

શ્રી ગોવિંદ ગુરુ યુનિવર્સિટી  
(ગુજરાત એક્ટ નં. ૨૪/૨૦૧૫ દ્વારા સ્થાપિત)  
Shri Govind Guru University  
(Established vide Gujarat Act No. 24/2015)

સરકારી પોલિટેકનીક કેમ્પસ  
ગદુકપુર, ગોધરા,  
જિલ્લો-પંચમહાલ. પિન કોડ-૩૮૯૦૦૧

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નં.એસજીજીયુ/એસ્ટા/એનટી/૨૦૧૮/૧૬૨૬૩

તા. ૩૦/૦૫/૨૦૧૮

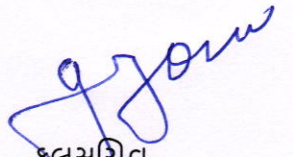
પરિપત્ર-૫૪૩

સંદર્ભ: આ યુનિવર્સિટીની જાહેરાત ક્રમાંક :૧/૨૦૧૮ તા.૧૧/૦૧/૨૦૧૮

આથી શ્રી ગોવિંદ ગુરુ યુનિવર્સિટી, ગોધરા દ્વારા સંદર્ભમાં આપવામાં આવેલ જાહેરાત અન્વયે અરજી કરેલ તમામ ઉમેદવારોને આદેશ અનુસાર જણાવવાનું કે શ્રી ગોવિંદ ગુરુ યુનિવર્સિટી એક્ટ, યુ.જી.સી. રેગ્યુલેશન-૨૦૧૦ તેમજ શ્રી ગોવિંદ ગુરુ યુનિવર્સિટી સ્ટેચ્યુટસની જોગવાઈ અનુસાર Department of Physics ની આસિસ્ટન્ટ પ્રોફેસરની જગ્યાપરની પસંદગી પદ્ધતિ આ સાથે સામેલ પરિશિષ્ટ-અ અનુસારની રહેશે.

શ્રી ગોવિંદ ગુરુ યુનિવર્સિટી દ્વારા આસિસ્ટન્ટ પ્રોફેસર Department of Physics ની જગ્યા માટે લેવામાં આવનાર લેખિત પરીક્ષાનો અભ્યાસક્રમ આ સાથે સામેલ પરિશિષ્ટ-બ અનુસારનો રહેશે.

ઉપરોક્ત તમામ બાબતોની સર્વે સંબંધિતોએ નોંધ લેવા વિનંતી છે.

  
કલસચિવ  
શ્રી ગોવિંદ ગુરુ યુનિવર્સિટી  
ગોધરા

બિડાણ : ઉપર મુજબ

પ્રતિ,

- જાહેરાત ક્રમાંક : ૧/૨૦૧૮ તા.૧૧/૦૧/૨૦૧૮ Department of Physics અન્વયે આસિસ્ટન્ટ પ્રોફેસરની જગ્યા માટે અરજી કરનાર તમામ ઉમેદવારો તરફ જાણ સારૂ.



પરિશિષ્ટ- અ

**MARKING SCHEME FOR SELECTION THE POST OF  
ASSISTANT PROFESSOR (LECTURER) PHYSICS**

1. A total minimum marks required to qualify for the selection is 50 marks.
2. Maximum marks for Academic Record and Research Performance will be 50 marks.
3. The score (Marks) for Academic Record and Research Performance shall be calculated as follow:
  - Maximum marks for academic record and research performance will be 50 marks
  - The Marks for academic record and research performance will be calculated as below

Particulars	Maximum marks	Marks Obtained
<b>Master Degree Percentage</b> <ul style="list-style-type: none"><li>• Up to 55 % (00 Marks )</li><li>• Above 55 % (1 Marks for each %)</li></ul>	10	
Ph.D.	10	
NET/GSET	05	
M.Phil.	05	
Research Project (GOG/GOI Sponsored )	05	
Paper presentation in conference /symposia /workshop (International/National)	05	
Research paper publication in UGC recognized Journals	05	
<b>Teaching Experience</b>		
As Assistant Professor in UG or PG (only University recognized) (1 Marks per 1 year )	05	
<b>Total Marks</b>	<b>50</b>	

4. Maximum marks for the Domain Knowledge and Teaching Skills will be 30 Marks (30)  
OMR Based MCQ Written Test of 2 hours and 100 Questions. each have 2 marks  
The Syllabus of the test is as per Annexure-I
7. Maximum marks for the interview performance will be 20 marks (20)



### I. **Mathematical Methods of Physics**

Dimensional analysis; Vector algebra and vector calculus; Linear algebra, matrices, Cayley Hamilton theorem, eigenvalue problems; Linear differential equations; Special functions (Hermite, Bessel, Laguerre and Legendre); Fourier series, Fourier and Laplace transforms; Elements of complex analysis: Laurent series-poles, residues and evaluation of integrals; Elementary ideas about tensors; Introductory group theory,  $SU(2)$ ,  $O(3)$ ; Elements of computational techniques: roots of functions, interpolation, extrapolation, integration by trapezoid and Simpson's rule, solution of first order differential equations using Runge-Kutta method; Finite difference methods; Elementary probability theory, random variables, binomial, Poisson and normal distributions.

### II. **Classical Mechanics**

Newton's laws; Phase space dynamics, stability analysis; Central-force motion; Two-body collisions, scattering in laboratory and centre-of-mass frames; Rigid body dynamics, moment of inertia tensor, non-inertial frames and pseudoforces; Variational principle, Lagrangian and Hamiltonian formalisms and equations of motion; Poisson brackets and canonical transformations; Symmetry, invariance and conservation laws, cyclic coordinates; Periodic motion, small oscillations and normal modes; Special theory of relativity, Lorentz transformations, relativistic kinematics and mass-energy equivalence.

### III. **Electromagnetic Theory**

Electrostatics: Gauss' Law and its applications; Laplace and Poisson equations, boundary value problems; Magnetostatics: Biot-Savart law, Ampere's theorem, electromagnetic induction; Maxwell's equations in free space and linear isotropic media; boundary conditions on fields at interfaces; Scalar and vector potentials; Gauge invariance; Electromagnetic waves in free space, dielectrics, and conductors; Reflection and refraction, polarization, Fresnel's Law, interference, coherence, and diffraction; Dispersion relations in plasma; Lorentz invariance of Maxwell's equations; Transmission lines and wave guides; Dynamics of charged particles in static and uniform electromagnetic fields; Radiation from moving charges, dipoles and retarded potentials.

### IV. **Quantum Mechanics**

Wave-particle duality; Wave functions in coordinate and momentum representations; Commutators and Heisenberg's uncertainty principle; Matrix representation; Dirac's bra and ket notation; Schrodinger equation (time-dependent and time-independent); Eigenvalue problems such as particle-in-a-box, harmonic oscillator, etc.; Tunneling through a barrier; Motion in a central potential; Orbital angular momentum, Angular momentum algebra, spin; Addition of angular momenta; Hydrogen atom, spin-orbit coupling, fine structure; Time-independent perturbation theory and applications; Variational method; WKB approximation;



Time dependent perturbation theory and Fermi's Golden Rule; Selection rules; Semi-classical theory of radiation; Elementary theory of scattering, phase shifts, partial waves, Born approximation; Identical particles, Pauli's exclusion principle, spin-statistics connection; Relativistic quantum mechanics: Klein Gordon and Dirac equations.

#### **V. Thermodynamic and Statistical Physics**

Laws of thermodynamics and their consequences; Thermodynamic potentials, Maxwell relations; Chemical potential, phase equilibria; Phase space, micro- and macrostates; Microcanonical, canonical and grand-canonical ensembles and partition functions; Free Energy and connection with thermodynamic quantities; First- and second-order phase transitions; Classical and quantum statistics, ideal Fermi and Bose gases; Principle of detailed balance; Blackbody radiation and Planck's distribution law; Bose-Einstein condensation; Random walk and Brownian motion; Introduction to nonequilibrium processes; Diffusion equation.

#### **VI. Electronics**

Semiconductor device physics, including diodes, junctions, transistors, field effect devices, homo and heterojunction devices, device structure, device characteristics, frequency dependence and applications; Optoelectronic devices, including solar cells, photodetectors, and LEDs; High-frequency devices, including generators and detectors; Operational amplifiers and their applications; Digital techniques and applications (registers, counters, comparators and similar circuits); A/D and D/A converters; Microprocessor and microcontroller basics.

#### **VII. Experimental Techniques and data analysis**

Data interpretation and analysis; Precision and accuracy, error analysis, propagation of errors, least squares fitting, linear and nonlinear curve fitting, chi-square test; Transducers (temperature, pressure/vacuum, magnetic field, vibration, optical, and particle detectors), measurement and control; Signal conditioning and recovery, impedance matching, amplification (Op-amp based, instrumentation amp, feedback), filtering and noise reduction, shielding and grounding; Fourier transforms; lock-in detector, box-car integrator, modulation techniques.

Applications of the above experimental and analytical techniques to typical undergraduate and graduate level laboratory experiments.

#### **VIII. Atomic & Molecular Physics**

Quantum states of an electron in an atom; Electron spin; Stern-Gerlach experiment; Spectrum of Hydrogen, helium and alkali atoms; Relativistic corrections for energy levels of hydrogen; Hyperfine structure and isotopic shift; width of spectral lines; LS & JJ coupling; Zeeman, Paschen Back & Stark effect; X-ray spectroscopy; Electron spin resonance, Nuclear magnetic resonance, chemical shift; Rotational, vibrational, electronic, and Raman spectra of diatomic molecules; Frank - Condon principle and selection rules; Spontaneous and stimulated emission, Einstein A & B coefficients; Lasers, optical pumping, population inversion, rate equation; Modes of resonators and coherence length.

#### **IX. Condensed Matter Physics**

Bravais lattices; Reciprocal lattice, diffraction and the structure factor; Bonding of solids; Elastic properties, phonons, lattice specific heat; Free electron theory and electronic specific heat; Response and relaxation phenomena; Drude model of electrical and thermal



conductivity; Hall effect and thermoelectric power; Diamagnetism, paramagnetism, and ferromagnetism; Electron motion in a periodic potential, band theory of metals, insulators and semiconductors; Superconductivity, type - I and type - II superconductors, Josephson junctions; Defects and dislocations; Ordered phases of matter, translational and orientational order, kinds of liquid crystalline order; Conducting polymers; Quasicrystals.

#### **X. Nuclear and Particle Physics**

Basic nuclear properties: size, shape, charge distribution, spin and parity; Binding energy, semi-empirical mass formula; Liquid drop model; Fission and fusion; Nature of the nuclear force, form of nucleon-nucleon potential; Charge-independence and charge-symmetry of nuclear forces; Isospin; Deuteron problem; Evidence of shell structure, single-particle shell model, its validity and limitations; Rotational spectra; Elementary ideas of alpha, beta and gamma decays and their selection rules; Nuclear reactions, reaction mechanisms, compound nuclei and direct reactions; Classification of fundamental forces; Elementary particles (quarks, baryons, mesons, leptons); Spin and parity assignments, isospin, strangeness; Gell-Mann-Nishijima formula; C, P, and T invariance and applications of symmetry arguments to particle reactions, parity non-conservation in weak interaction; Relativistic kinematics.