कार्मिक शाखा/Personnel Branch
बीएसएनएल निगम कार्या./BSNL Corporate Office
चौथा तल, भारत संचार भवन
4th Floor, Bharat Sanchar Bhawan,
जनपथ, नई दिल्ली-10001/Janpath , New Delhi-110001.

भारत संचार निगम लिमिटेड
(भारत सरकार का उद्यम)
BHARAT SANCHAR NIGAM LIMITED
(A Govt. Of India Enterprise)

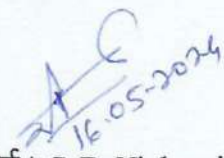No. BSNLCO-PERS/15(17)/2/2023-PERS1(Elect)   Dated 16 -05-2024

Subject: **Scheme and Syllabus for Direct Recruitment to the post of Senior Executive Trainee (DR) of Electrical Stream.**

...

The undersigned is directed to enclose herewith Scheme and Syllabus for direct recruitment to the post of Senior Executive Trainee (DR) [SET(DR)] of Electrical Stream for wide publicity. The Scheme and Syllabus shall be applicable w.e.f the date of notification.
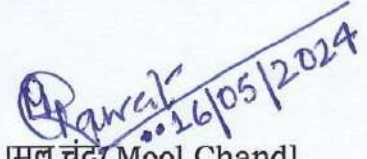
This issues with the approval of competent authority.

Encl.: As above.

[जी.पी. विश्नोई/ G.P. Vishnoi]
उप महाप्रबंधक (कार्मिक-II)
Dy. General Manager (Pers. II)

To

1. PPS to CMD, BSNL.
2. PPS to functional Directors of BSNL Board.
3. PPS to CVO, BSNL.
4. All Heads of Telecom Circles/Administrative Units, BSNL.
5. CGM(EW)/PGM(Pers)/PGM(Estt.)/GM(Rectt.), BSNL CO.
6. General Secretary, SNEA/AIGETOA/SEWA.
7. OL Section for Hindi version.
8. BSNL Intranet portal.

[मूल चंद/ Mool Chand]
सहायक महाप्रबंधक (कार्मिक नीति)
Assistant General Manager (Pers. Policy)

पंजी. और निगमित कार्यालय: भारत संचार भवन, एच.सी. माथुर लेन, जनपथ, नई दिल्ली-110 001
Regd. & Corporate Office: Bharat Sanchar Bhawan, H.C.Mathur Lane, Janpath, New Delhi – 110001 www.bsnl.co.in

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Scheme and Syllabus for Direct Recruitment to the post of Senior Executive Trainee [SET (DR)] of Electrical Stream

1. Scheme of Examination:

The examination (Computer based-Multiple choice-Objective type test) will consist of one paper as given below:

Paper	Particulars	Maximum Marks	Duration
Part-I (Common)	Written Test (Aptitude)	40 Marks (40 Questions)	180 Minutes
Part-II (Core)	Written Test (Technical)	160 Marks (160 Questions)	
	Total	200Marks (200 Questions)	

Note:

(a) The examination will be conducted in one shift comprising of Part-I (Common)-Written Test (Aptitude) and Part-II (Core) - Written Test (Technical) for 180 minutes duration.

(b) The examination will be objective type with negative marking. For each correct answer 01 Mark will be awarded and for each wrong answer (-)0.25 Marks will be awarded.

1.1 **Minimum qualifying Marks**: Minimum qualifying Marks in Part-I (Common) & Part-II (Core) shall be 40% in each Part and overall minimum qualifying Marks in both Part-I & Part-II combined shall be 50%. For SC/ST, OBC, PwBD and EWS candidates, there shall be relaxation in Qualifying Marks and the minimum Qualifying Marks in each Part shall be 35% and overall minimum Qualifying Marks in both the Parts combined shall be 45%.

1.2 **Determination of Final Merit List**: Final merit list will be prepared based on Total Marks obtained in Part-I (Common) & Part-II (Core), provided the candidate has secured minimum qualifying Marks as prescribed above.

2. Syllabus for Part-I (Common) – Written Test (Aptitude):

(40 Marks)

Part-I (Common)	Aptitude Test	1. Quantitative ability and data sufficiency 2. Reasoning (e.g. analytical, logical and critical reasoning) 3. Verbal ability, reading comprehension and analysis

3. Syllabus for Part-II (Core) – Written Test (Technical)-Electrical Stream:

As given in Annexure.

Syllabus of SET(DR)–Written Test Technical (Core)–Electrical Stream

(160 Marks)

Sl. No.	Topic	Weightage (in Marks)
1	**Electrical Materials**	10
	Electrical Engineering Materials, crystal structures and defects, ceramic materials, insulating materials, magnetic materials – basics, properties and applications; ferrities, ferro-magnetic materials and components; basics of solid state physics, conductors; Photo-conductivity; Basics of Nano materials and Superconductors.	
2	**Electric Circuits and Fields**	15
	Circuit elements, network graph, KCL, KVL, Node and Mesh analysis, ideal current and voltage sources, Thevenin's, Norton's, Superposition and Maximum Power Transfer theorems, transient response of DC and AC networks, Sinusoidal steady state analysis, basic filter concepts, two-port networks, three phase circuits, Magnetically coupled circuits, Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions, Ampere's and Biot- Savart's laws; inductance, dielectrics, capacitance; Maxwell's equations.	
3	**Electrical and Electronic Measurements:**	15
	Principles of measurement, accuracy, precision and standards; Bridges and potentiometers; moving coil, moving iron, dynamometer and induction type instruments, measurement of voltage, current, power, energy and power factor, instrument transformers, digital voltmeters and multi-meters, phase, time and frequency measurement, Q-meters, oscilloscopes, potentiometric recorders, error analysis, Basics of sensors, Transducers, basics of data acquisition systems	
4	**Computer Fundamentals:**	10
	Number systems, Boolean algebra, arithmetic functions, Basic Architecture, Central Processing Unit, I/O and Memory Organisation; peripheral devices, data representation and programming, basics of Operating system and networking, virtual memory, file systems; Elements of programming languages, typical examples.	
5	**Basic Electronics Engineering:**	15
	Basics of Semiconductor diodes and transistors and characteristics, Junction and field effect transistors (BJT, FET and MOSFETS), different types of transistor amplifiers, equivalent circuits and frequency response; oscillators and other circuits, feedback amplifiers.	
6	**Analog and Digital Electronics:**	15
	Operational amplifiers – characteristics and applications, combinational and sequential logic circuits, multiplexers, multi- vibrators, sample and hold circuits, A/D and D/A converters, basics of filter circuits and applications, simple active filters; Microprocessor basics- interfaces and applications, basics of linear integrated circuits; Analog communication basics, Modulation and de-modulation, noise and bandwidth, transmitters and receivers, signal to noise ratio, digital communication basics, sampling, quantizing, coding, frequency and time domain multiplexing, power line carrier communication systems.	

Sl. No.	Topic	Weightage (Marks)
7	**Systems and Signal Processing :**	10
	Representation of continuous and discrete-time signals, shifting and scaling operations, linear, time-invariant and causal systems, Fourier series representation of continuous periodic signals, sampling theorem, Fourier and Laplace transforms, Z transforms, Discrete Fourier transform, FFT, linear convolution, discrete cosine transform, FIR filter, IIR filter, bilinear transformation.	
8	**Control Systems:**	15
	Principles of feedback, transfer function, block diagrams and signal flow graphs, steady-state errors, transforms and their applications; Routh-hurwitz criterion, Nyquist techniques, Bode plots, root loci, lag, lead and lead-lag compensation, stability analysis, transient and frequency response analysis, state space model, state transition matrix, controllability and observability, linear state variable feedback, PID and industrial controllers.	
9	**Electrical Machines :**	20
	Single phase transformers, three phase transformers - connections, parallel operation, auto-transformer, energy conversion principles, DC machines - types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors, Induction motors - principles, types, performance characteristics, starting and speed control, Synchronous machines - performance, regulation, parallel operation of generators, motor starting, characteristics and applications, servo and stepper motors.	
10	**Power Systems :**	20
	Basic power generation concepts, steam, gas and water turbines, transmission line models and performance, cable performance, insulation, corona and radio interference, power factor correction, symmetrical components, fault analysis, principles of protection systems, basics of solid state relays and digital protection; Circuit breakers, Radial and ring-main distribution systems, Matrix representation of power systems, load flow analysis, voltage control and economic operation, System stability concepts, Swing curves and equal area criterion. HVDC transmission and FACTS concepts, Concepts of power system dynamics, distributed generation, solar and wind power, smart grid concepts, environmental implications, fundamentals of power economics.	
11	**Power Electronics and Drives :**	15
	Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs - static characteristics and principles of operation, triggering circuits, phase control rectifiers, bridge converters - fully controlled and half controlled, principles of choppers and inverters, basis concepts of adjustable speed DC and AC drives, DC-DC switched mode converters, DC-AC switched mode converters, resonant converters, high frequency inductors and transformers, power supplies.	
	Total	160

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