

**MAGADH UNIVERSITY  
BODH GAYA**



**SYLLABUS  
OF  
PRE- PH. D. REGISTRATION  
ENTRANCE TEST**

**PAT Electronics Syllabus**

**2014 onwards**

**FACULTY OF SCIENCES**

**Study Raw.Com**

*Price Rs. 100/-*



**ELECTRONIC****PAPER - I**

Time - 3 Hours

Full Marks-100

*There shall be 50 questions each consisting of two based on the topics prescribed in the syllabus.*

**PAPER - II**

Time - 3 Hours

Full Marks-100

*There shall be 12 (twelve) descriptive questions from the prescribed topics. The candidate shall be required to answer any 5 (five), carrying 20 marks each.*

**Prescribed Topics for Paper I & II****1. Mathematical Analysis**

Gradient, Divergence & Curl in Cartesian Curvilinear co-ordinates, Line, Surface and Volume Integrals, Classical dynamics, Lagrangian and Hamiltonian Equations, Postulates of Quantum mechanics, Schrodinger wave equation, MB, BE & FD Statistics. Discrete signal analysis- z transform & its properties, Continuous signal analysis- Fourier transform and its properties. Network theorems:- Node and Mesh analysis, Thevenins theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem.



## 2. Solid- State Physics

Simple crystal structures, Bravais lattices, Miller indices, Crystal - bondings. Free-electron theory of metal, Band theory of solids, Superconductivity - Superconducting materials, BCS theory of superconductivity. Dielectric materials- Piezoelectricity, ferroelectricity. Magnetic materials-theory of magnetism, diamagnetic, paramagnetic and ferromagnetic materials.

## 3. Analog Electronics

Physics of semiconductor devices, Theory of PN Junction Zener diode, Tunnel diode, LED, Photodiode, BJT, JFET, MOS-FET, UJT, SCR, OP-AMP, virtual ground, CMRR, Operational amplifier-characteristics and applications Computational applications, Summing amplifier, Integrator, Differentiator. IC Processing, Bipolar & MOS IC fabrications, Introduction to MSI, LSI, VLSI..

## 4. Digital Electronics

Number systems, coding systems, Logic families, Boolean algebra, Combinational Circuits and K- Map minimization techniques, Encoders, Decoders, Multiplexers and Demultiplexers. Sequential circuits, Flip-Flops, Synchronous and asynchronous counters, D/A converters- weighted resistor type, Ladder type DACs, A/D converters Comparator type, Successive approximation type, Counter type, dual - slope type. ROM, PROM, EPROM, RAM memories, Static and Dynamic memories.



## 5. Microprocessor

Organization of microprocessors, organization of microcomputers, Input and output devices, Hardware and Software. 8085 microprocessor architecture, Addressing modes, 8085 Instruction set, 8085 Interrupts, Memory & I/O Interfacing, Programmable Peripheral devices, 8086 Microprocessor architecture, addressing modes and interfacing techniques. Programming the 8086. Introduction to 80486 and its instruction set, Fundamentals of Pentium series of microprocessors.

## 6. Communication

Maxwell's equation, Time varying fields, wave equation and its solutions, Poynting vector, ground wave, tropospheric wave and sky wave propagation, Propagation of waves in ionosphere, Half & full wave Antennas, Antenna Arrays, Transmission lines, Impedance matching, Rectangular wave guides, TE & TM modes, Microwave devices Reflex klystron, TWT, Gunn diode, IMPATT & TRAPATT diodes, types of modulation AM, FM, PAM, PWM, PCM, ASK, FSK, PSK.

## 7. Laser & Optical Fibber

Spontaneous and Stimulated emissions, Einstein's A & B co-efficient, Two & Three level MASER, Population inversion, Optical pumping, Three & Four level laser, Ruby laser, Semiconductor laser,