

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER
SCHEME & SYLLABUS FOR THE POST OF ASSISTANT
CONSERVATOR FOREST & FOREST RANGE OFFICER GRADE Ist
COMPETITIVE EXAMINATION, 2018
FOREST DEPARTMENT

OPTIONAL SUBJECT - ELECTRONICS ENGINEERING

- 1. Electronic Devices :** Energy bands in intrinsic and extrinsic semiconductors, Carrier transport, diffusion current, drift current, mobility and resistivity, Generation and recombination of carriers, Poisson and continuity equations, P-N junction diodes, Zener diode, BJT, MOSFET, LED, photo diodes, solar cell, Thyristors, DIAC and TRIAC.
- 2. Electronic Circuits:** Small signal equivalent circuits of diodes, BJTs and MOSFETs, Simple diode circuits, clipping, clamping and rectifiers, Single-stage and multi-stage BJT and MOSFET amplifiers, biasing, bias stability, small signal analysis and frequency response, Feedback and Power amplifiers, Thyristor triggering circuits, A.C. to D.C. Converters, Inverters, choppers, controlled and uncontrolled power rectifiers, Bridge converters.
- 3. Linear Integrated Circuits:** Simple op-amp circuits, Active filters, Sinusoidal oscillators, criterion for oscillation, opamp configurations, Function generators, wave-shaping circuits and 555 timers, comparators, Regulators and Power supplies, ripple removal and regulation.
- 4. Digital Electronics:** Number systems, Combinatorial circuits, Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexers, decoders and PLAs; Sequential circuits: latches and flip-flops, counters, shift-registers, Sample and Hold circuits, ADCs and DACs, Semiconductor memories: ROM, SRAM, DRAM.
- 5. Microprocessor:** 8-bit Microprocessor architectures, Instruction set and simple assembly language programming, interfacing memory and I/O devices, Applications of microprocessors.

6. Control Systems: Basic control system components; Feedback principle, Transfer function, Block diagram representation, Signal flow graph, Routh-Hurwitz and Nyquist stability criteria, Bode and root-locus plots, Lag, lead and lag-lead compensation, State variable model and solution of state equation of LTI systems.

7. Network Analysis: Nodal and Mesh analysis, Network theorems: superposition, Thevenin and Norton's, maximum power transfer theorems, Steady state sinusoidal analysis using phasors, Time domain analysis of simple linear circuits, Solution of network equations using Laplace transform, Frequency domain analysis of RLC circuits, Linear 2-port network parameters, driving point and transfer functions,

8. Signals & Systems: Continuous-time signals, Fourier series and Fourier transform representations, sampling theorem and applications, Discrete-time signals, discrete-time Fourier transform (DTFT), DFT, FFT, Z-transform, LTI systems, definition and properties, causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay.

9. Electromagnetics: Electrostatics, Maxwell's equations: differential and integral forms and their interpretation, boundary conditions, wave equation, Poynting vector, Plane waves and properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth; Transmission lines: equations, characteristic impedance, impedance matching, impedance transformation.

10. Electronic Measurements & Instrumentation: Accuracy & precision, Repeatability, Digital Voltmeters and Multimeters, Q meters, Vector Impedance meter, RF Power & Voltage Measurements, Introduction to shielding & grounding, Transducers: Classification, Selection Criteria, Characteristics, Construction, Working Principles and Application: RTD, Thermocouples, Thermistors, LVDT, Strain Gauges, Bourdon Tubes, Tachogenerators, Load Cells, Piezoelectric Transducers.

Note :- **Pattern of Question Paper**

- 1. Objective type paper**
- 2. Maximum Marks : 200**
- 3. Number of Questions : 120**
- 4. Duration of Paper : Three Hours**
- 5. All questions carry equal marks.**
- 6. There will be Negative Marking.**