INTERACTIVE IAS MAIN TEST SERIES PROGRAMME 2010

Expert Guidance, Feedback & Telephonic Discussion

ANSWER WRITING EVALUATION PROGRAMME

PHYSICS MAINS TEST SERIES 2010: MODULE - III

FOCUS: Answer writing skill development, Structure & presentation of answer, How to present facts, information & knowledge in the answer, Understanding actual requirement (key words , Context & Content) of the UPSC in the different marks types questions (60 Marks , 30 Marks , 20 marks) and which questions should be attempted for good score (strategy & approach) , Understanding your current state preparedness & required action plans and Framing your mind towards actual pattern, toughness and timing of the actual UPSC Examination.

Criteria for assessment of candidate performance in the written IAS exam as per UPSC instruction:
"The main Examination is intended to assess the overall intellectual traits and depth of understanding of candidates rather than merely the range of their information and memory".

- ***Union Public Service Commission (UPSC)***

Methodology for evaluation of Answer sheet: Our expert will evaluate answer sheet on following indicators and experience in the field UPSC.

EVALUATION INDICATORS	**QUESTION No.** ☐ Score (1 – 5)
1. Alignment Competence	
2. Context Competence	
3. Content Competence	
4. Language Competence	
5. Introduction Competence	
6. Structure – Presentations Competence	
7. Conclusion Competence	
MARKS	

Score: Scale: 1- 5

5 – Outstanding
4 – Excellent
3 – Good
2 – Average
1 - Poor

NOTE: 1*. Total Marks in the question has been given on proper consideration of weightage of every evaluation indicators based on types of the questions and UPSC experience of the expert.*
2. *The score of every indicator for any question will highlight candidate's competence performance (for understanding of the level of quality of the question and required action plans).*
3. *Effective feedback and comments has been marked by expert.*

Basic understanding of following Designed Competences:

- **Alignment Competence:**
  - Writing the answer according to the actual requirement of the questions
  - Focus on Key words & Tail words effectively *(Elucidate – Explain, Comment , Examine , Critically examine , Discuss , Analyze , Illustrate , Review , Argue , Justify etc.)*
- **Context Competence:**
  - Contextual understanding of the Questions
  - Present relevant information , choice of words and proper statement
- **Content Competence :**
  - Content of the answer in the contextual framework
- **Language Competence :**
  - Optional Subject Specific Language not used general words in the optional paper (but In General Studies language should be simple and clear)
  - Appropriate words at proper place
  - Word limits
- **Structure – Presentation Competence:**
  - Proper systematization in the structure of the answer
  - Proper consideration of priority and focus of given ideas.
  - Logical structure of sentence and their connectivity
  - proper visibility of idea through facts, data , diagram , figure , illustration according to the requirement of the question
- **Introduction – Conclusion Competence:**
  - Impressive beginning and Ending of the answer
  - Give your opinion only when asked for it.
  - Incorporate your opinion from different perspective in a balance manner

INTERACTIVE IAS PHYSICS MAIN TEST SERIES 2010

Number of Mock Tests : 8
Fee : Rs 5000

What you will get:

- Mock Test Papers & answer sheet (8 Tests)
- Evaluated Answer sheet by experts with proper feedback, comments & guidance.
- Answer format (Solution) of Mock Test paper

SCHEDULE & CONTENT

TEST No.	Date of Mock Test *	Sections Covered	Topics covered
Test 1	11 July 2010	Mechanics	**1.(a) Mechanics of Particles:** Laws of motion; conservation of energy and momentum, applications to rotating frames, centripetal and Coriolis accelerations; Motion under a central force; Conservation of angular momentum, Kepler's laws; Fields and potentials; Gravitational field and potential due to spherical bodies, Gauss and Poisson equations, gravitational self-energy; Two-body problem; Reduced mass; Rutherford scattering; Centre of mass and laboratory reference frames. **(b) Mechanics of Rigid Bodies:** System of particles; Centre of mass, angular momentum, equations of motion; Conservation theorems for energy, momentum and angular momentum; Elastic and inelastic collisions; Rigid body; Degrees of freedom, Euler's theorem, angular velocity, angular momentum, moments of inertia, theorems of parallel and perpendicular axes, equation of motion for rotation; Molecular rotations (as rigid bodies); Di and tri-atomic molecules; Precessional motion; top, gyroscope.

		+ **Waves and Optics**	**(c) Mechanics of Continuous Media:** Elasticity, Hooke's law and elastic constants of isotropic solids and their inter-relation; Streamline (Laminar) flow, viscosity, Poiseuille's equation, Bernoulli's equation, Stokes' law and applications. **(d) Special Relativity:** Michelson-Morley experiment and its implications; Lorentz transformations-length contraction, time dilation, addition of relativistic velocities, aberration and Doppler effect, mass-energy relation, simple applications to a decay process; Four dimensional momentum vector; Covariance of equations of physics. **2. Waves and Optics:** **(a) Waves:** Simple harmonic motion, damped oscillation, forced oscillation and resonance; Beats; Stationary waves in a string; Pulses and wave packets; Phase and group velocities; Reflection and Refraction from Huygens' principle. **(b) Geometrical Optics:** Laws of reflection and refraction from Fermat's principle; Matrix method in paraxial optics-thin lens formula, nodal planes, system of two thin lenses, chromatic and spherical aberrations. **(c) Interference:** Interference of light-Young's experiment, Newton's rings, interference by thin films, Michelson interferometer; Multiple beam interference and Fabry-Perot interferometer. **(d) Diffraction:** Fraunhofer diffraction-single slit, double slit, diffraction grating, resolving power; Diffraction by a circular aperture and the Airy pattern; Fresnel diffraction: half-period zones and zone plates, circular aperture. **(e) Polarization and Modern Optics:** Production and detection of linearly and circularly polarized light; Double refraction, quarter wave plate; Optical activity; Principles of fibre optics, attenuation; Pulse dispersion in step index and parabolic index fibres; Material dispersion, single mode fibres; Lasers-Einstein A and B coefficients; Ruby and He-Ne lasers; Characteristics of laser light-spatial and temporal coherence; Focusing of laser beams; Three-level scheme for laser operation; Holography and simple applications
Test 2	**25 July 2010**	**Electricity and Magnetism** **+** **Thermal and Statistical Physics**	**3. Electricity and Magnetism:** **(a) Electrostatics and Magnetostatics:** Laplace and Poisson equations in electrostatics and their applications; Energy of a system of charges, multipole expansion of scalar potential; Method of images and its applications; Potential and field due to a dipole, force and torque on a dipole in an external field; Dielectrics, polarization; Solutions to boundary-value problems-conducting and dielectric spheres in a uniform electric field; Magnetic shell, uniformly magnetized sphere; Ferromagnetic materials, hysteresis, energy loss. **(b) Current Electricity:** Kirchhoff's laws and their applications; Biot-Savart law, Ampere's law, Faraday's law, Lenz' law; Self-and mutual-inductances; Mean and r m s values in AC circuits; DC and AC circuits with R, L and C components; Series and parallel resonances; Quality factor; Principle of transformer. **(c) Electromagnetic Waves and Blackbody Radiation:** Displacement current and Maxwell's equations; Wave equations in vacuum, Poynting theorem; Vector and scalar potentials; Electromagnetic field tensor, covariance of Maxwell's equations; Wave equations in isotropic dielectrics, reflection and refraction at the boundary of two dielectrics; Fresnel's relations; Total internal reflection; Normal and anomalous dispersion; Rayleigh scattering; Blackbody radiation and Planck's radiation law, Stefan-Boltzmann

			law, Wien's displacement law and Rayleigh-Jeans' law **4. Thermal and Statistical Physics:** **(a) Thermodynamics:** Laws of thermodynamics, reversible and irreversible processes, entropy; Isothermal, adiabatic, isobaric, isochoric processes and entropy changes; Otto and Diesel engines, Gibbs' phase rule and chemical potential; van der Waals equation of state of a real gas, critical constants; Maxwell-Boltzman distribution of molecular velocities, transport phenomena, equipartition and virial theorems; Dulong-Petit, Einstein, and Debye's theories of specific heat of solids; Maxwell relations and applications; Clausius-Clapeyron equation; Adiabatic demagnetisation, Joule-Kelvin effect and liquefaction of gases. **(b) Statistical Physics:** Macro and micro states, statistical distributions, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac distributions, applications to specific heat of gases and blackbody radiation; Concept of negative temperatures.
Test 3	**8 August 2010**	**Quantum Mechanics + Atomic and Molecular Physics**	**1.Quantum Mechanics:** Wave-particle dualitiy; Schroedinger equation and expectation values; Uncertainty principle; Solutions of the one-dimensional Schroedinger equation for a free particle (Gaussian wave-packet), particle in a box, particle in a finite well, linear harmonic oscillator; Reflection and transmission by a step potential and by a rectangular barrier; Particle in a three dimensional box, density of states, free electron theory of metals; Angular momentum; Hydrogen atom; Spin half particles, properties of Pauli spin matrices. **2.Atomic and Molecular Physics:** Stern-Gerlach experiment, electron spin, fine structure of hydrogen atom; L-S coupling, J-J coupling; Spectroscopic notation of atomic states; Zeeman effect; Frank-Condon principle and applications; Elementary theory of rotational, vibratonal and electronic spectra of diatomic molecules; Raman effect and molecular structure; Laser Raman spectroscopy; Importance of neutral hydrogen atom, molecular hydrogen and molecular hydrogen ion in astronomy; Fluorescence and Phosphorescence; Elementary theory and applications of NMR and EPR; Elementary ideas about Lamb shift and its significance
Test 4	**22 August 2010**	**Nuclear and Particle Physics + Solid State Physics, Devices and Electronics**	**3.Nuclear and Particle Physics:** Basic nuclear properties-size, binding energy, angular momentum, parity, magnetic moment; Semi-empirical mass formula and applications, mass parabolas; Ground state of deuteron, magnetic moment and non-central forces; Meson theory of nuclear forces; Salient features of nuclear forces; Shell model of the nucleus - successes and limitations; Violation of parity in beta decay; Gamma decay and internal conversion; Elementary ideas about Mossbauer spectroscopy; Q-value of nuclear reactions; Nuclear fission and fusion, energy production in stars; Nuclear reactors. Classification of elementary particles and their interactions; Conservation laws; Quark structure of hadrons; Field quanta of electroweak and strong interactions; Elementary ideas about unification of forces; Physics of neutrinos. **4.Solid State Physics, Devices and Electronics:** Crystalline and amorphous structure of matter; Different crystal systems, space groups; Methods of determination of crystal structure; X-ray diffraction, scanning and transmission electron microscopies; Band theory of solids - conductors, insulators and semiconductors; Thermal properties of solids, specific heat, Debye theory; Magnetism: dia, para and ferromagnetism; Elements of superconductivity, Meissner effect, Josephson junctions and applications; Elementary ideas about high

			temperature superconductivity. Intrinsic and extrinsic semiconductors; p-n-p and n-p-n transistors; Amplifiers and oscillators; Op-amps; FET, JFET and MOSFET; Digital electronics-Boolean identities, De Morgan's laws, logic gates and truth tables; Simple logic circuits; Thermistors, solar cells; Fundamentals of microprocessors and digital computers.
Test 5	**5 September 2010**	**FULL LENGTH MOCK TEST- I**	[Morning Session : 9 AM to 12 PM] **Complete syllabus of Paper I**
Test 6		**FULL LENGTH MOCK TEST- I**	[Evening Session : 2 PM to 5 PM] **Complete Syllabus of Paper II**
Test 7	**19 September 2010**	**FULL LENGTH MOCK TEST- II**	[Morning Session : 9 AM to 12 PM] **Complete syllabus of Paper I**
Test 8		**FULL LENGTH MOCK TEST-II**	[Evening Session : 2 PM to 5 PM] **Complete Syllabus of Paper II**

NOTE:

1. Question Papers of the Mock Test & answer sheet will be dispatched through air mail before the date of Mock Test (4 days); it will take 2-3 days to reach its destination.
2. **Evaluated answer sheet with proper Comments, Feedback & Guidelines** & next Question paper of the Mock Test will be sent on scheduled dates of dispatch respectively.
3. After Registration, We will also send previous Mock test paper & answer sheet and next Mock Test Paper will be sent on scheduled dates of dispatch respectively.
4. You are advised to return the answer booklet at the earliest, so that our expert can evaluate in time. The evaluated answer booklet will be returned with the successive test.
5. Date of dispatch can be rescheduled on the demand of the candidate.