spectroscopy, Raman Scattering and their use in pollution studies. Nonlinear interaction of Light with matter.

Unit-11: Laser induced multiplication processes and their applications. Ultra-high-resolution spectroscopy with lasers and their applications, Propagation of light in a medium with variable refractive index.

Unit-12: Optical fibres: propagation mechanism, angle of acceptance, attenuation, numerical aperture of the fibre, Modes of propagation- multimode and single mode, pulse dispersion (qualitative only).

References:

1. Lasers and Non-linear Optics – B. B. Laud.

2. Lasers: Theory and Applications – K. Thyagarajan, A. K. Ghatak

3. Atomic and Molecular Spectra: Lasers- Raj Kumar

COURSE: MP 2.5A -Optics Lab

Any Ten of the following experiments:

1. Verification of the Brewster law of polarization.
2. Verification of Fresnel laws of reflection from a plane dielectric surface.
3. Determination of the inversion temperature of the copper-iron thermocouple.
4. Birefringence of mica by using the Babinet compensator.
5. Birefringence of mica by using the quarter-wave plate.
6. Experiments with the Michelson interferometer.
7. Determination of the refractive index of air by Jamin interferometer.
8. Determination of the size of lycopodium spores by the method of diffraction haloes.
9. Determination of wavelength by using the Fabry-Perot etalon.
10. Dispersion of the birefringence of quartz.
11. The Franck-Hertz experiment.
12. Experiments with the laser.
13. Determination of the Stokes vector of a partially polarized light beam
14. Determination of the modes of vibration of a fixed-free bar.

COURSE: MP 2.5B-Computer Lab -2(C programming Lab)

Any Ten of the following programs:

1. Check whether given number is odd or even and prime or not.
2. Find the largest and smallest number in the input set.
3. Compute the Fibonacci sequence.
4. Compute the roots of a quadratic equation.
5. Generate Pascal's triangle.
6. To add two mXn matrices.
7. To find the sum and average of a data stored in a file.
8. To find the trajectory of a projectile shot with an initial velocity at an angle. Also, find the maximum height travelled and distance travelled.
9. Solution of a polynomial equation using Newton-Raphson method.
10. Linear least-squares fitting to data in a file.
11. Application of Newton interpolation formulae.
12. Application of Trapezoidal method, Simpson rule.
13. Application of Runge-Kutta methods.

SEMESTER III

Course: MP 3.1- Nuclear Physics-1

BLOCK-3.1A

Unit-1: Constituents of nucleus and their properties, determination of nuclear radius by different methods.

Unit-2: Nuclear moments: Spin, magnetic dipole moment. Relation between J and μ on the basis of single particle model, determination of nuclear magnetic moment by molecular beam experiment, electric quadrupole moment.

Unit-3: Q-values, nuclear reactions in a centre of mass frame, threshold energy for a reaction, reactions induced by proton, deuteron and particles.

Unit-4: Cross section for a nuclear reaction, mean free path, reaction rate, relation between cross sections in lab and centre of mass systems.

BLOCK-3.1B

Unit-5: Alpha decay: basic alpha decay process, measurement of the energy of alpha particles, Geiger-Nuttall law, Gamow's theory of alpha decay.

Unit-6: Beta decay: Beta spectrum, Pauli neutrino hypothesis, mass of neutrino from spectral shape, Fermi theory of beta decay, Kurie plot, ft – values and forbidden transitions, Nuclear isomerism, Auger effect, Internal Conversion (qualitative only).

Unit-7: Energy loss due to Interaction of charged particles with matter, Bethe-Bloch formula, energy loss of fast electrons (bremsstrahlung), electron range and transmission curves.

Unit-8: Interaction of gamma rays with matter: interaction of gamma radiations with matter elastic scattering, Photoelectric effect, Compton scattering, pair production, attenuation coefficient.

BLOCK-3.1C:

Unit-9: Liquid drop model: semi-empirical mass formula and its application to

(i) stability of nuclei against beta decay and (ii) fission process. Mass parabola.

Unit-10: Fermi gas model: well depth, level density and kinetic energy for ground stateasymmetry energy-nuclear evaporation.

Unit-11: Shell model: single particle potentials, spin-orbit coupling.

Unit-12: Collective model: collective vibrations and rotations, Nilsson model- calculation ofenergy levels, prediction of ground state spin.

BLOCK-3.1D:

Unit-13: General features of nuclear forces: spin dependence, charge independence, exchange character, meson theory of nuclear forces- Yukawa's theory, pi-mesons: Production and properties, decay modes, meson resonances.

Unit-14: Types of interaction between elementary particles, classification of elementary particles, conservation laws: conservation of energy, momentum, angular momentum, charge and isospin, parity, fundamental forces, properties and decay modes of elementary particles.

Unit-15: Strange particles, associated particle production, CP violation in Kaon decay, Gell-Mann -Nishijima scheme.

Unit-16: Quark hypothesis of elementary particles, quark content of baryons and mesons,elementary ideas of Standard model.

References:
1. Introductory nuclear physics, K.S.Krane, Wiley, New York.

2. Atomic and nuclear physics, Vol. 2., S.N.Ghoshal, S.Chand and Company, Delhi.

3. Introduction to particle physics, M.P. Khanna, Prentice Hall of India, Delhi.

4. Elements of nuclear reactor theory. Glasstone and Edlund, van Nostrand, New Jersey.

5. Introductory nuclear physics, Waghmare, M/S Oxford IBH company,New Delhi.

6. Fundamental particles, C.E. Schwartz.

7. Elementary particles, C.N.Yang.

Course: MP 3.2- Condensed Matter Physics-1

BLOCK-3.2A

Unit-1: Interatomic forces: bonding in solids: ionic bond – bond energy and lattice energy in NaCl crystal, calculation of Madelung constant and repulsive exponent from compressibility data, covalentbonds-hybridization, metallic bond and hydrogen bond.

Unit-2: Classical Free Electron Theory of Metals: Boltzmann transport equation, RMS velocity, relaxation time, mean free path, classical theory of electric conduction- Ohm's law, temperaturedependence of resistance, drawbacks of classical theory.

Unit-3: Quantum Theory of Free Electrons: Fermi-Dirac statistics and electronic distribution in solids, density of states and Fermi energy, heat capacity of electron gas, effect of temperature on Fermi distribution function.

Unit-4: Properties of Metals: Thermal conductivity in metals, thermal expansion, electricalconductivity at high frequencies, skin effect, Schottky effect, Hall effect.

BLOCK-3.2B:

Unit-5: Periodic potentials: Bloch theorem-statement and proof, origin of energy gap, electron inperiodic potential of crystal, free electron approximation.

Unit-6: Brillouin zones: Brillouin zones- construction of Brillouin zones in square lattice, Kronig-Penny model, solution to near zone boundary and tightly bound electron approximation.

Unit-7: Classification of solids: Conductors, insulators and semiconductors, overlapping energy bands, direct and indirect energy gap, concept of effective mass of electron and hole, relation between effective mass and rest mass of electron.

Unit-8: Energy surfaces: Constant energy surfaces, Fermi surfaces- in extended and reduced zonescheme, Fermi surfaces in square lattice, extension to cubic structures.

BLOCK-3.2C:

Unit-9: **Crystal and lattice**: Lattice and basis, crystal structure, unit cell and primitive cell, crystal systems and Bravais space lattices, crystal directions, planes and Miller indices, interplanar spacing in cubic and tetrahedron crystal systems.

Unit-10: Symmetry elements: Symmetry elements at a point and point, groups, screw axis and glide plane and space groups, representation of some simple space groups.

Unit-11: Diffraction: Electron, Neutron and X-ray diffraction and their comparison, applications and their limitations.

Unit-12: Diffraction by crystals: Diffraction by three-dimensional lattice, Laue equations, solutions to Laue equations and reciprocal lattice, Bragg's law, Ewald's construction, Ewald's sphere and diffraction, limiting sphere.

BLOCK-3.2D:

Unit-13: The Unit cell: Determination of contents of the unit cell, Fourier synthesis, atomic scattering factors and structure factors, crystal symmetry-Friedel's law and its breakdown, systematic absences.

Unit-14: Structure Solution: Intensity measurement, corrections to intensity data- polarization factor, Lorentz factor, temperature factor, absorption factor-primary and secondary extinction factors, the phase problem-direct methods.

Unit-15: Structure refinement: The necessity of refinement, difference Fourier synthesis, least squares refinement, residual factor and goodness of fit.

Unit-16: Experimental techniques: The powder method, the rotation method, Weissenberg method and Buerger precession method, single crystal diffraction method.

References:

1   Dekker A.J., Solid State Physics, Prentice Hall, 1985.
2   Kittel C., Introduction to Solid State Physics, 7th Edn., John Wiley, New York, 1996.
3   Pillai S.O., Solid State Physics, New Age International Publications, 2002.
4   Ashcroft N.W. And Mermin N.D., Solid State Physics, Saunders College Publishing, 1996.
5   Ibach H. And Luth H., Solid State Physics, Narosa, Publishers New Delhi, 1996.
6   Wahab M.A., Solid State Physics, Narosa Publishing House, New Delhi, 1999.

Course: MP 3.3- Numerical Computational Methods

BLOCK-3.3A

Unit-1: Root Finding: iterative methods: Bisection method, Newton-Raphson method, Secant method, The method of successive approximations, Mullers Method and Chebyshev Method.

Unit-2: Polynomial Equations: Solution of a polynomial equation: Descartes' Rule of signs, Iterative methods.

Unit-3: Initial Value Problems and Euler method: Introduction to numerical methods, Taylor Series method, Euler's methods.

Unit-4: Runge-Kutta methods: Runge-Kutta 2nd order method, Runge-Kutta 4th order formulae, and Runge-Kutta method for system of equations.

BLOCK-3.3B:

Unit-5: Solution of System of Equations – Direct Methods: Solution of System of Equations - The Gauss elimination method, Gauss Jordan Method, LU decomposition method.

Unit-6: Gauss Seidel Method and System of Nonlinear Equations: Gauss-Seidel method, Cholesky Method, An Introduction to the Solution of simultaneous non-linear equations.

Unit-7: Interpolations: introduction, Newton interpolation formulae, extrapolation, Lagrange interpolation.

Unit-8: Piecewise and Spline interpolation: Piecewise linear interpolation, Piecewise Quadratic Interpolation, and Quadratic Spline Interpolations.

BLOCK-3.3C:

Unit-9: **Least-squares approximation of functions**: Introduction, linear regression, algorithm for linear regression. Polynomial regression, fitting exponential and trigonometric functions.

Unit-10: Numerical Differentiation: Formulae for numerical differentiation, optimum choice of step-length and extrapolation methods.

Unit-11: Numerical Integration: Newton Cotes methods- Trapezoidal method, Simpson rule. Errors in integration formulae, Romberg method.

Unit-12: Gaussian Quadrature Methods: Gaussian Quadrature Formulae - Gauss-Legendre Integration methods, Gauss-Chebyshev Integration methods and Gauss-Laguerre Integration methods.

References

1. Rajaraman V., Computer Oriented Numerical Methods, Prentice Hall of India Pvt. Ltd., India, 2001.
2. Atkinson K.E., An Introduction to Numerical Analysis, John Wiley and Sons, Usa, 1988.
3. M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical methods for scientific and engineering computation, New- age international Publishers 2008, Fifth Edition.
4. S. S. Sastry, Introductory Methods of Numerical Analysis, Prentice – hall of India 2008, fourth Edition.
5. Press W.H., Flannery B.P., Teukolsky S.A. And Vetterling W.T., Numerical Recipes InC, Cam-Bridge University Press, Uk, 1989.
6. Krishnamurthy E.V. And Sen S.K, Numerical Algorithms, Affiliated East West Press Pvt. Ltd., India, 1993.

Course: MP 3.4- Accelerator Physics

BLOCK-3.4A

Unit-1: Ion production, Semi classical treatment of ionization, Townsend theory-comparison of theory and experiment for ion production.

Unit-2: The gas plasma characterization: Conductivity and stability of a plasma-extraction of beams from plasma.

Unit-3: Insulation at high voltages-Spark voltage, Paschen's law for gas breakdown.

Unit-4: Focusing properties of linear fields, Electrostatic and magnetic lenses.

BLOCK-3.4B:

Unit-5: Development of accelerators, Direct-voltage accelerators: Cockcroft-Walton generator, Van de Graff generator, Tandem accelerators, Pelletron.

Unit-6: Resonance accelerators: Cyclotron—fixed and variable energy, principles and longitudinal dynamics of the uniform field cyclotron.

Unit-7: Linear accelerators, Betatron, Beam focusing and Betatron Oscillation.

Unit-8: Principle of phase stability, Mathematical theory for Principle of phase stability.
Microtron.

BLOCK-3.4C:

Unit-9: Electron synchrotron, Proton synchrotron, Alternating gradient machines: Alternating gradient principle, AG Proton Synchrotron, Current status of advanced accelerators, Indus 1, Indus 2.

Unit-10: Rutherford Back scattering, Channelling, Proton Induced X-ray Emission (PIXE).

Unit-11: Neutron scattering methods, Ion implantation, nuclear structure studies, Electron structure studies.

Unit-12: Radiation damage studies, Food irradiation and processing, Applications of Accelerator produced radio isotopes, mutation studies. Medical applications of radiations and radio isotopes.

References:

1. Townsend P.D., Kelly J.C. And Hartley N.E.W., Ion Implantation, Sputtering And Their Applications, Academic Press, London, 1976.
2. Humphrey S. Jr., Principles Of Charged Particle Acceleration, John Wiley, 1986.
3. Arya A.P., Fundamentals Of Nuclear Physics, Allyn And Bacon, USA, 1968.
4. Ghoshal S.N., Atomic And Nuclear Physics, Vol. 2, S.Chand And Company, Delhi, 1994.
5. Varier K.M., Joseph A. And Pradyumnan P.P., Advanced Experimental Techniques In Modern Physics, PragathiPrakashan, Meerut, 2006.
6. Leo W.R.,Techniques For Nuclear And Particle Physics Experiments, Springer Verlag, 1992.
7. Thompson M.W., Defects and radiation damage in metals, Cambridge university press, Cambridge, 1992.
8. Ziegler J.F. Ed., Handbook of ion implantation technology, North Holland Publishing Amsterdam, 1992.
9. Characterization of Materials, E.N.Kaumann (Ed) Vol 1 and Vol 2, John Wiley and Sons, New Jersey, 2003).
10. Physical Methods of Characterization, PEJ Flewitt and RK Wild (IOP, Bristol, 2003).
11. Thompson M.W., Defects and radiation damage in metals, Cambridge university press, Cambridge, 1969.

Course: MP 3.5- Material Science

BLOCK-3.5A: Nanomaterials

Unit-1: Introduction to nanomaterials: Physical properties at nano scale, quantum size effect, surface to volume ratio, optical properties-surface plasmon resonance, optical absorption and photoluminescence, electrical properties-surface scattering, mechanical properties, melting point.

Unit-2: Fabrication of nanomaterials: Bottom-up and top-down approaches, zero-dimensional nanostructures- nanoparticles, synthesis by homogeneous nucleation and heterogeneous nucleation methods, ball milling method.

Unit-3: Higher dimensional nano structures: One-dimensional nanostructures - nanowires and nanorods, carbon fullerenes and nano tubes, graphene - fabrication and properties, nanolithography.

Unit-4: Characterization: Structural characterization-NMR, XRD and EXAFS methods, morphological characterization – SEM, TEM and atomic force microscopy, optical characterization – absorbance, photoluminescence and Raman spectroscopy.

BLOCK-3.5B: Thin films

Unit-5: Fabrication of thin films: Spin coating, spray pyrolysis, vapor deposition methods, laser ablation and MBE techniques.

Unit-6: Thickness measurements: Electrical methods - resistivity and capacitance measurements, optical methods - optical absorption and interference, vibrating quartz method.

Unit-7: Characterization of thin films: Mechanical properties- internal stress and strain analysis, electrical properties- measurement of resistivity by four probe method, optical characterization.

Unit-8: Applications of thin films: Applications of thin films and deposition techniques – electrodes, transparent conducting films and semiconducting film, diamond-like carbon coating, bio-medical coating, EMI shielding, hard transparent protective coating, thin film solar cells.

BLOCK-3.5C:

Unit-9: Liquid crystals: Thermotropic and lyotropic liquid crystals, phases of amphiphilic molecular systems, nematic, smectic and cholesteric phases, applications of liquid crystals- liquid crystals displays and thermometers.

Unit-10: Alloys: Solid solutions - substitutional and interstitial, Hume Rothery rules, super lattice- long range order theory, diffusion in alloys- Darkens equation, some special alloys- ferrous and nonferrous, super alloys.

Unit-11: Glasses: Preparation and structure, types of glasses- borates, silicate, oxide, metallic and semiconducting glasses, tempered glass and chemically strengthened glass.

Unit-12: Polymers: Classification of polymers, synthesis of polymers- chain polymerization, step polymerization, industrial polymerization methods, processing of plastic materials- compression, injection blow, extrusion, spinning.

References:

1. Elements of material science and engineering, Lawrence H. Van Vlack Addison Wesley (1975).
2. Material science and engineering, V. Raghavan, Prentice Hall (1993)
3. Foundation of material science and engineering, William F. Smith, McGraw Hill international Editions (1988).

COURSE: MP 3.6A- Nuclear Physics Lab-1

(Any eight of the following experiments)

1. Half Life of Indium-116
2. Energy Resolution Of NaI [Tl] Scintillation Spectrometer
3. Beta Absorption Coefficient
4. Gamma Ray Absorption Coefficient
5. Dead Time of a GM Counter
6. Rest Mass energy of an electron using NaI [Tl] Scintillation Spectrometer.
7. Randomness of Radioactive Decay.
8. Timer circuits using IC 555.
9. FET amplifier.
10. IC 741 Amplifiers.
11. Cockcroft- Walton voltage multiplier

COURSE: 3.6B-Condensed Matter Physics Lab-1

(Any eight of the following experiments)

1. Analysis of the powder x-ray photograph of a simple cubic crystal.
2. Thermionic Work Function of a Metal.
3. Energy Gap of Semiconductors.
4. Determination of Stefan's Constant.
5. Frank-Hertz Experiment.
6. Magnetic Hysteresis.
7. Birefringence of Quartz Using Spectrometer.
8. Fermi Energy of Copper.
9. Verification of Langmuir-Child Law.
10. Thermo Luminescence.
11. Curie Temperature of Ferro-Electric Material.
12. Thermal Expansion Coefficient in Solids.
13. Study of mercury spectrum by superposing it on brass spectrum.
14. Sodium Spectral Analysis by Edser-Butler Fringes.

Course: MP 3.7- Python Programming (Theory)

(Skill Enhancement Course-1)

Block-3.7A: Introduction to Python Programming

Unit 1: Introduction to python programming, Variables, Operators and Data types, Operations on data types; Input and Output statements, Precedence and Associativity, Comments, Type Conversions

Unit 2: Decision control flow statements **(***if, if…else, if…elif…else***,** Nested *if*, Types of Looping statements - while and for loop, Nested loops, Break and Continue Statements.

Unit 3: Functions: Modules, Built-in functions, User defined functions, Scope and lifetime of variables, Default parameters, Keyword arguments. Strings- Creating and storing strings, Basic String operations, Formatting strings.

Unit 4: Lists-Basic list operations, Slicing and indexing, List methods. Dictionaries- creating dictionaries, Dictionary methods, Tuples and sets- creating/indexing and slicing/tuple methods and set methods. Introduction to numpy and matplotlib for basic plotting

Unit 5: Arrays: Matrix Computation, Linear Algebra Operations

Block 3.7B- Computational PhysicsUnit 6
Applications of Python-1: Systems of Equations: Linear Systems, matrix inverse, eigenvalue problems, Fourier transforms: fast Fourier transform; maxima and minima of functions.

Unit 7
Applications of Python-2: Euler method, Runge-Kutta methods, Gauss-Seidel method, Newton-Raphson method, bisection method and Secant method.

Unit 8
Applications of Python-3: simple and double pendulums, Newton's law of gravitation, planetary motion, Projectile motion, Capacitor discharge in an RC circuit, Planck's law – plot 'Planck curves', Heisenberg's uncertainty relation.

References:

1. Landau, R. H., Páez, M. J., & Bordeianu, C. C. (2015). *Computational physics: Problem solving with Python*. John Wiley & Sons.
2. Gowrishankar, S., & Veena, A. (2018). *Introduction to Python Programming*. CRC Press.
3. Bhasin, H. (2018). *Python Basics: A Self-Teaching Introduction*. Stylus Publishing, LLC.

SEMESTER IV

Course: MP 4.1- Nuclear Physics-2

BLOCK-4.1A:

Unit-1: Gas filled detectors: ionization chambers, proportional counter, Geiger-Müller counters.

Unit-2: Scintillation detectors: Organic and inorganic scintillators, General Characteristics of Scintillation Counting Systems, properties of ideal scintillation material, Scintillation mechanism in NaI(Tl) crystal, gamma ray scintillation spectrometer.

Unit-3: Semiconductor detectors: diffused junction, surface barrier and lithium implanted detectors, relation between applied voltage and depletion layer thickness in junction detectors, HPGe detectors.

Unit-4: Cherenkov detectors, Neutron detectors (BF3 counter), Solid State Nuclear Track Detectors.

BLOCK-4.1B:

Unit-5: Pre-amplifier circuits: charge, current and voltage sensitive pre-amplifiers (theory, working and applications).

Unit-6: Linear Pulse Amplifiers: general considerations, linearity, Pulse shaping circuits, Pulse stretching, Operational Amplifiers.

Unit-7: Analog to Digital Converters: Pulse height discriminators, Principle of multivibrator, Scalers, Schmitt trigger as pulse discriminator, Coincidence circuits.

Unit-8: Integral discriminators, Single Channel Analyzers (differential discriminators), Multichannel Analyzers: block diagram, working, and its use in data processing, memory devices.

BLOCK-4.1C:

Unit-9: Nuclear fission: fission cross section, spontaneous fission, mass energy distribution of fission fragments, liquid drop model applied to fission, Bohr-Wheeler theory, saddle point, barrier penetration.

Unit-10: Essential components of a nuclear reactor, Schematic of a Nuclear Power Plant, Neutron and its interaction with matter- collision kinematics, Fick's Law of Diffusion, differential elastic scattering cross section, isotropic scattering, average logarithmic decrement, mean free path and relaxation length, slowing down power and moderating ratio, lethargy.

Unit-11: Conditions for a self- sustaining chain reaction, Neutron balance in a chain reaction, multiplication factor for thermal reactors, leakage of neutrons, neutron transport equation using elementary diffusion theory, transport correction, transport mean free path.

Unit-12: Critical size of a reactor (definition), reactor control, continuous slowing down model (Age diffusion theory), Fermi age theory, relation between Fermi Age and Chronological Age. One group critical equation. Effective multiplication factor.

BLOCK-4.1D:

Unit-13: Reflector reactors: effects of reflectors, One group method of a homogeneous reactor with reflector, reflector savings, predicting size of a critical reactor.

Unit-14: Two particle systems: Deuteron: Schrödinger equation for a nucleon system, theory of the ground state of deuteron under central and non-central forces, excited states of deuteron, Rarita-Schwinger relations.

Unit-15: Theory of s-wave scattering of neutrons by free protons, Wigner's formula for n- p scattering, effective range theory for n-p scattering.

Unit-16: s-wave theory of proton-proton, Mott's modification of Rutherford's formula, pion-nucleon scattering experimental results.

References:
1. Price J.W., Nuclear Radiation Detectors, Mcgraw Hill, New York, 1965.
2. Kapoor S.S. And Ramamoorthy V., Nuclear Radiation Detectors, Wiley Eastern, Bangalore, 1993.
3. Kowalski E., Nuclear Electronics, Springer Verlag, Berlin,1970.
4. Leo W.R., Techniques for Nuclear and Particle Physics Experiments, Springer Verlag, 1992.
5. GF Knoll, Radiation Detection and Measurements, 3rd Edition, John Wiley, New York 2000.
6. Glasstone S. And Edlundm.c., elements of nuclear reactor theory, d. Van nostrand co., usa, 9th print, 1963.
7. Garg s., ahmed f. And kotharii.s., physics of nuclear reactors, tata mcgraw-hill, new delhi, 1986.
8. Glasstone S. And Edlund M.C., Nuclear Reactor Engineering. D. Van Nostrand Co., USA, 9th print, 1963.

Course: MP 4.2- Condensed Matter Physics-2

BLOCK-4.2A: Magnetism

Unit-1: Magnetic Properties of materials: Magnetization, permeability and susceptibility, Theory of diamagnetism-Langevin's theory and Larmor diamagnetic susceptibility.

Unit-2: Paramagnetism: Classical theory of paramagnetism, Quantum theory of paramagnetism, Curie's law, Measurement of susceptibility by Guoy balance and Quincke's method.

Unit-3: Ferromagnetism: Ferromagnetic materials-remanence and hysteresis, Spontaneous magnetization in ferromagnetic materials, The domain model, Anti-ferromagnetism and Ferrimagnetism.

Unit-4: Magnetic Relaxation and Resonance: Relaxation mechanism: spin-lattice relaxation and spin-spin relaxation, Nuclear magnetic moments and nuclear magnetic resonance.

BLOCK-4.2B: Superconductivity

Unit-5: Superconductivity: evolution of superconductivity, Critical temperature, critical magnetic field, Meissner effect, Effect of magnetic field on critical temperature and Isotope effect.

Unit-6: Superconductors: Energy gap, Type-1 and type-2 superconductors, London equations, Penetration depth, Thermodynamic theory of superconductivity.

Unit-7: Theory of Superconductors: Ginzburg-Landau theory of superconductivity, Superconductors in AC fields, BCS theory of superconductivity (qualitative), Flux quantization.

Unit-8: Josephson effects: Theory of AC and DC Josephson's effect, High temperature superconductivity and applications.

BLOCK-4.2C: Semiconductors and Dielectrics

Unit-9: Intrinsic Semiconductor: Carrier concentration, Fermi energy and electrical conductivity, Thermistors and LDR

Unit-10: Extrinsic Semiconductor: P-type and N-type semiconductors, Carrier concentration in extrinsic semiconductors, Variation of Fermi level with temperature and doping concentration, Hall effect in semiconductors.

Unit-11: Dielectrics-1: Dielectrics, Gauss's theorem, Polarization and electric susceptibility, Langevin's theory, Clausius-Mosotti relation and Lorentz-Lorentz formula.

Unit-12: Dielectrics-2: Dipole theory of ferroelectricity, Piezoelectricity, Dielectrics in alternating fields-complex polarizability, Complex dielectric constant and dielectric losses.

BLOCK-4.2D: Thermal and Optical properties of solids

Unit-13: Specific heats of solids: Classical theory of specific heats-Dulong and Petits law, Einstein theory of specific heat, Density of States, Debye theory of specific heat.

Unit-14: Lattice vibrations: Elastic vibrations in an infinite one-dimensional array of identical atoms and vibrational modes, Vibrational modes of diatomic linear lattice and thermal conductivity of solids.

Unit-15: Luminescence: Excitation and emission, Franck-Condon principle. Decay mechanisms-temperature dependent and independent decays, Thermo luminescence and glow curve, Electroluminescence-Gudden-pohl effect and carrier injection luminescence.

Unit-16: Liquid Crystals: Thermotropic and lyotropic liquid crystals, Different molecular order- nematic, smectic and cholesteric phases, Molecular theory of liquid crystals, Liquid crystal display.

References:

1   Dekker A.J., Solid State Physics, Prentice Hall, 1985.
2   Kittel C., Introduction to Solid State Physics, 7th Edn., John Wiley, New York, 1996.
3   Pillai S.O., Solid State Physics, New Age International Publications, 2002.
4   Ashcroft N.W. And Mermin N.D., Solid State Physics, Saunders College Publishing, 1996.
5   Ibach H. And Luth H., Solid State Physics, Narosa, Publishers New Delhi, 1996.
6   Wahab M.A., Solid State Physics, Narosa Publishing House, New Delhi, 1999.

COURSE: MP 4.3 - Spectroscopy

BLOCK-4.3A:

Unit-1: Basic concepts: characterization of electromagnetic radiation, regions of the spectrum, representation of spectra, signal to noise ratio, resolving power, width and intensity of spectral lines.

Unit-2: Microwave spectroscopy: classification of molecules, rotational spectra of rigid and non- rigid molecules- example of HF, microwave oven.

Unit-3: Polyatomic molecules: linear and symmetric top molecules, Techniques and instrumentation: Stark effect.

Unit-4: Infra-red spectroscopy: Energy of a diatomic molecule, Simple harmonic oscillator, Anharmonic oscillator, Diatomic vibrating rotator, the vibration- rotation spectrum of carbon monoxide

BLOCK-4.3B:

Unit-5: Breakdown of Born-Oppenheimer approximation, vibrations of polyatomic molecules: fundamental vibrations, overtones.

Unit-6: Influence of rotation on the spectra of polyatomic molecules: linear molecules, symmetric top molecules, analysis by infra-red techniques and instrumentation: Fourier transform spectroscopy, carbon dioxide laser.

Unit-7: Raman spectroscopy: the classical theory of Raman effect- molecular polarizability, quantum theory of Raman Effect, Pure rotational Raman spectra: linear and symmetric top molecules.

Unit-8: Vibrational Raman spectra: Raman activity of vibrations, vibrational Raman spectra, rotational fine structure, structure determination from Raman and Infra-red spectroscopy, Techniques and instrumentation of Raman spectroscopy.

BLOCK-4.3C:

Unit-9: Spin resonance spectroscopy: interaction between spin and magnetic field, Nuclear Magnetic resonance: resonance condition, population of energy levels, Larmor precession, relaxation time.

Unit-10: NMR spectroscopy: Chemical shift and spin-spin interaction. Example of ethyl alcohol, Fourier transform technique in NMR, FTNMR spectrometer and experimental procedure, a brief account of NMR in medicine.

Unit-11: Spectral analysis: Principle and applications of chromatography- gas, liquid, paper, gel, analysis of results in chromatographic techniques.

Unit-12: Techniques and applications of Spectrometry: Spectrophotometry, photofluorimetry, mass spectrometry and their applications.

References:

1. Tralli n. And pomillap.r., atomic theory, McGraw-hill, new york, 1999.
2. Banwellc.n. And mccashe.m., fundamentals of molecular spectroscopy, 4th edn., tata mcgraw-hill, new delhi, 1995.
3. Mahan b.h., university chemistry, 3rd edn. (chapters 3, 10, 11 and 12), narosa, new delhi, 1975.
4. Hecht e., optics, addison-wesley, 2002.
5. Lipson s.g., lipson h. And tannhauserd.s., optical physics, cambridge university press, usa, 1995

Course: MP 4.4- Atmospheric Physics

BLOCK-4.4A:

Unit-1: Introduction and overview of the atmosphere, description of atmospheric behaviour, mechanisms influencing atmospheric behaviour, composition and structure.

Unit-2: Planetary atmosphere, escape of gases from the atmosphere, atmospheric structure and chemistry.

Unit-3: Distribution of pressure and density in earth's atmosphere, isothermal equilibrium, adiabatic equilibrium, joint effect of moisture, gravity and temperature, atmospheric dragon a satellite.

Unit-4: Variations in atmospheric composition, structure on the basis of composition, thermal structure of the composition.

BLOCK-4.4B:

Unit-5: Introduction, gas laws, virtual temperature, Hydrostatic equation, geopotential, scale height, Hypsometric equation, thickness and heights of constant pressure surfaces, reduction of pressure to sea level.

Unit-6: Adiabatic processes, concepts of an air parcel, dry adiabatic lapse rate, potential temperature.

Unit-7: Water vapour in air, moisture parameters.

Unit-8: Atmospheric dynamics, kinematics of large-scale horizontal flow, properties of the flow, dynamics of horizontal flow, apparent forces, real forces, pressure gradient force, frictional force, horizontal equation of motion, geostrophic wind, effect of friction.

BLOCK-4.4C:

Unit-9: Boundary layer, static stability, atmospheric boundary layer, stability in ABL, boundary layer formation, synoptic forcings, ABL structure and evolution, cumulative heating or cooling, temperature profile evolution, seasonality, stable boundary layer temperature.

Unit-10: Moisture, vapour pressure, Clausius - Clapeyron equation, humidity variables, mixing ratio, specific humidity, absolute humidity, relative humidity, dew point temperature, lifting condensation level, wet bulb temperature, total water mixing ratio.

Unit-11: Dynamics, Newton's second law of motion, Lagrangian and Eulerian momentum budget, forces, advection, pressure gradient force, centrifugal force, Coriolis force, turbulent drag force, winds, geostrophic wind, gradient wind, boundary layer wind, boundary layer gradient wind, cyclostrophic wind.

Unit-12: Global circulation, differential heating, meridional temperature gradient, radiative forcings, heat transport, thermal wind, Jet streams, mid-latitude troughs and ridges, Barotropic instability, Rossby waves, Planetary waves, General circulation.

References:
1. Houghton J., The Physics of the Atmosphere, Cambridge University Press, 2002.
2. John M. Wallace and Peter V. Hobbs, Atmospheric Science – an introductory survey, Academic Press, 2006.
3. Lutgens F.K. And Tarbuk E.K., The Atmosphere: An Introduction To Meteorology, Prentice Hall, USA, 1986.
4. Roland B. Stull, Meteorology for scientists and Engineers, Brooks/Cole, II Edition, 2000.
5. Salby M.L., Fundamentals of atmospheric Physics, Academic Press, 1996.

Course: MP 4.5- Dissertation

COURSE: MP 4.6A-Nuclear Physics Lab-2

(Any eight of the following experiments)

1. Schmidt trigger.
2. Variable delay line.
3. End point energy of beta ray measurement - Feather analysis
4. End point energy of beta ray measurement –Fermi-Curie plot
5. End point energy of beta ray measurement- half-thickness measurement
6. End point energy of beta ray measurement- Nomogram method
7. Z dependence of external Bremsstrahlung radiation
8. Resolution time of coincidence circuit
9. Source strength by gamma-gamma coincidence.
10. Source strength by beta -gamma coincidence.
11. Multi-channel analyzer- energy resolution of gamma rays.
12. Unknown gamma ray source – determination of energy

COURSE: MP 4.6B-Condensed Matter Physics Lab-2

(Any eight of the following experiments)

1. Paramagnetic Susceptibility – Quincke's Method
2. Paramagnetic Susceptibility – Gouy-Balance Method
3. Powder x-Ray Diffraction Pattern – Cell Parameters
4. Powder x-Ray Diffraction Pattern of a Simple Cubic Crystal
5. Magneto Resistance of Semiconductors
6. Optical Rotation of Uniaxial Crystal
7. Polarizabilities of Molecules of a Uniaxial Crystal Using Spectrometer
8. Photo Elasticity in Crystalline Solids
9. Ionic Conductivity of Alkali Halide Crystal
10. Ultrasonic Velocity and Elastic constants of a Solid
11. Determination of Material Constant of an Intrinsic Semiconductor
12. Hall Effect.

Course: MP 4.7- Python Programming: (Practical)

(Skill Enhancement Course-2)

(*Any eight of the following*)

1. Calculate the solar mass.
2. Moment of inertia about center of mass (Sphere and Cylinder).
3. Half-life period of a radioactive material.
4. Calculate Rydberg's constant.
5. Newton's law of gravitation.
6. Heisenberg's uncertainty relation.
7. Capacitor discharge in an RC circuit.
8. Plot relativistic and classical momentum against velocity (velocity range 0c to 0.9c, where cis the velocity of light).
9. Planck's law – plot Planck curves.
10. Planetary motion - plot the actual orbits of the planet for three eccentricities, Projectile motion.

INTER- DISCIPLINARY COURSE
(Open Elective) for First Semester

ವಿಭಾಗ– ಕನ್ನಡ

ಪತ್ರಿಕೆ–೭: 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–೭೫: ಪ್ರಗತಿಶೀಲ ಮತ್ತು ನವ್ಯ: ಅನಕೃ, ಕಟ್ಟೀಮನಿ, ನಿರಂಜನ, ಚದುರಂಗ, ವಿ.ಕೃ. ಗೋಕಾಕ, ಅಡಿಗ, ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ಶಾಂತಿನಾಥ ದೇಸಾಯಿ, ಅನಂತಮೂರ್ತಿ, ಯಶವಂತ ಚಿತ್ತಾಲ, ಲಂಕೇಶ್, ತೇಜಸ್ವಿ, ವೈದೇಹಿ, ವೀಣಾ ಶಾಂತೇಶ್ವರ, ವಿಜಯಾದಬ್ಬೆ,

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, ೧೯೮೨

೨. ಯುಗಧರ್ಮ ಮತ್ತು ಸಾಹಿತ್ಯ ದರ್ಶನ: ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಮನೋಹರ ಗ್ರಂಥ ಮಾಲೆ, ಧಾರವಾಡ, ೧೯೮೦

೩. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಇತಿಹಾಸ: ರಂ.ಶ್ರೀ. ಮುಗುಳಿ, ಗೀತಾ ಬುಕ್ ಹೌಸ್, ಮೈಸೂರು, ೨೦೦೯

೪. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ: ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಹಂಪಿ, ಹೊಸಪೇಟೆ, ೧೯೯೩

೫. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ: (ಪ್ರ.ಸಂ) ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ, ಕರ್ನಾಟಕ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ೨೦೦೯

೬. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ: ತ.ಸು. ಶಾಮರಾಯ, ತಳುಕಿನ ವೆಂಕಣ್ಣಯ್ಯ ಸ್ಮಾರಕ ಗ್ರಂಥಮಾಲೆ, ಮೈಸೂರು, ೨೦೦೪

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,

DEPARTMENT - ENGLISH

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

INDIAN LITERATURE-I

OBJECTIVES

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

BLOCK –I
Kalidasa: Shakuntala
Shudraka: Mrichhakatika

BLOCK -II

Jawaharlal Nehru: An Autobiography
Ram Mohan Roy: Letter to Lord Amherst
Macaulay: Minutes on Indian Education
Vivekananda: Address to the Parliament of Religions

Suggested Reading:

- **M.K.Naik:** Critical Essays on Indian Writing in English. Sahitya Akademi, 1969.

- **Narasimhaiah. C.D:** The Swan and the Eagle. Indian Institute of Advanced Study, 1987.
- **Meenakshi Mukherjee:** The Twice Born Fiction. Heinemann Educational Publishers, 1972.
- **Chirantan Kulshrestha.** Contemporary Indian English Verse: An Evaluation. Arnold-Heinemann, 1981.

DEPARTMENT - HINDI

व्यावहारिक हिंदी एवं व्याकरण

वर्ण विचार

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

- संधि
- समास

शब्द विचार

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

वाक्य विचार

- वाक्य का अर्थ और परिभाषा
- वाक्य के प्रकार .... **आदि**

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- తెలుగుసాహిత్యం లోని రూప-రచనల పరిచయం– పరిచయాత్మక వ్యాస రచనలు
- అనువాద పద్ధతులు- ప్రాయోగికాంశాల అధ్యయనం

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: $1\frac{1}{2}$ and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs
BLOCK – I: **India's Economic Policies**
UNIT : 1 **Economic Policies in India Since 1991**
Economic reforms in India – Economic Scenario in India during 1990-91 – Domestic Financial Crisis – Balance of Payment Crisis – Extent of External debt and debt Trap Problem.
UNIT : 2 **Need for Reforms**
Measures Taken – Devaluation – Privatization – Liberalization – Globalization.
UNIT : 3 **Monetary Policy and Fiscal Policy**
Narasimhan Committee on Banking and Financial Sector Reforms Since 1998 – Fiscal

Reforms: Raja Chellaiah Committee and Tax Reform Policies – Fiscal Prudence and Policies.

UNIT : 4   **Structural Adjustments and External Sector in India**

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

BLOCK : II   **FDI and the Role of State**

UNIT : 5   **Foreign Direct Investment (FDI)**

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

UNIT : 6   **Challenges to Development in India**

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

UNIT: 7   **The Role of State**

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

UNIT : 8   **Administrative Reforms**

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

References:

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

DEPARTMENT - POLITICAL SCIENCE

(OEL-I) Local Government in India

Block-I

Unit:1   Meaning, Nature and Scope of Local Governments.
Unit:2   Evolution of Panchayat Raj Institution in India.
         a) Constitute Assembly and Village Panchayat.

b) Balavanth Roy Mehta Committee Report
c) Ashok Mehta Committee Report.
d) G.V.K. Rao Committee Report.

Unit:3   Constitutional Amendments and Panchayat Raj Institutions:
a) Basis of Constitutional Amendment.
b) 73rd and 74th Constitutional Amendment.
c) Karnataka Panchayat Raj At of 1983.
d) Karnataka Panchayat Raj Act of 1993.

Unit:4   Zilla Panchayat: Structure, Functions and Sources of Revenue.

Block-II

Unit:5   Taluk Panchayat : Structure, Functions, Executive Officer, Powers and Functions.
Unit:6   Gram Panchayat: Gram Sabha, Ward Sabha: Structure, Functions and Sources of Revenue.
Unit:7   Panchayat Development Officer and Secretary: Powers and Functions.
Unit:8   Role of Panchayat Raj Institutions in Development (with Reference to Karnataka)
a) Panchayat Raj in Rural Development.
b) 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:

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

DEPARTMENT - EDUCATION

IDC – 1 FOUNDATIONS OF EDUCATION

BLOCK-1 FOUNDATIONS OF EDUCATION – I

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

BLOCK-2 FOUNDATIONS OF LEARNING – II

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

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

DEPARTMENT – COMMERCE

EL1.1: Personal Financial Planning

Objective: To enable the Students to understand about the different Investment Avenues, Saving Schemes designed by various agencies particularly for the individuals.
Pedagogy: A Combination of Lectures, Group Discussion, Assignments.
Credits: 2
Examination Duration: $1\frac{1}{2}$ 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 andMadhuamathi, Investment Analysis and Portfolio Management, Pearson Publications.
04. Gordon and Natarajan, Emerging Scenario of Financial Services, Himalaya Publishing House.
05. George Rejda, Principles of Risk Management and Insurance, Pearson.

DEPARTMENT - MANAGEMENT
COURSE: OE-1 : Disaster Management - Credit: 2
MBAS 459: DISASTER MANAGEMENT

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

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

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

DEPARTMENT - BIO CHEMISTRY
Basics of Bioinorganic and Biophysical chemistry for Biology graduates.

Bioinorganic chemistry

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

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

Porphyrin nucleus and their classification. Important metallo-porphyrins occurring in nature. Structure and biological importance of Heme, cytochrome, chlorophyll,Vitamin 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 vectors-plasmids, cloning in plasmid, transformation and detection of transformants- lacZ, genomic and cDNA libraries, gene analysis techniques-hybridization: Southern, Northern, Western, in situ, Polymerase chain reaction.

Microbial and food and environmental Biotechnology

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

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

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

Plant Biotechnology

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

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

Animal Biotechnology

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

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

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

DEPARTMENT - CHEMISTRY

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

ock-2	Title: Bonding and molecular structure
it-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.
it-6	ns and ionic compounds, properties of ionic compounds, formation of ionic compounds, covalent compounds, properties of covalent compounds, properties of covalent compounds
it-7	etals, 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.
it-8	ids and bases, general properties of acid and bases, Acid base reactions, oxidation reduction reactions, oxidation number, types of redox reactions, balancing oxidation-reduction equation, exothermic and endothermic reactions

energy change in chemical reactions.

DEPARTMENT : CLINICAL NUTRITION AND DIETETICS
OEL-1: HEALTHY LIFESTYLES AND NUTRITION
3 Credits

BLOCK 1: INTRODUCTION TO FOOD AND NUTRITION

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

Unit 2-. A brief review of nutrients in general –
- Energy and macronutrients – Carbohydrates, Protein, Fat - functions, sources deficiency disorders and recommended intakes.
- Micronutrients: Minerals – calcium, Iron, Iodine, and other elements, Vitamins – FatSoluble & Water Soluble.

Unit 3: Nutritional assessment- Anthropometric, biochemical, clinical, dietary andBiochemical 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 publishing company, Bombay.

- B. 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 -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.
2. Smith, B. E. (2013). Green Computing: Tools and Techniques for Saving Energy, Money, andResources. CRC Press.

DEPARTMENT -BOTANY

Plant-Microbe Interactions

Overview of plant microbes interactions,
Introduction, beneficial microbes, Rhizobium bacterium and nitrogen fixation, mycorrhizal fungi.
Plant pathogens, Agrobacterium tumefaciens and crown gall disease,
Mechanisms of plant disease mechanism, some bacterial plant diseases,
Plant viruses and mechanism of plant against viruses attacks.
Fungal pathogen- mechanism of plant disease,
Omycete pathogens, Fungal mediated plant.
General concept of plant immunity,
PAMP-triggered immunity (PTI) and effectors-triggered immunity (ETI).
Transcription activator like effector and their role in virulence and disease resistance.

References

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

DEPARTMENT -ZOOLOGY

MZO-IE-1: Parasites, Vectors & Communicable Diseases
Introduction to parasites.
Distribution, types, origin and evolution of parasites. Parasitism.
Types: Ecto-parasites, Endo-parasites and their adaptations.

Pathogenic micro-organisms, brief outline and classification of parasitic protozoan's: Entamoeba, Balantidium, Giardia, 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-host-parasites interactions, Host-pathogen interaction, insects transmitting Bacteria and viruses.

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

Insecticide resistance in vectors, Drug resistance in pathogens.

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

DEPARTMENT –FOOD AND NUTRITION SCIENCE

ELMFNS- 01   FOOD PSYCHOLOGY

Credits: 2

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

Unit 2: The Role of Food and Eating on Personality and Social Development: Psychology of eating, Food and emotion regulation, Food in daily living, Food Socialization, Food and control of others
Unit 3: Food Preferences and Fluctuations: Developmental Models, Cognitive Models & Psychophysiological Models, Physiology of food choice, Likes and Dislikes, acquired food preferences, Attitudes towards change, Food and sensory stimulus, Factors influencing eating behavior – (biological, environmental, individual, food characteristics, culture etc., Effect of eating on food selection and preferences, Understanding of the body and self – selection of the diet.

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

BLOCK 2: EATING DISORDERS AND TREATMENTS

Unit 5: Mood, Emotions, food cravings and addictions: relation with food preferences, Connection between mood and eating, Biological and physiological aspects of food cravings, Stress and eating behavior, Food addiction - description, neurobiology of food addiction

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

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

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

REFERENCES:

1. Smith John L. (2002), The Psychology of Food and Eating (English, Hardcover, Smith John , Publisher: Palgrave MacmillanL.), ISBN: 9780333800201, 0333800206.

   Alexandra W. LogueOct 2017, The Psychology of Eating and Drinking Fourth Edition.

INTER- DISCIPLINARY COURSE

(Open Elective) for Second Semester

ವಿಭಾಗ– ಕನ್ನಡ

ಪತ್ರಿಕೆ–೧: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ   EL-2.1 (ಕ್ರೆಡಿಟ್–೨)

ಬ್ಲಾಕ್–೩೧: ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಉಗಮ ಮತ್ತು ವಿಕಾಸ

ಘಟಕ–೧೪೯: ಸಾಹಿತ್ಯದ ಉಗಮ, ಬೆಳವಣಿಗೆ, ಉದ್ದೇಶ.

ಘಟಕ–೧೫೦: ಪ್ರಾಚೀನ ಪೂರ್ವ ಶಾಸನಸಾಹಿತ್ಯ.

ಘಟಕ–೧೫೧: ಪಂಪ ಪೂರ್ವ ಯುಗದ ಸಾಹಿತ್ಯ.

ಘಟಕ–೧೫೨: ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ವಿಭಾಗಕ್ರಮ.

ಬ್ಲಾಕ್–೩೨: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ

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

ಘಟಕ–೧೫೪: ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪರಿಕಲ್ಪನೆಗಳು;

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

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

ಪಂಪ, ರನ್ನ, ಪೊನ್ನ, ೧ನೆ ಚಾವುಂಡರಾಯ, ನಾಗವರ್ಮ ೨ನೆಯ 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 ಗ್ರಂಥಗಳು

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

೨. ಕಾವ್ಯ ವಿಹಾರ : ಕುವೆಂಪು, ಉದಯರವಿ ಪ್ರಕಾಶನ, ಮೈಸೂರು, ೧೯೮೯

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, ೧೯೯೩

೬. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಸಂಗಾತಿ : ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ, ಮನೋಹರ ಗ್ರಂಥಮಾಲೆ, ಧಾರವಾಡ

೭. ಶೈಲಿ : ಎಸ್.ವಿ.ರಂಗಣ್ಣ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು, ೧೯೮೬

೮.   ಶತಮಾನದ ಕನ್ನಡ ಸಾಹಿತ್ಯ : ಸಂಪಾದಕರು, ಜಿ.ಎಸ್. ನಾಯಕ, ಕನ್ನಡ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ಬೆಂಗಳೂರು

೯. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಇತಿಹಾಸ : ರಂ. ಶ್ರೀ. ಮುಗಳಿ, ಕೇಂದ್ರ ಸಾಹಿತ್ಯ   ಅಕಾಡೆಮಿ, ನವದೆಹಲಿ, ೧೯೯೩

೧೦. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ರಂ.ಶ್ರೀ. ಮುಗಳಿ, ಉಷಾ ಸಾಹಿತ್ಯ ಮಾಲೆ, ಮೈಸೂರು, ೧೯೮೦

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, ಪ್ರಸಾರಾಂಗ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು, ೨೦೦೮

DEPARTMENT - ENGLISH

EL-2.1: INDIAN LITERATURE-II
OBJECTIVES
- To appreciate artistic values in *Hayavadana* and the use of myth
- To know the importance of Indian English historical plays
- To appreciate Sri Aurobindo as a poet and critic
- To comprehend the different theories of aesthetic experience of art

BLOCK -I
Girish Karnad: Hayavadana
Gurucharan Das: Larin Sahib

BLOCK –II

M. Hiriyanna: Art Experience
Sri Aurobindo: Selections: The Poets of the Dawn and The Poets of the Dawn 3 (The Future Poetry)

Suggested Reading:
- **K.R.Srinivas Iyengar:** Indian Writing in English .Macmillan, 1979.
- **M.K.Naik:** Critical Essays on Indian Writing in English.Sahitya Akademi, 1969.
- **Narasimhaiah C.D:** The Swan and the Eagle. Indian Institute of Advanced Study, 1987.

- **Meenakshi Mukherjee:** The Twice Born Fiction. Heinemann Educational Publishers, 1972.

DEPARTMENT - HINDI

हिंदी सिनेमा

- सिनेमा का उद्भव और विकास
- मूक चलचित्र और दादा साहब फाल्के युग
- दूसरा पढाव, सवाक चलचित्र अथवा आलमआरा
- रंगीन सिनेमा का युग
- 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- प्रह्लाद अग्रवाल, अनामिका प्रकाशन, नई दिल्ली
- कथाकार कमलेश्वर और हिंदी सिनेमा- उज्ज्वल अग्रवाल, राजकमल प्रकाशन, नई दिल्ली
- बॉलिवुड पाठ विमर्श के संदर्भ- ललित जोशी, वाणी प्रकाशन, नई दिल्ली
- 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.

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

DEPARTMENT - ECONOMICS
EL2.1: Institutions for International Development

- **Objective:** To enable the Students to understand the need and importance of various International Institutions.
- **Pedagogy:** A Combination of Lectures, Group Discussion, Assignments.
- **Credits:** 2 ; Examination Duration: $1\frac{1}{2}$ and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

Block – I **Economic Issues at Global and National Level**

Unit – 1 **Globalisation**
Globalisation – Forces Driving Globalisation – Income Inequality – National Integrity – Impact on Labour – Multinational corporations – Global Business Environment – National Business Environment.

Unit – 2 **Legal Issues of Business at Global and National Level**
Political Risks – Legal System – Business Ethics – Centrally Planned Economy – Mixed Economy – Market Economy – Human Development

Unit – 3 **International Trade**
Importance – Volume – Direction – Composition – Trends – Theories of Trade - Mercantilism – Absolute Advantage – Comparative Advantage – International Product Life Cycle – Political, Economic and Cultural Motives behind Government Intervention.

Unit – 4 **GATT and WTO**
Importance – objectives – Functions - GATT and W.T.O – India and WTO.

Block – II **Economic Integration and International Business Issues**
Unit – 5 **Regional Economic Integration**
Meaning – Effects – Integration in Europe: European Union – Integration in Americans :

North American Free Trade Agreement (NAFTA) – Latin American Integration Association (LAIA) – Free Trade Area of Americans (FTAA) and Transatlantic Economic Partnership.

Unit – 6   Integration in Asia
Association of Southern East Asian Nations (ASEAN) - Asia Pacific Economic Cooperation (APEC) – Integration in middle East : Gulf Cooperation Council (GCC) – BRICS – SAARC.

Unit – 7   International Financial Markets
International capital markets – Foreign Exchange markets – Currency Convertibility – International Monetary System.

Unit – 8   Issues in International Business
Trade War – Balance of Payment – Terrorism – Oil Crisis – Smuggling – Dumping – Environmental Degradation – Exhibit of Nuclear power – Covid 19 and other pandemics.

References:

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

DEPARTMENT - POLITICAL SCIENCE

(OEL-I) Indian Constitution

Block-I
Unit:1   Framing of the Indian Constitution.
Unit:2   Preamble and Salient Features of the Indian Constitution.
Unit:3   Fundamental Rights and Duties.
Unit:4   Directive Principles of the State Policy.

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

References:

1. Andre Beteille, 1965. Caste,class, and Power. Berkley: University of California Press.
2. Appadorai, A 1968. india: Studies In Social And Political Development 1947-1967. New Delhi: Aisa Publishing House.
3. Desai, A R. 2016. Social Background of Indian Nationalism. Los Angeles: 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)
<u>**References**</u>

- 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: $1^{1}/_{2}$ and Maximum Marks: 50 (Internal Assessment Marks = 10 and Semester-end Examination =40)

Course Inputs

Block I
*   **Unit -1: Entrepreneur and Entrepreneurship:** Introduction **-** Evolution – Characteristics – Distinction between Entrepreneur and Manager – Functions – Types – Entrepreneur - Concept of Entrepreneurship – Growth of Entrepreneurship in India – Role of Entrepreneurship in Economic Development
*   **Unit – 2: Women Entrepreneurship:** Introduction - Concept – Statistical Evidence – New Age Women – Functions – Growth - Problems – Recent trends in Development of Women Entrepreneurship.
*   **Unit -3: Rural Entrepreneurship:** Introduction **-** Meaning – Need – Rural Industrialisation in Retrospect – Problems – Development of Rural Entrepreneurship – NGOs and Rural Entrepreneurship.
*   **Unit -4: Conceptual Models of Entrepreneurship:** Introduction **-** Models of John Kao – Udai Pareek and Nadakarni– NISIET.

Block II
*   **Unit – 5: Factors Affecting Entrepreneurial Growth And Competencies:** Introduction **-** Economic Factors – Non-Economic Factor – Government Actions - Entrepreneurial Competencies: Meaning – Major Entrepreneurial Competencies – Developing Competencies.
*   **Unit -6: Entrepreneurial Motivation and Mobility:** Introduction **-** Motivation – Motivation Theories – Motivating Factors – Achievement Motivation – Factors Influencing Mobility – Occupational Mobility – Locational Mobility.
*   **Unit – 7: Entrepreneurship Development 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, ($KHSO_4$, HNO_3, 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 Semi-conservative DNA replication, DNA Polymerases and its role, E.coli Chromosome Replication, Bidirectional Replication of Circular DNA molecules. Rolling Circle Replication, DNA Replication in Eukaryotes DNA Recombination – Holliday Model for Recombination Transformation

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

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

DEPARTMENT - CHEMISTRY

ock-1	Title: Physical parameters of molecules
it-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 .

ii.   Microbial Control of Soil Borne Plant Pathogens: Biocontrol mechanisms and ways, Microorganisms used as biocontrol agents against Microbial plant pathogens, Insects, Weeds.

iii.   Biofertilization, Phytostimulation,

iv.   Bioinsecticides: Plant growth promoting 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 -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 E-commerce, Local E-commerce E-commerce: A Brief History, Understanding E-commerce: Organizing Themes, Academic Disciplines Concerned with E-commerce

Unit 3 : E-Commerce Infrastructure
The Internet, Technology Background , Internet – Key Technology concepts, TCP/IP, IP addresses, Domain names, DNS and URLs, Client Server Computing, Cloud computing model, Mobile platform

Unit 4 : Internet and Web
Hypertext, HTML, XML, Web servers and clients, Web browsers, Communication tools – E mail, messaging apps, online message boards, Internet Telephony

Block 2: Construction of E-commerce presence

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

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

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

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

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

DEPARTMENT - BOTANY
Plant Diversity and Human Welfare
Plant Diversity and its Scope Levels of biodiversity: Genetic, Species and Ecosystem; Agrobiodiversity and cultivated plant taxa and related wild taxa.
Values and uses of Biodiversity, Methodologies for valuation, Ethical and aesthetic values, Uses of plants; Ecosystem services.
Loss of Biodiversity Loss of biodiversity- causes and implications, Hot spots of biodiversity, extinction of species, projected scenario for biodiversity loss.
Management of Plant Biodiversity Organizations associated with biodiversity management, IUCN, UNEP, WWF, UNESCO, NBPGR; Methodology for execution;

Biodiversity legislation; Information management and communication.

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

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

Biodiversity awareness programmes, Sustainable development.

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

References

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices.Oxford and IBH Publications Co. Pvt. Ltd. New Delhi

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

3. Reddy, K.V. and Veeraiah, S. (2010). Biodiversity and Plant Resources. Aavishkar publication, New Delhi.

4. Heywood, V. H. and Watson, R. T. (1995). Global biodiversity and Assessment. Cambridge University Press.

DEPARTMENT –FOOD AND NUTRITION SCIENCE

OEL-2: NUTRITIONAL MANAGEMENT IN DISASTER CONDITIONS

BLOCK- I: NATURAL / MANMADE DISASTERS

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

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

Unit-3: Feeding Programs during Emergencies.

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

BLOCK- I: NUTRITIONAL RELIEF AND REHABILITATION

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

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

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

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

REFERENCES:

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

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

A. Question Paper Pattern

First semester M.Sc. Physics Examination, MM/YYYY

Paper: MP 1.3 – Atomic and Molecular Physics

Time: 3 Hours   Maximum Marks: 80

Instruction: Answer *all* questions.

1. (a)   (10)

   (b)   (5)

(OR)

2. (a)   (10)

   (b)

                                                                                                           (5)

   3 .(a)   (10)

      (b)   (5)

(OR)

4 .(a) (10)

(b) (5)

5. (a) (10)

(b) (5)

(OR)

6 .(a) (10)

(b) (5)

7. (a)

(10)

(b)   (5)

(OR)

8. (a)   (6)

(b)   (5)

(c)   (4)

9.   Answer **any four** of the following: (4X5=20)

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

First semester M.Sc. Physics Examination, MM/ YYYY

Paper: MP 1.3 – Atomic and Molecular Physics

Time: 3 Hours   Maximum Marks: 80

Instruction: Answer *all* questions.

1. (a)   Derive an expression for the rotational energy of a diatomic molecule using rigid rotator.   (10)

   (b)   Explain vibrational Progression and Sequence in the electronic spectrum of a diatomic   (5)
         molecule with a neat diagram.

<div align="center">OR</div>

2. (a)   Obtain an expression for Franck-Condon factor and explain its significance.   (10)

   (b)   Write a note on the formation of band head in rotational band spectra for $B'_v < B''_v$ using

         Fortrat parabola.   (5)

3. (a)   Describe the parameters of a molecular structure.   (10)

   (b)   Write the applications of lattice energy.   (5)

<div align="center">OR</div>

4. (a)   Explain the formation of σ -bond and π-bond.   (10)

   (b)   Discuss sp-hybridization along with its characteristics.   (5)

5. (a)   Explain the processes of induced absorption, spontaneous emission and stimulated
         emission in Lasers using Einstein's coefficients.

         (10)

   (b)   Write a note on coherence in Lasers.   (5)

<div align="center">OR</div>

6 .(a) Explain the construction and working of Ruby Laser.   (10)

   (b) Write the applications of Holography techniques.   (5)

7. (a)   Define Harmonic generation. How second harmonic generation can be observed experimentally?
                                                                               (10)

   (b)   Explain the environmental applications of Laser Raman Spectroscopy. (5)

                                    OR

8. (a) What are the mode locking of Lasers? Discuss with examples.   (10)

   (b) Write a note on Q-switched Lasers.   (5)

9.   Answer **any four** of the following: (4X5=20)

(a)   Arrive at an expression for rotational level with maximum intensity using Boltzmanndistribution law.

 (b)   Discuss the intensity distribution in the vibrational structure for $r_e^{''} < r_e^{'}$.

(c)   Write a note on Ionic bond.

 (d)   Write a note on close packing structure.

(e)   What do you mean by pumping in Lasers? What are its types?

(f)   Discuss the construction of CO_2 laser along with the neat diagram.

(g)   Why Stokes' lines are more intense than anti-Stokes' lines?

(h)   What is homogeneous and inhomogeneous broadening?