RANI DURGAVATI VISHWAVIDYALAYA, JABALPUR

SYLLABUS

M. Phil and Ph. D. Entrance Test (w.e.f. 2018-19)

In accordance with Revised M. Phil. and Ph.D. Ordinances

ELECTRONICS

The Question paper of the Entrance test will have two sections A and B, each consisting of 50 objective type compulsory questions. The section A will represent a component of "Research Methodology" whereas section B shall be "Subject Specific". Each question will carry one mark.

i. There will be no negative marks
ii. The duration of the Entrance test will be Two hours.
iii The candidate must score minimum 50% marks in the Entrance test to qualify for the interview.

(Time 2 Hours) **PART –A & B** **(Max Marks 100)**

PART –A

Part –A shall consist of 50 objective type compulsory questions of 1 mark each based on Research Methodology. It shall be of generic nature, intended to assess the Research aptitude of the candidate. It will primarily be designed to test reasoning ability, data interpretation and quantitative aptitude of the candidate.

PART –B

UNIT –I

Electronic Transport in semiconductor, PN Junction, Diode equation and diode equivalent circuit. Breakdown in diodes, Zener diodes, Tunnel diode, Semiconductor diodes, characteristics and equivalent circuits of BJT,JFET,MOSFET, IC, fabrication – crystal growth, epitaxy, oxidation, lithography, doping, etching, isolation methods, metallization, bonding, Thin film active and passive devices.

UNIT-II

Superposition, Thevenin, Norton and Maximum Power Transfer Theorems, Network elements, Network graphs, Nodal and Mesh analysis, Zero and Poles, Bode Plots, Laplace, Fourier and Z-transforms. Time and frequency domain responses. Image impedance and passive filters. Two –port Network Parameters. Transfer functions, Signal representation. State variable method of circuit analysis, AC circuit analysis, Transient analysis.

UNIT-III

Rectifiers, Voltage regulated ICs and regulated power supply, Biasing of Bipolar junction transistors and JFET. Single stage amplifier, Multistage amplifiers, Feedback in amplifiers, oscillators , function generators, multivibrators, Operational Amplifiers (OPAMP) – characteristics and Applications, Computational Applications, Integrator, Differentiator, Wave shaping circuits, F to V and V to F converters. Active filters, Schmitt trigger, Phase locked loop.

UNIT-IV

Logic families, flip –flops, Gates, Boolean algebra and minimization techniques, Multivibrators and clock circuits, Counters-Ring, Ripple. Synchronous, Asynchronous, Up and down shift registers, multiplexers and demultiplexers, Arithmetic circuits Memories, A/D and D/A converters.

UNIT-V

Architecture of 8085 and 8086 Microprocessors, Addressing modes,8085 instruction set,8085interrupts,Programming, Memory and I/O interfacing, Interfacing 8155, 8255, 8279, 8253, 8257, 8259, 8251,with 8085 Microprocessors Serial communication protocols, Introduction of Microcontrollers (8 bit)-8031/8051 and 8048.

UNIT-VI

Introduction of High –level Programming Language, Introduction of data in C. Operators and its precedence, Various data types in C, Storage classes in C. Decision-making and forming loop in program, Handling character, Arrays in C, Structure, and union, User defined function, Pointers in C, Advanced pointer. Pointer to structures, pointer to functions. Dynamic data structure, file handling in C, Command line argument, Graphics-video modes, video adapters, Drawing various object on screen, Interfacing to external hardware via serial /parallel port using C, Applying C to electronic circuit problems. Introduction to object –Oriented Programming and C++.

Introduction of FORTRAN language, programming discipline , statements to write a program, intrinsic functions, integer-type statement, IF statement, Data validation, Format-directed input and output. Subscripted variables and DO loops. Array, Fortran Subprogram.

UNIT-VII

Maxwell's equations, Time varying fields, Wave equation and its solution, Rectangular waveguide, Propagation of wave in ionosphere, Poynting vector, Antenna

parameters, Half-wave antenna, Transmission lines, Characteristic of Impedance matching, Smith chart, Microwave components-T, Magic-T Tuner. Circulator isolator, Direction couplers, Sources-Reflex Klystron, Principle of operation of Magnetron, Solid State Microwave devices, Basic Theory of Gunn, GaAs FET, Crystal Detector and PIN diode for detection of microwaves.

UNIT- VIII

Basic principle of amplitude, frequency and phase modulation, Demodulation, Intermediate frequency and principle of super heterodyne receiver, Spectral analysis and signal transmission through linear systems, Random signals and noise, Noise temperature and noise figure. Basic concepts of information theory, Digital modulation and Demodulation: PM, PCM, ASK, FSK, PSK, Time –division Multiplexing, Frequency-Division Multiplexing, Data Communications- Circuits, Codes and Modems. Basic concepts of signal processing and digital filters.

UNIT-IX(a)

Characteristics of solid state power devices –SCR, Triac, UJT, Triggering circuits, choppers, inverters, converters. AC-regulators, speed control of A.C. and D.C motors. Stepper and synchronous motors; Three phase controlled rectifier; Switch mode power supply; Uninterrupted power supply.

UNIT-IX (b)

Optical sources –LED ,Spontaneous emission, Stimulated emission, Semiconductor Diode LASER, Photodetectors- p-n photodiode. PIN photodiode, Phototransistors, Optocouplers, Solar cells, Display devices, Optical Fibres-Light propagation in fibre, Types of fibre, Characteristic parameters, Modes, Fibre splicing, Fibre optic communication systems –coupling to and from the fibre, Modulation, Multiplexing and coding, Repeaters, Bandwidth and Rise time budgets.

UNIT-X (a)

Transducers- Resistance, Inductance Capacitance, Peizoelectric, Thermoelectric, Hall effect, Photoelectric, Techogenerators, Measurement of displacement, velocity, acceleration, force, torque, strain, speed and sound temperature, pressure, flow humidity, thickness, pH, position.

Measuring Equipment –Measurement of R, L and C, Bridge and Potentiometers, voltage, current ,power energy, frequency/time, phase, DVMs, DMMs, CRO, Digital storage oscilloscope, Logic probes, Logic State Analyser, Spectrum Analyzer, Recorder, Noise and Interference in instrumentation, Instrumentation amplifiers, Radio Telemetry.

Analytical Instruments-Biomedical instruments –ECG, blood pressure measurements, spectrophotometers, Electron Microscope, X-ray diffractometer.

UNIT- X (b)

Open–loop and close-loop control system. Error amplifier, on-off controller, Proportional (p),Proportional –Integral (PI),Proportional –Derivative (PD) ,PID controllers, Dynamic Behaviour of control systems-servomechanism characteristic parameters of control systems-Accuracy, Sensitivity, Disturbances, Transient response, Stability, Routh-Hurwitz criterion, Bode plots, Nyquist criterion, Controlling speed. Temperature and position using analog / digital control circuits.