BROAD CONTENTS OF THE GENERAL STUDIES AND ENGINEERING APTITUDE PAPER (Stage-I, Paper-I).

General Studies and Engineering Aptitude

(Stage I - Paper I, Objective type, Common to all Candidates, 2 hours duration, 200 Marks maximum)

The questions from the following Topics will be set in Paper-I of Stage-I.

1. Current issues of national and international importance relating to social, economic and industrial development.

2. Engineering Aptitude covering Logical reasoning and Analytical ability

3. Engineering Mathematics and Numerical Analysis 4. General Principles of Design, Drawing, Importance of Safety

5. Standards and Quality practices in production, construction, maintenance and services

6. Basics of Energy and Environment: Conservation, environmental pollution and degradation, Climate Change, Environmental impact assessment

7. Basics of Project Management

8. Basics of Material Science and Engineering

9. Information and Communication Technologies (ICT) based tools and their applications in Engineering such as networking, e-governance and technology based education.

10. Ethics and values in engineering profession

Note:

The paper in General Studies and Engineering Aptitude will include Knowledge of relevant topics as may be expected from an engineering graduate, without special study.

Questions from all the 10 topics mentioned above shall be set. Marks for each Topic may range from 5% to 15% of the total marks in the paper.

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REVISED SYLLABI OF FOUR ENGINEERING DISCIPLINES

UNION PUBLIC SERVICE COMMISSION, NEW DELHI ENGINEERING SERVICES EXAMINATION (ESE) SYLLABI

Branch/Discipline: Electronics & Telecommunication Engineering

Contents for syllabi of both the Papers together for Stage-I objective type Paper-II and separately for Stage-11 Conventional type Paper-I and Paper - II

Paper-I

1. Basic Electronics Engineering:

Basics of semiconductors; Diode/Transistor basics and characteristics; Diodes for different uses; Junction & Field Effect Transistors (BJTs, JFETs, MOSFETs); Transistor amplifiers of different types, oscillators and other circuits; Basics of Integrated Circuits (ICs); Bipolar, MOS and CMOS ICs; Basics of linear ICs, operational amplifiers and their applications-linear/non-linear; Optical sources/detectors; Basics of Opto electronics and its applications.

2. Basic Electrical Engineering:

DC circuits-Ohm's & Kirchoff's laws, mesh and nodal analysis, circuit theorems; Electro-magnetism, Faraday's & Lenz's laws, induced EMF and its uses; Single-phase AC circuits; Transformers, efficiency; Basics-DC machines, induction machines, and synchronous machines; Electrical power sources- basics: hydroelectric, thermal, nuclear, wind, solar; Basics of batteries and their uses.

3. Materials Science:

Electrical Engineering materials; Crystal structure & defects; Ceramic materials-structures, composites, processing and uses; Insulating laminates for electronics, structures, properties and uses; Magnetic materials, basics, classification, ferrites, ferro/para-magnetic materials and components; Nano materials-basics, preparation, purification, sintering, nano particles and uses; Nano-optical/magnetic/electronic materials and uses; Superconductivity, uses.

4. Electronic Measurements and Instrumentation:

Principles of measurement, accuracy, precision and standards; Analog and Digital systems for measurement, measuring instruments for different applications; Static/dynamic characteristics of measurement systems, errors, statistical analysis

and curve fitting; Measurement systems for non-electrical quantities; Basics of telemetry; Different types of transducers and displays; Data acquisition system basics.

5. Network Theory:

Network graphs & matrices; Wye-Delta transformation; Linear constant coefficient differential equations- time domain analysis of RLC circuits; Solution of network equations using Laplace transforms- frequency domain analysis of RLC circuits; 2-port network parameters-driving point & transfer functions; State equations for networks; Steady state sinusoidal analysis.

6. Analog and Digital Circuits:

Small signal equivalent circuits of diodes, BJTS and FETs; Diode circuits for different uses; Biasing & stability of BJT & JFET amplifier circuits; Analysis/ design of amplifier- single/ multi-stage; Feedback& uses; Active filters, timers, multipliers, wave shaping, ND-D/A converters; Boolean Algebra& uses; Logic gates, Digital IC families, Combinatorial/sequential circuits; Basics of multiplexers, counters/ registers/ memories / microprocessors, design& applications.

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PAPER — II

1. Analog and Digital Communication Systems:

Random signals, noise, probability theory, information theory; Analog versus digital communication & applications: Systems- AM, FM, transmitters/receivers, theory/practice/ standards, SNR comparison; Digital communication basics: Sampling, quantizing, coding, PCM, DPCM, multiplexing-audio/video; Digital modulation: ASK, FSK, PSK; Multiple access: TDMA, FDMA, CDMA; Optical communication: fiber optics, theory, practice/standards.

2. Control Systems:

Classification of signals and systems; Application of signal and system theory; System realization; Transforms& their applications; Signal flow graphs, Routh-Hurwitz criteria, root loci, Nyquist/ Bode plots; Feedback systems-open &close loop types, stability analysis, steady state, transient and frequency response analysis; Design of control systems, compensators, elements of lead/lag compensation, PID and industrial controllers.

3. Computer Organization and Architecture:

Basic architecture, CPU, I/O organization, memory organization, peripheral devices, trends; Hardware /software issues; Data representation& Programming; Operating systems-basics, processes, characteristics, applications; Memory management, virtual memory, file systems, protection & security; Data bases, different types, characteristics and design; Transactions and concurrency control; Elements of programming languages, typical examples.

4. Electro Magnetics:

Elements of vector calculus, Maxwell's equations-basic concepts; Gauss', Stokes' theorems; Wave propagation through different media; Transmission Lines-different types, basics, Smith's chart, impedance matching/transformation, S-parameters, pulse excitation, uses; Waveguides-basics, rectangular types, modes, cut-off frequency, dispersion, dielectric types; Antennas-radiation pattern, monopoles/dipoles, gain, arrays-active/passive, theory, uses.

5. Advanced Electronics Topics:

VLSI technology: Processing, lithography, interconnects, packaging, testing; VLSI design: Principles, MUX/ROM/PLA-based design, Moore & Mealy circuit design; Pipeline concepts & functions; Design for testability, examples; DSP: Discrete time signals/systems, uses; Digital filters: FIR/IIR types, design, speech/audio/radar signal processing uses; Microprocessors & microcontrollers, basics, interrupts, DMA, instruction sets, interfacing; Controllers & uses; Embedded systems.

6. Advanced Communication Topics:

Communication networks: Principles /practices /technologies /uses /OSI model/security; Basic packet multiplexed streams/scheduling; Cellular networks, types, analysis, protocols (TCP/TCPIP); Microwave & satellite communication: Terrestrial/space type LOS systems, block schematics link calculations, system design; Communication satellites, orbits, characteristics, systems, uses; Fiber-optic communication systems, block schematics, link calculations, system design.

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