SYLLABUS FOR THE POST OF LABORATORY ASSISTANT
IN FORENSIC SCIENCE DEPARTMENT
(HIGHER SECONDARY STANDARD)
(OBJECTIVE TYPE)

SUBJECT CODE: 320

A) PHYSICS

UNIT – I: ELECTROSTATICS
Frictional electricity, charges and their conservation; Coulomb’s law – forces between two point electric charges. Forces between multiple electric charges – Superposition principle.
Electric field – Electric field due to a point charge, electric filed lines; Electric dipole, electric filed intensity due to a dipole – behaviour of dipole in a uniform electric field – application of electric dipole in microwave oven.
Electric potential – potential difference – electric potential due to a point charge and due a dipole. Equipotential surfaces – Electrical potential energy of a system of two point charges.

Electric flux – Gauss’s theorem and its applications to find field due to (1) infinitely long straight wire (2) uniformly charged infinite plane sheet (3) two parallel sheets and (4) uniformly charged thin spherical shell (inside and outside)


UNIT – II: CURRENT ELECTRICITY
Electric current – flow of charges in a metallic conductor – Drift velocity and mobility and their relation with electric current.


UNIT- III: EFFECTS OF ELECTRIC CURRENT
Magnetic effect of electric current – Concept of magnetic field. Oersted’s experiment – Biot-Savart law – Magnetic field due to an infinitely long current carrying straight wire and circular coil – Tangent galvanometer – Construction and working – Bar magnet as an equivalent solenoid – magnetic field lines.
Amper’s circuital law and its application.
Force on a moving charge in uniform magnetic field and electric field – cyclotron – Force on current carrying conductor in a uniform magnetic field, forces between two parallel current carrying conductors – definition of ampere.
Torque experienced by a current loop in a uniform magnetic field-moving coil galvanometer – Conversion to ammeter and voltmeter – Current loop as a magnetic dipole and its magnetic dipole moment – Magnetic dipole moment of a revolving electron.

UNIT-IV: ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT
Electromagnetic induction – Faradys’s law – induced emf and current – Lenz’s law.
Self induction – Mutual induction – Self inductance of a long solenoid – mutual inductance of two long solenoids.
Methods of inducting emf – (1) by changing magnetic induction (2) by changing area enclosed by the coil and (3) by changing the orientation of the coil (quantitative treatment) analytical treatment can also be included.
AC generator – commercial generator. (Single phase, three phase).
Eddy current – Applications – Transformer – Long distance transmission.


UNIT – V: ELECTROMAGNETIC WAVES AND WAVE OPTICS

Electromagnetic waves and their characteristics – Electromagnetic spectrum, Radio, Microwaves, Infra red, visible, ultra violet – X rays, gamma rays.
Emission and absorption spectrum – Line, Band and continuous spectra – Flourescence and phosphorescence.

Theories of light – Corpuscular – Wave – Electromagnetic and Quantum theories.

Scattering of light – Rayleigh's scattering – Tyndal Scattering – Raman effect – Raman spectrum – Blue colour of the sky and reddish appearance of the sun at sunrise and sunset.

Wavefront and Huygen's principle – Reflection, Total internal reflection and refraction of plane wave at a plane surface using wavefronts.


Diffraction – differences between interference and diffraction of light – diffraction grating.


UNIT – VI: ATOMIC PHYSICS

Atomic structure – discovery of the electron – specific charge (Thomson’s method) and charge of the electron (Millikan’s oil drop method) – alpha scattering – Rutherford’s atom model.

X-rays – production, properties, detection, absorption, diffraction of X-rays – Laue’s experiment – Bragg’s law, Bragg’s X-ray spectrometer – X-ray spectra – continuous and characteristic X-ray spectrum – Mosley’s law and atomic number.


UNIT – VII: DUAL NATURE OF RADIATION AND MATTER – RELATIVITY
Concept of space, mass, time – Frame of references. Special theory of relativity – Relativity of length, time and mass with velocity (E=mc^2).

UNIT – VIII: NUCLEAR PHYSICS
Radio carbon dating – biological radiation hazards.

UNIT – IX: SEMICONDUCTOR DEVICES AND THEIR APPLICATIONS
Formation of P-N Junction – Barrier potential and depletion layer – P-N Junction diode – Forward and reverse bias characteristics – diode as a rectifier – zener diode. Zener diode as a voltage regulator – LED.


Logic gates – NOT, OR, AND, EXOR using discrete components – NAND and NOR gates as universal gates – integrated circuits.


**UNIT – X: COMMUNICATION SYSTEMS**

Modes of propagation, ground wave – sky wave propagation.
Amplitude modulation, merits and demerits – applications – frequency modulation – advantages and applications – phase modulation.
Antennas and directivity.
Radio transmission and reception – AM and FM – superheterodyne receiver.
T.V. transmission and reception – scanning and synchronising.
Vidicon (Camera tube) and picture tube – block diagram of a monochrome TV transmitter and receiver circuits.
Radar – principle – applications.
Digital communication – data transmission and reception – principles of fax, modem, Satellite communication – wire, cable and Fibre – optical communication.
B) CHEMISTRY

I - INORGANIC CHEMISTRY

UNIT - I: ATOMIC STRUCTURE-II
Dual properties of electrons - de-Broglie relation – Heisenberg’s uncertainty principle – Wave nature of an electron – Schrodinger wave equation (only equation, no derivation) – Eigen values and Eigen function – significance only – molecular orbital method. Application to Homo diatomic and Hetero diatomic molecules – Metallic Bond – Hybridization of atomic orbital’s Hybridization involving s, p and d Orbital’s – Types of forces between molecules.

UNIT- II: PERIODIC CLASSIFICATION-II
Review of periodic properties – Calculation of atomic radii – Calculation of ionic radii – Method of determination of Ionisation potential – Factors affecting ionisation potential – Method to determine the electron affinity – Factors affecting EA – Various scales on electro negativity values.

UNIT- III: p- BLOCK ELEMENTS – II

UNIT- IV: d- BLOCK ELEMENTS
General characteristics of d-block elements – First transition series – Occurrence and principles of extraction – chromium, copper and zinc – Alloys – Second transition series – Occurrence and principles of extraction of silver – Third transition series – Compounds – K$_2$Cr$_2$O$_7$, CuSO$_4$.5H$_2$O, AgNO$_3$, Hg$_2$Cl$_2$, ZnCO$_3$, Purple of cassius.

UNIT-V: f- BLOCK ELEMENTS
General characteristics of f-block elements and extraction – Comparison of Lanthanides and Actinides – Uses of lanthanides and actinides.
UNIT-VI: COORDINATION COMPOUNDS AND BIO-COORDINATION COMPOUNDS

UNIT - VII: NUCLEAR CHEMISTRY
Nuclear energy, nuclear fission and fusion – Radio carbon dating – Nuclear reaction in sun – Uses of radioactive isotopes.

II.PHYSICAL CHEMISTRY

UNIT-VIII: SOLID STATE II

UNIT- IX: THERMODYNAMICS – II

UNIT-X: CHEMICAL EQUILIBRIUM II
Applications of law of mass action – Le Chatlier’s principle.

UNIT-XI: CHEMICAL KINETICS –II
First order reaction and pseudo first order reaction – Experimental determination of first order reaction – method of determining order of reaction – temperature dependence of rate constant – Simple and complex reactions.

UNIT-XII – SURFACE CHEMISTRY

UNIT-XIII – ELECTROCHEMISTRY – I
Conductors, insulators and semi conductors – Theory of electrical conductance – Theory of strong electrolytes – Faraday’s laws of electrolysis – Specific resistance,
specific conductance, equivalent and molar conductance – Variation of conductance with dilution – Kohlraush’s law – Ionic product of water, pH and pOH – Buffer solutions – Use of pH values.

UNIT-XIV – ELECTROCHEMISTRY – II

III. ORGANIC CHEMISTRY
UNIT-XV: ISOMERISM

UNIT- XVI: HYDROXY DERIVATIVES

UNIT- XVII: ETHERS

UNIT- XVIII: CARBONYL COMPOUNDS

UNIT- XIX: CARBOXYLIC ACIDS
Nomenclature – Preparation of aliphatic monocarboxylic acids –formic acid – Properties – Uses – Tests for carboxylic acid – Monohydroxy mono carboxylic acids

UNIT-XX – ORGANIC NITROGEN COMPOUNDS

UNIT-XXI – BIOMOLECULES

UNIT- XXII :CHEMISTRY IN ACTION

C) BIOLOGY
I.BOTANY
UNIT – I: TAXONOMY OF ANGIOSPERMS
UNIT – II: PLANT ANATOMY
Tissue and tissue systems – anatomy of monocot and dicot roots – anatomy of monocot and dicot stems – anatomy of dicot leaf.

UNIT – III: CELL BIOLOGY AND GENETICS

UNIT – IV: BIOTECHNOLOGY

UNIT – V: PLANT PHYSIOLOGY

UNIT – VI: BIOLOGY IN HUMAN WELFARE

II. ZOOLOGY

UNIT – I: HUMAN PHYSIOLOGY


Reproductive system – Brief account of spermatogenesis – Oogenesis Menstrual cycle – Invitro fertilization – Birth control.

UNIT – II: MICROBIOLOGY


UNIT – III: IMMUNOLOGY


UNIT – IV: MODERN GENETICS

Introduction – Scope – Human Genetics karyotyping Chromosome gene mapping, Recombinant DNA technology and segmenting.


UNIT – V: ENVIRONMENTAL SCIENCE

UNIT – VI: APPLIED BIOLOGY
Pisciculture Fish farming – Edible fishes of Tamilnadu.

UNIT – VII: THEORIES OF EVOLUTION

UNIT – VIII: AQUACULTURE

(D) GENERAL STUDIES (S.S.L.C. STANDARD)
UNIT-I: GENERAL SCIENCE
Chemistry: Elements and Compounds-Acids, bases and salts-Fertilizers, pesticides, insecticides.
Botany: Main Concepts of life science-Classification of living organism-Nutrition and dietetics-Respiration.
UNIT- II: CURRENT EVENTS
Geography: Geographical landmarks-
Economics: Current socio-economic problems
Science: Latest inventions on science & technology

UNIT- III: GEOGRAPHY

UNIT – IV: HISTORY AND CULTURE OF INDIA AND TAMIL NADU
Indus valley civilization-Guptas, Delhi Sultans, Mughals and Marathas - Age of Vijayanagaram and the bahmanis-South Indian history-Culture and Heritage of Tamil people-India since independence-Characteristics of Indian culture-Unity in diversity – race, colour, language, custom-India-as secular state-Growth of rationalist, Dravidian movement in TN-Political parties and populist schemes.

UNIT-V: INDIAN POLITY
UNIT-VI: INDIAN ECONOMY

UNIT-VII: INDIAN NATIONAL MOVEMENT
National renaissance-Emergence of national leaders-Gandhi, Nehru, Tagore-Different modes of agitations-Role of Tamil Nadu in freedom struggle Rajaji, VOC, Periyar, Bharathiar & others.

UNIT-VIII: APTITUDE & MENTAL ABILITY TESTS

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