

MAGADH UNIVERSITY

BODH GAYA



SYLLABUS OF PRE- Ph. D. REGISTRATION ENTRANCE TEST

2014 onwards

FACULTY OF SCIENCES

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), cadding 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,

Transmission characteristics of Optical fibres and cables, Optical sources and detectors, Application of optical fibres.

8. Transducers

Resistive, strain, pressure, moisture, photovoltaic, photoconductive, photoemissive transducers, characteristics of telemetry, radio telemetry, robot and their uses, robot auxiliary control device, a pick and place robot.

9. Algorithm and Data structure

Design and development of algorithm, flow chart, top down and bottom up approach of structured programming. Entity data, attributes, fields, records, files etc. Data structure - arrays, linked list, trees, stack, queue, and graph. Data structure Operations: traversing, inserting, deletion, merging, searching, and sorting

10. Software Systems

Concept of Assemblers, loaders, linker, interpreter and compilers. Operating system concepts, UNIX/GNU-LINUX operating system, administration and configuration, file systems hierarchy (FHS), file operations: creation of files and directory, removing of files and directories, file permission, attributes, general

purpose commands and utilities. Introduction to data communication, computer networks: LAN & WAN. Concept of HTML.

11. Computer Programming

Introduction to programming languages. ANSI compliant C language, insertion of data in C, operations and its procedure, various data types in C; decision making and looping. Introduction to object oriented programming, C++ features: Class, Objects, Overloading of operators, functions. FORTRAN: introduction, programming , discipline statement to write a program, intrinsic functions, integer type data, statements, arrays, sub-programmes. Introduction to DBMS, overview of DBASE & FOXPRO, Structured Query Language (SQL).

