महाराष्ट्र नागरी सेवा राजपत्रित संयुक्त परीक्षेमधील सन २०२३ पासून पारंपारिक/ वर्णनात्मक स्वरुपात घेण्यात येणा-या खालील परीक्षांकरीता प्रश्नपत्रिकेची रचना (Question Paper Structure) साधारणत: पुढीलप्रमाणे राहील.

१) महाराष्ट्र अभियांत्रिकी सेवा मुख्य परीक्षा गट- अ व ब (स्थापत्य/ यांत्रिकी/ विद्युत/ विद्युत व यांत्रिकी).

२) निरीक्षक, वैधमापन शास्त्र, गट-ब मुख्य परीक्षा.

३) अन्न व औषधी द्रव्ये प्रशासकीय सेवा [सहायक आयुक्त (अन्न) तथा पदनिर्देशित अधिकारी, गट-अ (राजपत्रित) व अन्न सुरक्षा अधिकारी, गट-ब (राजपत्रित)] मुख्य परीक्षा.

Time Allowed: Three Hours	*Maximum Marks: 200*
Medium – English	*Type of Paper- Conventional*

Question Paper Specific Instructions

Please read each of the following instructions carefully before attempting questions:

1. There are **EIGHT** questions divided in two sections, out of which **FIVE** are to be attempted.
2. Questions no. 1 and 5 are compulsory. Out of the remaining questions, THREE are to be attempted choosing at least ONE question from each Sections.
3. The number of marks carried by a question/sub question is indicated against it.
4. Keep in mind the word limit indicated in the question if any.
5. Wherever option has been given, only the required number of responses in the serial order attempted shall be assessed. Unless struck off, attempt of a question shall be counted even if attempted partly. Excess responses shall not be assessed and shall be ignored.
6. Candidates are expected to answer all the sub-questions of a question together. If sub-question of a question is attempted elsewhere (after leaving a few page or after attempting another question) the later sub-question shall be overlooked.
7. Any page or portion of the page left blank in the Answer Booklet must be clearly struck off.
8. Unless otherwise mentioned, symbol and notation have their usual standard meanings. Assume suitable data, if necessary and indicate the same clearly.
9. Neat sketches may be drawn, wherever required.
10. The medium of answer should be mentioned on the answer book as claimed in the application and printed on admission card. The answers written in medium other than the authorized medium will not be assessed and no marks will be assigned to them.

Note - Candidates will be allowed to use Scientific (Non-programmable type) calculators.

Paper I & Paper II

Section A			Maximum Marks
Question No. 1	**Solve any five out of seven.**		40
	a	Short Question	
	b	Short Question	
	c	Short Question	
	d	Short Question	
	e	Short Question	
	f	Short Question	
	g	Short Question	
Question No. 2	a	Long Question	40
	b	Long Question	
	c	Short Question	
Question No. 3	a	Long Question	40
	b	Long Question	
	c	Short Question	
Question No. 4	a	Long Question	40
	b	Long Question	
	c	Short Question	
Section B			**Maximum Marks**
Question No. 5	**Solve any five out of seven.**		40
	a	Short Question	
	b	Short Question	
	c	Short Question	
	d	Short Question	
	e	Short Question	
	f	Short Question	
	g	Short Question	
Question No. 6	a	Long Question	40
	b	Long Question	
	c	Short Question	
Question No. 7	a	Long Question	40
	b	Long Question	
	c	Short Question	
Question No. 8	a	Long Question	40
	b	Long Question	
	c	Short Question	

Note: 1. Long question can be Derivative/Problem/Explain in detail diagram/ sketch question justifying the marks assigned to the question.

2. Short question can be Definition/ short notes justifying the marks assigned to the question.

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महाराष्ट्र अभियांत्रिकी सेवा (विद्युत), गट-अ व ब (मुख्य) परीक्षा आणि महाराष्ट्र अभियांत्रिकी सेवा (विद्युत व यांत्रिकी), गट-अ व ब (मुख्य) परीक्षा

Maharashtra Engineering Services (Electrical), Group A & B (Main) Examination AND Maharashtra Engineering Services (Electrical & Mechanical), Group A & B (Main) Examination

-: परीक्षा योजना :-

प्रश्नपत्रिकांची संख्या - दोन

लेखी परीक्षा - ४०० गुण
मुलाखत - ५० गुण
एकूण - ४५० गुण

विषय	सांकेतांक	गुण	दर्जा	माध्यम	कालावधी	प्रश्नपत्रिकेचे स्वरुप
विद्युत अभियांत्रिकी पेपर क्रमांक - १	१०७०	२००	बी.ई. (विद्युत)	इंग्रजी	तीन तास	पारंपारिक/ वर्णनात्मक
विद्युत अभियांत्रिकी पेपर क्रमांक - २	१०७१	२००	बी.ई. (विद्युत)	इंग्रजी	तीन तास	पारंपारिक/ वर्णनात्मक

-: अभ्यासक्रम :-

Electrical Engineering – Paper – I

Sr.No.	Topics
	Section A
1	Circuit Analysis: DC circuit elements, ideal current and voltage sources, work power energy calculations, network graph, KCL, KVL, node and mesh analysis, Thevenin's, Norton's, Superposition and Maximum Power Transfer theorems.
2	Circuit Analysis: Work power energy calculations in AC series and parallel circuits, steady state and transient response of DC and AC networks. Two port networks, magnetically coupled circuits. AC network analysis.
3	Electric field and Materials: Gauss's Law, electric field and potential due to point, line, plane and spherical charge distributions, Electric dipoles and systems of charges. Ampere's and Biot-Savart's laws; inductance, dielectrics, capacitance; Maxwell's equations. Characteristics and applications of materials for electrical systems, crystal structures and defects, ceramic materials, insulating materials, semiconducting materials photoelectric materials, superconducting materials.

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	Section B
4	Magnetic field and Materials: Magnetic field, magnetic circuits. Energy stored in electric and magnetic fields, electromagnetic induction, BH curve. Magnetic materials ferrites, Ferro-magnetic materials; Basics of Nano materials. Maxwell◦s equations for time varying fields. Electromagnetic waves.
5	Transformers and DC machines: Transformers-principles and performance of Single phase and three phase transformers; three phase transformers connections, parallel operation, auto-transformer, energy conversion principles. DC Machines- Principles, performance and applications of DC generators and Motors, types, characteristics, armature reaction and commutation, starting and speed control of motors; Principles and performance.
6	AC Machines: AC Machines- Principles, performance characteristics of single phase and three phase induction motors; Synchronous machines - performance, regulation, parallel operation of generators, motor starting. Applications. Special Machines- Servo Motors, Stepper motors, BLDC and PMSM motors-Characteristics and applications. Linear motors.
	Section C
7	Power and Energy Systems Concept of power generation, types of turbines, transmission line models and performance, Calculation of sag and tension in transmission of lines, cable performance, insulation, corona and radio interference, power factor correction, principles of protection systems, basics of solid-state relays and digital protection; Circuit breakers, LT and HT switchgear, Radial and ring-main distribution systems.
8	Power System Analysis Power system Analysis-symmetrical components, fault analysis, load flow analysis. Power system Operation and Control-voltage control and economic operation, stability analysis, Swing curves and equal area criterion. Concepts of power system dynamics.
9	Recent Trends in Power and Energy Systems Energy scenario in India and Maharashtra, energy policies, energy pricing, smart energy meters, renewable energy systems, distributed generation, energy storage systems, batteries, fuel cells and super capacitors; Energy systems for hybrid and electric vehicles. Smart Grid systems.

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Section D	
10	Illumination Basic terms in lighting systems and features, lamp types and their features, Recommended illumination levels for various tasks, methodology of lighting system energy efficiency study, Illumination system design for residential, commercial, industrial categories. Solar powered illumination and associated economics.
11	DG set and UPS DG set selection and installation factors, Operational features, Energy performance assessment of DG sets, Energy saving majors for DG sets, Synchronization of DGs with utility supply. Parallel operation. UPS technology, types and specifications, Performance assessment.
12	Utilization Pump types and characteristics, Pump curves, Factors affecting pump performance, Efficient pumping system operation, and Energy conservation in pumping systems. Fan and compressor types, Fan and compressor performance evaluation and efficient system operation, Compressor capacity assessment, Energy saving opportunities in fans and compressors.

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Electrical Engineering – Paper – II

Sr.No.	Topics
	Section A
1	Linear Integrated Circuits: Characteristics and applications of operational amplifiers, basics of linear integrated circuits; basics of filter circuits and applications.
2	Analog Electronics: Analog communication basics, Modulation and de-modulation, noise and bandwidth, transmitters and receivers, signal to noise ratio.
3	Digital Electronics Digital logic gates, combinational and sequential logic circuits, multiplexers, demultiplexers, sample and hold circuits, A/D and D/A converters. Microprocessor basics – interfaces and applications. Number systems, Boolean algebra, arithmetic functions, Computer Architecture, Central Processing Unit, I/O and Memory Organization; peripheral devices, data base management, basics of Operating system and networking, virtual memory, file systems; Elements of c programming.
	Section B
4	Digital Communication Digital communication basics, sampling, quantizing, coding, frequency and time domain multiplexing, power line carrier communication systems.
5	Power Electronics and Applications १: Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs § static characteristics and principles of operation, triggering circuits, PWM generators, half and fully controlled rectifiers, DC to DC buck, boost, buck boost, cuk, and sepic converters.
6	Power Electronics and Applications २ : Single phase and three phase inverters, resonant converters, high frequency inductors and transformers, power supplies.
	Section C
7	Power Electronics and Drives: Basic concepts of adjustable speed dc and ac drives, v/f control and Direct Torque control of machines. Different drive mechanism for EVs Concepts of HVDC transmission and FACTS
8	Continuous Signal Analysis Representation of continuous signals; Fourier series representation of continuous periodic and aperiodic signals, Fourier and Laplace transforms.

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9	Discrete Signal Analysis Representation of discrete-time signals, shift operator, types of systems. Sampling theorem, Z transforms, Discrete Fourier transform, FFT, convolution, discrete cosine transform, FIR filter, IIR filter.
	Section D
10	Control Systems Analysis Open loop and closed loop control system, transfer function, block diagrams and signal flow graphs representation and simplification, steady-state errors, Routh-Hurwitz criterion, Nyquist techniques, Bode plots, root loci. transient and frequency response analysis.
11	Control Systems Design Lag, lead and lead-lag compensation, Classical PID and industrial controllers, tuning of PID controllers, stability analysis, state space representation, state transition matrix, controllability and observability, linear state variable feedback controller, Luenberger observer.

सचिव
महाराष्ट्र लोकसेवा आयोग

दिनांक : २४/०१/२०२३

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