letter No 254 dated 28/5/19

Syllabus for PAT Examination (Physics)

Unit-1

Complex variables, Analytical functions, calculus of residue, nature of singularities, evaluation of definite integral, Matrices- Linear transformation, Inverse, orthogonal and unitary matrices, Eigen values and eigen vectors

Unit-II

Approximation method – Stationary perturbation theory, non degenerate and degenerate cases, Variational method, Time dependent perturbation theory, Harmonic perturbation, Scattering theory- Scattering cross section , Patial wave analysis, and phase shift, First order Born approximation with their applications.

Unit-III

Differential amplifier- CMRR, Operational amplifier, Characteristics of Op-Amp, Inverting and non inverting amplifier, Adder , subtractor, Differentiator, integrator, Current to voltage convertor, First order active filters, Oscillators- Principle Barkhausen criterion, Phase shift oscillator

Unit- IV

Band theory- Bloch theorem, K. P. Model, Distinction between conductor, insulator and semiconductor, Classification of magnetic materials, Molecular field theory, quantum theory of dia , para and ferro magnetism.

Unit-V

Atomic spectra- spin orbit interaction, Fine structure of hydrogen lines, LS and JJ coupling, Zeeman and Paschen back effect of one and two valence electron system, Molecular spectra- Franck-Condon Principle, rotational, rotational vibrational and electronic spectra of diatomic molecules. Laser- Basic principle of lasers, He-Ne and Co2 Laser

Unit –VI

Classical electrodynamics- Lorentz transformation as orthogonal transformation, Invariance of Maxwell equations under Lorentz transformation,

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Unit-VII

Plasma- Motion of charged particle in uniform electric and magnetic fields, Pinch effect and plasma confinement, Alfven wave and magnetosonic wave, Appleton Hartree formula and propagation of electromagnetic wave through ionosphere.

Unit—VIII

Quantum mechanical ensembles, density matrix, Liouvillies theorem, Partition function, free particle in a box, Ideal Fermi gas, ideal Bose gas and their properties

Unit- IX

Nucleon- nucleon scattering, partial wave analysis, direct and compound nuclear reaction mechanism, Compound nucleous. Fermi theory of B –decay, Liquid drop model shell model, magic number

Unit –X

Computer arithmetic, Methods of finding roots of equation, Newton- Rapson method, Newton interpolation, least square fitting of a function, Trapezoidal rules, Simpson rule for numerical integration, Fortran and C programme for the above methods .

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