જાહેરાત ક્રમાંક: ૪૬ /૨૦૧૬-૧૭, ગૃહ વિભાગ હસ્તકની ન્યાય સહાયક વિજ્ઞાન કચેરી હેઠળની સાયન્ટીફીક ઓફિસર (ભૌતિક), સામાન્ય રાજય સેવા વર્ગ-૨ જગ્યા પર ભરતી માટેની પ્રાથમિક કસોટીમાં **ભાગ-૧ અને ભાગ-૨** ના ૧૦૦ મિનિટના સંયુક્ત પ્રશ્નપત્રનો અભ્યાસક્રમ

પ્રાથમિક કસોટીનો અભ્યાસક્રમ **પ્રશ્નપત્ર-૧** **માધ્યમ: ગુજરાતી** **પ્રશ્નો – ૧૦૦** **કુલ ગુણ :૧૦૦**	
૧	ભારતની ભૂગોળ- ભૌગોલિક, આર્થિક, સામાજિક, કુદરતી સંસાધન અને વસ્તી અંગેની બાબતો- ગુજરાતના ખાસ સંદર્ભ સાથે
૨	ભારતનો સાંસ્કૃતિક વારસો- સાહિત્ય, કલા, ધર્મ અને સ્થાપત્યો- ગુજરાતના ખાસ સંદર્ભ સાથે
૩	ભારતનો ઈતિહાસ- ગુજરાતના ખાસ સંદર્ભ સાથે
૪	ભારતની અર્થવ્યવસ્થા અને આયોજન
૫	ભારતીય રાજનીતિ અને ભારતનું બંધારણ: (૧) આમુખ (૨) મૂળભૂત અધિકારો અને ફરજો (૩) રાજ્યનીતિના માર્ગદર્શક સિદ્ધાંતો (૪) સંસદની રચના (૫) રાષ્ટ્રપતિની સત્તા (૬) રાજ્યપાલની સત્તા (૭) ન્યાયતંત્ર (૮) અનુસૂચિત જાતિ, અનુસૂચિત જનજાતિ અને સમાજના પછાત વર્ગો માટેની જોગવાઈઓ (૯) એટર્ની જનરલ (૧૦) નીતિ આયોગ (૧૧) પંચાયતી રાજ (૧૨) નાણા પંચ (૧૩) બંધારણીય તથા વૈધનિક સંસ્થાઓ- ભારતનું ચૂંટણી પંચ, સંઘ લોક સેવા આયોગ, રાજ્ય લોક સેવા આયોગ, કોમ્પ્ટ્રોલર એન્ડ ઓડિટર જનરલ; કેન્દ્રીયસતર્કતા આયોગ, લોકપાલ તથા લોકાયુક્ત અને કેન્દ્રીય માહિતી આયોગ
૬	સામાન્ય બૌદ્ધિક ક્ષમતા કસોટી
૭	સામાન્ય વિજ્ઞાન, પર્યાવરણ અને ઈન્ફર્મેશન એન્ડ કોમ્યુનિકેશન ટેકનોલોજી
૮	ખેલ જગત સહિત રોજબરોજના પ્રાદેશિક, રાષ્ટ્રીય અને આંતરરાષ્ટ્રીય મહત્વના બનાવો

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Syllabus of Preliminary Test Paper-1 Medium: Gujarati 100 Questions Total Marks- 100	
1	Geography of India-Physical, Economic, Social, Natural Resources and population related topics- with special reference to Gujarat
2	Cultural heritage of India-Literature, Art, Religion and Architecture- with special reference to Gujarat
3	History of India with special reference to Gujarat
4	Indian Economy and Planning
5	Indian Polity and the Constitution of India: (1) Preamble (2) Fundamental Rights and Fundamental Duties (3) Directive Principles of State Policy (4) Composition of Parliament (5) Powers of the President of India (6) Powers of Governor (7) Judiciary (8) Provisions for Scheduled Castes, Scheduled Tribes and backward classes of the society (9) Attorney General (10) NITIAayog (11) Panchayati Raj Institutions (12) Finance Commission (13) Constitutional and Statutory Bodies: Election Commission of India, Union Public Service Commission, State Public Service Commission, Comptroller and Auditor General; Central Vigilance Commission, Lokpal and Lokayukta, Central Information Commission
6	General Mental Ability
7	General Science, Environment and Information & Communication Technology
8	Daily events of Regional, National and International Importance including Sports

ભાગ-૨ વિષયને લગતા પ્રશ્નપત્રના અભ્યાસક્રમની વિગતો

um- English	200 Questions	Marks- 200

Scientific Officer – Physics Group

1. Forensic science

- Definition and Scope of Forensic Science, History and development of Forensic science, Need and Principle**,** Police and, Forensic science laboratories / institutions in India, Organizational Structure of a Forensic Science Laboratory/Institution, Services provided by other institutions, Functions and responsibility of Forensic scientist

2. Spectroscopic Methods:

- Electromagnetic radiations
- General properties of electromagnetic radiations: Wave and Quantum Interaction of EMR with matter
- Electronic spectra and molecular structure
- Internal standards and standard addition calibration methods
- Ultraviolet and visible spectroscopy: Instrumentation and Applications.

3. Molecular and Atomic Spectroscopy:

- Infrared Spectroscopy: Molecular vibration, Theory of IR absorption, IR Sources and Instrumentation, FT-IR Applications.
- Raman Spectroscopy: Theory of Raman & FT-Raman spectroscopy, Instrumentation, Applications.
- Instrumentation and Applications of Flame emission spectrometry, Atomic absorption spectrometry and Atomic Fluorescence Spectrometry.

4. Emerging and Hyphenate Spectroscopy:

- Mass Spectroscopy: Theory, Instrumentation and Applications.
- Inductively coupled plasma-Mass Spectroscopy: Theory, Instrumentation and Applications.
- X-Ray Spectroscopy: Theory, Types, Instrumentation, Applications and Applications.
- Nuclear Magnetic Resonance Spectroscopy: Theory, Instrumentation and Applications.

Glass:

- Introduction to glass, Types of glass and their compositions, Forensic examination of glass fractures under different conditions, determination of direction of impact: hackle marks, backward fragmentation, Physical measurements of glass, color and fluorescence, physical matching, density comparison, physical measurements, refractive index by refractometer, elemental analysis.

5. Paints:

- Introduction, Composition, Manufacture of Paint, types of paint, Forensic Examination of Paints and Coatings: Collection and Preservation of paint samples, macroscopic and microscopic techniques for the characterization of Paint Fragments, Physical , Chemical & Instrumental analysis of paint.

6. Soil:

- Soil and its composition, Classification of soil, Collection and preservation of soil as a evidence, analysis of soil samples: Physical, chemical and instrumental.

7. Speaker identification:

- Speaker identification and tape authentication: voice production theory, Speech signal processing and pattern recognition, acoustic parameters of sound, analogue to digital conversion, Frequency and time domain representation of speech signal, fast Fourier transform, Authentication of audio-video signal.

8. Introduction to voice identification/speaker recognition Speech signal processing

9. Fire:

- Introduction to Fires
- Thermodynamics of fire
- Accelerants and incendiary devices

10. Trajectory formation, Influence of earth trajectory, Effect of air resistance on trajectories

11. Computer Forensics:

- Introduction to Computer and its components, Computer Storage Media, Windows and Unix
- File Storage, Introduction to Cyber crime and Cyber Law, Terms: Internet, hacking, virus, obscenity, pornography, program manipulation, Software piracy, attacks, phishing etc, case studies.

12. Understanding cyber space Computer Security Incident, Information as Business Asset, Data Classification, Information Warfare, Key Concepts of Information Security, Vulnerability, Threat, and Attack, Types of Computer Security Incidents

13. Understanding of Windows , Linux & Macintosh operating systems, Understanding of mobile operating systems such as android, iOS, Windows, Blackberry etc., Introduction to hardware and software, Key terms, Number systems, Boot process, File types and signature, Architecture and Functioning of memory device

14. Life cycle of Vulnerability Assessment, Vulnerability Scanners

15. Brute-force, Dictionary-based Enumeration. Cross Site Scripting ,XSS Actors, Vulnerable Web Applications, Users, Attackers, Finding an XSS, Reflected XSS Attacks, Reflected XSS Filters, Persistent XSS Attacks, Persistent XSS Attack Examples, Cookie Stealing via XSS,DOM XSS SQL Injections

16. Communication using Symmetric Cryptography, Introduction to One-way Functions, Public-Key Cryptography, Introduction to Digital Signatures, Random and Pseudo Random Sequence Generators. Introduction to Basic, Intermediate, Advanced and Esoteric Protocols

17. Social Engineering:

- Introduction to social engineering, social engineering cycle, information gathering, user profiling, types of social engineering attacks and techniques, elicitation, social engineering tools and counter measures.

18. Introduction to Malware Analysis:

- Malware definition and types, Malware Analysis, Forensic Importance of Malware Analysis, Introduction to different analysis techniques, Malware Behavior, setting up malware analysis laboratory.

19. Thermal Analysis:

- Principle theory and applications of Thermo gravimetric analysis, differential thermal analysis and differential scanning calorimetry.
- Density gradient analysis, Specific Gravity analysis, Abbe's and Digital Refractometer, Micro chemical analysis, TLC.

20. IR spectroscopy, Raman spectroscopy, FT-IR spectroscopy, Atomic Absorption Spectroscopy.

21. Lasers:

- Characteristics of laser light, Spontaneous emission, Stimulated emission, Stimulated absorption, Einstein coefficients, Population inversion and light amplification, Essential components of the laser, Ruby and He-Ne laser (principles only). Holography: Formation of a hologram, Reconstruction of the hologram, Requirements, Application In forensic investigation.

22. X-rays:

- Production; continuous and characteristic X-rays and their spectra; Mosley's law; diffraction of X-rays by crystals; Bragg's law; Compton Effect**.**

23. Natural Radioactivity & Radioactive Decays:

- Type of radioactive decays, theory of radioactive disintegration, radioactive constants, Mean life of a radio element, Activity of radioactive sources, Radioisotopes – their production &uses and forensic applications

24. Nuclear Reactions:

- Types of nuclear reactions, conserved quantities of nuclear reaction, energies of nuclear reaction–Q-value & its experimental determination. Exoergic & endoergic reactions, Weapons of mass destruction, forensic significance

25. Nuclear Magnetic Resonance Spectroscopy (NMR):

- Theory of NMR, Environmental effect on NMR, NMR spectrophotometers, Proton NMR, C-13 NMR, and other nuclei, their Applications.

26. Introduction to Microscopy, Types of Microscopes, Principles and Working of microscopes, Forensic Applications

27. Forensic Nanotechnology:

- introduction to Nano particles, Nano tubes, Utilization of nanotechnology in analysis of physical evidences, selectivity particles with compatibility and feasibility.

28. Forensic Engineering:

- Introduction to forensic engineering, ISI/Code of Building Construction, Structural failures, static loads, dynamic loads, causes of structural collapse, Types of cement and their composition, determination of adulterants by physical, chemical and instrumental methods, examination of brick, analysis of Bitumen & road materials, analysis of cement mortar and cement concrete & stones, forensic examination of electrical appliances installations.

29. LED: Introduction

30. Photodiodes- General Consideration

31. Application of Signal Processing

32. Digital Integrated Circuits:

- Introduction, Level of Integration, Digital IC families, TTL Logic Family: Introduction, NAND Gate with Totem-pole Output, Types of TTL, TTL parameters: floating inputs, worst case input/output voltage, profile and windows, compatibility, sourcing and sinking, noise immunity, standard loading, loading rules, Three state TTL Devices.\
- MOS Logic Family: Introduction, MOS Inverters, NMOS-NAND & NOR Gates. CMOS Logic Family: NAND & NOR Gates, Power Dissipation, CMOS characteristics: Floating inputs, Compatibility, sourcing and Sinking. TTL to CMOS and CMOS to TTL interface, Comparison of Various Logic Families.

33. Operational Amplifiers & Its Application:

- Frequency compensation and slew rate, DC and AC amplifiers, Integrator and differentiator, Voltage to current and current to voltage convertor, bridge amplifier, electronic analog computation, sine square, triangular and saw tooth wave generators, Schmitt trigger.

34. Junction –Diode Characteristics:

- Open –Circuited p-n Junction, p-n Junction as a Rectifier, Current Components in a p-n Diode, Volt-Ampere Characteristic, Temperature Dependence of the V/I Characteristic, Diode Resistance, Space Charge, Transition Capacitance, Charge-Control Description of a Diode , Diffusion Capacitance , Junction Diode Switching Times, Breakdown Diodes, Tunnel Diode, Semiconductor Photodiode, Photovoltaic Effect, Light –Emitting Diodes

35. Diode Circuits:

- Diode as a Circuit Element, Load-Line Concept, Piecewise Linear Diode Model, Clipping Circuits, Clipping at Two Independent Levels, Comparators, Sampling Gate, Rectifiers, Other Full-Wave Circuits, Capacitor Filters, Additional Diode Circuits

36. Power Circuits and Systems:

- Class A large Signal Amplifiers, Second Harmonic Distortion, Higher – Order Harmonic Generation, Transformer Coupled Audio Power Amplifier, Efficiency, Push-Pull Amplifiers, Class B Amplifiers, Class AB Operation, Regulated Power Supplies, Series Voltage Regulator

37. Binary System:

- Digital computer and digital systems, Binary Number, Number base conversion Octal and Hexadecimal Number, complements, Binary Codes, Binary Storage and register. Binary Logic, Integrated Circuit

38. Boolean Algebra and Logic Gates :

- Basic Definition, Axiomatic Definition of Boolean Algebra, Basic Theorem and Properties of Boolean Algebra, Minterms And Maxterms, Logic Operations, Digital Logic Gates, IC digital Logic Families

39. Basic and principal of Instruments: EDXRF (energy-dispersive-X-ray-fluorescence), SEM (Scanning electron microscope), FTIR (Furious transform Infrared spectroscopy), Tensile Testing, ICP (Inductive Coupled Plasma)

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