MANONMANIAM SUNDARANAR UNIVERSITY -TIRUNELVELI

UG **PROGRAMMES**

OPEN AND DISTANCE LEARNING (ODL) PROGRAMMES

(FOR THOSE WHO JOINED THE PROGRAMMES FROM THE ACADEMIC YEAR 2023-2024 ONWARDS)

B.Sc. Physics			
Semester	**Course**	**Title of the Course**	**Course Code**
III	Part I –Languages (Tamil)	தமிழக வரலாறும் பண்பாடும்	J1TL31
	Part II – Languages (English)	General English III	J2EN31
	Core V	Mechanics	JMPH31
	Core VI	Physics Practical III	JMPHP3
	Elective	Allied Chemistry I	JECH31
		Allied Chemistry Practical I	JECHP 1
	Skill Enhancement Course - IV	Maintenance of Electrical appliances	JSPH31
	NMC /Substitute Paper	Instrumentation physics I	JNPH31
	EVS	Environmental Studies (Common)	JEVS31

Mechanics

UNIT	Details
I	LAWS OF MOTION: Newton‘s Laws – forces – equations of motion – frictional force – motion of a particle in a uniform gravitational field. Gravitation: Introduction – Kepler‘s laws, Newton‘s law of gravitation – Determination of G by Boy‘s method – Earth-moon system – weightlessness – earth satellites –earth density – mass of the Sun – gravitational potential –escape velocity – satellite potential and kinetic energy
II	CONSERVATION LAWS OF LINEAR AND ANGULAR MOMENTUM: Conservation of linear and angular momentum – Internal forces and momentum conservation – center of mass – examples – general elastic collision of particles of different masses – system with variable mass – examples – conservation of angular momentum – torque due to internal forces – torque due to gravity – angular momentum about center of mass
III	CONSERVATION LAWS OF ENERGY: Introduction – significance of conservation laws – law of conservation of energy - concepts of work- power – energy – conservative forces – potential energy and conservation of energy in gravitational field – examples –non-conservative forces – general law of conservation of energy.
IV	RIGID BODY DYNAMICS: Translational and rotational motion – angular momentum – moment of inertia – general theorems of moment of inertia – examples – rotation about fixed axis – kinetic energy of rotation – examples – body rolling along a plane surface – body rolling down an inclined plane
V	LAGRANGIAN MECHANICS: Generalized coordinates –degrees of freedom - principle of virtual work and D‘ Alembert‘s Principle – Lagrange‘s equation from D‘ Alembert‘s principle – application –simple pendulum – Atwood‘s Machine.

TEXT BOOKS
1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai. 2. P.DuraiPandian, LaxmiDuraiPandian, MuthamizhJayapragasam,2005,Mechanics, 6threvised edition,S.Chandand Co. 3. D. S.Mathur and P. S.Hemne, 2000, Mechanics, Revised Edition,S.Chandand Co. 4. Narayanamurthi, M.andNagarathnam. N, 1998, Dynamics. The National Publishing,Chennai. 5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai

Physics Practical III

Minimum of Six Experiments from the list:

1. Calibration of low range voltmeter using potentiometer
2. Calibration of ammeter using potentiometer.
3. Determination of field along the axis of a current carrying circular coil.
4. Determination of earth‘s magnetic field using field along axis of current carrying coil.
5. Determination of specific resistance of the material of the wire using PO box.
6. Determination of specific resistance using Carey Foster‘s bridge.
7. Determination of e.m.f of thermo couple using potentiometer
8. Determination of figure of merit of BG or spot galvanometer.
9. Ballistic Galvanometer – Comparison of EMF‘s – E1 / E2
10. Series Resonance Circuit
11. Parallel Resonance Circuit
12. Owen‘s Bridge – Determination of self-inductance of the coil
13. Anderson‘s bridge – Self - inductance of the coil
14. Comparison of Magnetic Moments – Deflection Magnetometer (Tan A and Tan B position)
15. M and BH – Vibration magnetometer

Note : Use of digital balance, digital screw gauge, digital calipers are permitted

Allied Chemistry For Physical Sciences I

UNIT	Details
I	**Chemical Bonding and Nuclear Chemistry** Chemical Bonding: Molecular Orbital Theory-bonding, antibonding, and non-bonding orbitals. Molecular orbital diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties. Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions - group displacement law. Nuclear binding energy - mass defect - calculations. Nuclear fission and nuclear fusion - differences – Stellar energy. Applications of radioisotopes - carbon dating, rock dating and medicinal applications.
II	**Industrial Chemistry** Fuels: Fuel gases: Natural gas, water gas, semi water gas, carburetted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required). Silicones: Synthesis, properties and uses of silicones. Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate.
III	**Fundamental Concepts in Organic Chemistry** Hybridization: Orbital overlap, hybridization and geometry of CH4, C2H4, C2H2 and C6H6. Electronic effects: Inductive effect and consequences on Ka and Kb of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric examples. Reaction mechanisms: Types of reactions–aromaticity (Huckel's rule) - aromatic electrophilic substitution; nitration, halogenation, Friedel- Craft's alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.
IV	**Thermodynamics and Phase Equilibria** Thermodynamics: Types of systems, reversible and irreversible processes, isothermal and adiabatic processes and spontaneous processes. Statements of first law and second law of thermodynamics. Carnot's cycle and efficiency of heat engine. Entropy and its significance. Free energy change and its importance (no derivation).Conditions for spontaneity in terms of entropy and Gibbs free energy. Relationship between Gibbs free energy and entropy. Phase Equilibria: Phase rule - definition of terms in it. Applications of phase rule to water system. Two component system – Reduced phase rule and its application to a simple eutectic system (Pb-Ag).
V	**Analytical Chemistry** Introduction to qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques – extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography.

Text Books

1. V.Veeraiyan, Text book of Ancillary Chemistry; High mount publishing house,Chennai, first edition,2009.
2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006.
3. S.ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, NewDelhi, twenty third edition, 2012.
4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.

Allied Chemistry Practical For Physical Sciences I

VOLUMETRIC ANALYSIS
1. Estimation of sodium hydroxide using standard sodium carbonate. 2. Estimation of hydrochloric acid using standard oxalic acid. 3. Estimation of ferrous sulphate using standard Mohr's salt. 4. Estimation of oxalic acid using standard ferrous sulphate. 5. Estimation of potassium permanganate using standard sodium hydroxide. 6. Estimation of magnesium using EDTA. 7. Estimation of ferrous ion using diphenyl amine as indicator.

Maintenance of Electrical appliances

UNIT	Details
I	Basic Electric components Active & passive components-Resistance – capacitance types - inductance –its units- - Galvanometer, ammeter, voltmeter and multimeter- Transformers-types-coils –wire gauges Electrical energy - power - consumption of electrical power.
II	Basic home Electrical appliances Electric bulbs-working principles of - LED lamps-Electric Fans-Wet Grinder- Water purifier basics and working – maintenance-Mixie –electric Iron box
III	High Power Electrical appliances and safety requirements Water Heater - Storage and Instant types – basics and working of microwave oven - Washing Machine - Air conditioner- its maintenance- concept of water pumping motor - overloading-short circuiting- ground earthing of appliances.
IV	Thermal electrical appliances Room heater-basics and working of electric iron & immersion rod-automatic rice cookerelectric kettletoaster& hair dryer-induction cooker& stove
V	Relays & Switches Electrical protection - Relays - Fuses - Electrical switches - Circuit breakers-MCB - basics and working of ELCB - RCCB - ground fault protection

TEXT BOOKS
1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai. 2. P.DuraiPandian, LaxmiDuraiPandian, MuthamizhJayapragasam,2005,Mechanics, 6th revised edition, S.Chandand Co. 3. D. S.Mathur and P. S.Hemne, 2000, Mechanics, Revised Edition,S.Chandand Co.19 4. Narayanamurthi, M.andNagarathnam. N, 1998, Dynamics. TheNational Publishing,Chennai. 5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai

Instrumentation Physics – I

UNIT	Details
I	MEASUREMENT Definition - Units of measurement; systems of units - Length, mass, and time measurements - Accuracy and precision
II	ERROR Definition - Types of error (Gross error, Systematic error, Random error) - Statistical analysis (Arithmetic mean, Deviation from the mean, Average deviation, Standard deviation) - Probability of errors (Normal distribution of errors, Probable error) - Limiting errors.
III	ELECTRODES Electrode potential - Purpose of the electrode paste - Electrode material - Types of electrodes - Microelectrodes (metal microelectrode) - Surface electrodes
IV	SPECIALIZED IN MEDICAL INSTRUMENTS Angiography - Digital thermometer - Endoscopes - EEG - ECG – Computed Tomography (CT scan)
V	DISPLAYS Classification of displays - Display devices - Liquid Crystal Diode – Incandescent display -Liquid vapour display – Light Emitting Diode (LED)

TEXT BOOKS

1. Albert D. Helfrick and William D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice-Hall of India Pvt. Limited, Reprint 2002.
2. M. Arumugam, Biomedical Instrumentation, Anuradha Agencies, Reprint 2002.
3. H.S.Kalsi, Electronic Instrumentation, Tata McGraw Hill Education Pvt. Limited, Reprint 2012.