অসম লোকসেৱা আয়োগ
ASSAM PUBLIC SERVICE COMMISSION
Jawaharnagar, Khanapara, Guwahati-781022.

(3) Name of Post: **Junior Scientific Officer for Mobile Forensic Laboratories under the Directorate of Forensic Science, Assam.**

SYLLABUS

(Master Degree Standard)

SUBJECT: PHYSICS AND GENERAL STUDIES

(Multiple Choice Objective Type)

Full Marks: 200 Marks **Time: 2 Hrs**

PART-A

1. General Physics

Laws of motion: Motion and its physical interpretation, Newton's law of motion, Law of conservation of linear momentum and its applications. Static and kinetic friction, laws of friction. Circular motion: Centripetal and Centrifugal force, Projectile motions and its application. Simple Harmonic Motion and Elasticity: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Elastic and inelastic collisions between particles. Elasticity, stress, strain, and Relation between the Elastic constants.

First Law of Thermodynamics: Thermodynamic Variables, Thermodynamic Equilibrium, Zeroth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Internal Energy, various thermodynamic processes, Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes.

Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot engine & efficiency, Kelvin-Planck and Clausius Statements. Concept of entropy. Kinetic theory of gases and Theory of Radiation: Real and Ideal gas, Maxwell-Boltzmann Law of Distribution of velocities. Mean, RMS and Most Probable Speeds. Mean Free Path. Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Wien's distribution law, Rayleigh-Jeans Law, Stefan Boltzmann Law and Wien's displacement.

Wave: Wave motion, Wave equation, longitudinal and transverse waves, Plane Progressive (Travelling) Waves, Nature and properties of electromagnetic waves, Speed

of sound wave in different media and their properties, Velocity of Transverse Vibrations of Stretched Strings, Newton's hypothesis, Laplace correction in speed of sound.

Optics: Electromagnetic spectrum, Interference, Reflection, refraction polarization and diffraction of light. Young's double slit experiment, Refractive index and total internal reflection of light. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. Physical and Chromatic aberrations

2. Forensic Physics

Forensic Physics: Introduction and scope, tools and techniques, examination of vehicle in case of road traffic accident, skid marks evaluation. Physical Evidences: types and importance. Forensic Statistics: Types of data, measure of central tendency, dispersion of data, correlations and probability and proof.

Glass: Types of glass and their composition-soda-lime, boro-silicate, safety glass, laminated, light-sensitive, tampered/ toughened, wire glass, coloured glass. Matching and comparison. Forensic examinations of glass fractures-concentric and radial fractures. Colour, fluorescence, physical measurements, specific gravity examination and elemental analysis of glass evidence.

Paint: Types of paint and their composition, macroscopic and microscopic analysis of paint pigments, pigment distribution, micro-chemical analysis- solubility test, pyrolysis gas chromatography, TLC, colorimetric analysis, IR spectroscopy and Xray diffraction, elemental analysis, mass spectrometer, interpretation of paint evidence.

Fibre: Types of fibres, forensic aspects of fibre examination- fluorescence, optical properties, refractive index, birefringence, dye analysis. Physical fit and chemical testing. IR-micro spectroscopy. Miscellaneous Evidences: wire, broken angles, seals, counterfeit coins, ropes/ strings, synthetic fibers etc theirintroduction & forensic examination. Tool Marks: theory, types of tool marks, and their forensic examination, Restoration methods of obliterated marks.

3. Forensic Ballistics

Introduction to Forensic Ballistics, Basics concept of forensic ballistic, its definition, History and development of Forensic Ballistics, Introduction to Internal, External and Terminal ballistics, Role of Forensic Ballistics Expert.

Introduction to firearms: Parts of firearms and its function, Firearm safety, Assembly and disassembly of firearm, Firearms characteristics & classification of firearms on different basis, History and background of firearms, Functional assembly & Operating principle of firearms, Bore and caliber, choke, rifling – class characteristics of rifled

bore, purpose of rifling, types of rifling, methods to produce rifling, Characteristics & Working mechanism of Standard: Rifled firearms, Small arms, Shot guns & Non-standard: Improvised, Country made, Imitative firearms, identification of origin.

Identification of firearms, ammunition and their components: Principles, Processing of Firearm Exhibits involved, Class characteristics & Individual characteristics (Identifiable marks) produced during firing process on cartridge cases & projectiles and their linkage with firearms.

Analysis of GSR –Composition of GSR, Location & Collection, Mechanism of formation, Chemical & Instrumental techniques involved in analysis, Shooter Identification Technique. Determination of range of fire & its related phenomena, Techniques involved in ballistic studies, Stereo and comparison microscopy, BDAS, IBIS.

4. Forensic Structural Analysis

Building Materials: Cement- composition, types, Forensic Analysis- bromoform test, fineness test, ignition-loss test, Identification of adulterated cement. Mortar and concrete analysis. Soil: Types and composition of soil, sample preparation, removal of contaminants, colour, turbidity test, pH measurements, microscopic examination, density gradient analysis, ignition-loss test, elemental analysis.

5. Audio-Video Forensics

Audio and Video Analysis and Tape Authentication: theory of voice production, theory of voice identification, acoustics of speech, the sound spectrograph, voice comparison - standards and methods of voice comparison, voice spectrograph and its significance. Speech recognition and speaker identification.

PART – B

1. **General Knowledge.**
2. **General English.**
3. **General Science.**

Controller of Examinations,
Assam Public Service Commission
Khanapara, Guwahati-22

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