

महाराष्ट्र नागरी सेवा राजपत्रित संयुक्त परीक्षेमधील सन २०२३ पासून पारंपारिक/ वर्णनात्मक स्वरूपात घेण्यात येणा-या खालील परीक्षांकरीता प्रश्नपत्रिकेची रचना (Question Paper Structure) साधारणतः पुढीलप्रमाणे राहिल.

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

**अन्न व औषधी द्रव्ये प्रशासकीय सेवा (राजपत्रित), (मुख्य) परीक्षा**  
**[सहायक आयुक्त (अन्न), गट-अ आणि अन्न सुरक्षा अधिकारी, गट-ब]**  
**Food and Drugs Administrative Services (Gazetted) (Main) Examination**  
**[Assistant Commissioner (Food), Group-A and Food Safety Officer, Group-B ]**

-: परीक्षा योजना :-

प्रश्नपत्रिकांची संख्या - दोन

पेपर क्र.-१ - २०० गुण

पेपर क्र.-२ - २०० गुण

मुलाखत - ५० गुण

एकूण - ४५० गुण

विषय	सांकेतांक	दर्जा	माध्यम	गुण	कालावधी	प्रश्नपत्रिकेचे स्वरूप
अन्न व औषधी द्रव्ये विषयक घटक पेपर-१	१०७२	पदवी	इंग्रजी	२००	तीन तास	पारंपारिक/ वर्णनात्मक
अन्न व औषधी द्रव्ये विषयक घटक -पेपर-२	१०७३	पदवी	इंग्रजी	२००	तीन तास	पारंपारिक/ वर्णनात्मक

-: अभ्यासक्रम :-

पेपर-I

अ.क्र.	घटक
<b>Section – A : CHEMISTRY SYLLABUS</b>	
<b>1</b>	<b>Periodic table/ Concepts of qualitative analysis</b> Periodicity of Elements: s, p, d, f block elements, the long form of periodic table. Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table, Atomic radii (van der Waals), Ionic and crystal radii, Covalent radii (octahedral and tetrahedral).
<b>2</b>	<b>Bonding &amp; Structure of organic compounds &amp; their nomenclature</b> a) Hybridization: $sp^3$ , $sp^2$ , $sp$ hybridization of carbon and nitrogen; $sp^3$ and $sp^2$ hybridizations of Organic compounds (alcohol, ether, aldehyde, ketone, carboxylic acid, ester, cyanide, amine and amide) b) IUPAC nomenclature. Nomenclature of organic compounds: alkanes, alkenes, alkynes, haloalkanes, alcohols, ethers, aldehydes, ketones, carboxylic acids, carboxylic acid derivatives (acid halides, esters, anhydrides, amides), nitro compounds, nitriles and amines; including their cyclic analogues
<b>3</b>	<b>Mechanism of organic reactions Alkanals and Cycloalkanes</b> Alkanes and Cycloalkanes, Organic Reactions, Reactions of alkanes, Alcohols, and Amines, Nucleophilic Substitution, Formation of Alkenes and Alkynes. Elimination Reactions, Free Radical Addition and Substitution Reactions
<b>4</b>	<b>Chemical calculations – Introduction to molecular spectroscopy</b> a) Chemical Calculations; Expressing concentration of solutions: Normality, molality, molarity, formality, mole fractions, weight ratio, volume ratio, weight to volume ratio, ppm, ppb, millimoles, milliequivalents. b) Molecular spectroscopy; Electromagnetic radiation, electromagnetic spectrum, interaction of electromagnetic radiation with matter: Absorption, emission, scattering, fluorescence, electronic, vibrational and rotational transitions, Beer-Lambert's law
<b>5</b>	<b>Chemical thermodynamics</b> a) Thermodynamic terms: System, surrounding, boundaries, open, closed and isolated system, intensive and extensive properties, state functions and path functions, zeroth law of thermodynamics

	<p><b>b)</b> Thermo chemistry: Heats of reactions, standard states, enthalpy of formation of molecules, enthalpy of combustion and its applications, calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, Kirchhoff's equation</p> <p><b>c)</b> First law of thermodynamics: concept of heat (q), work (w), internal energy (U), statement of first law, enthalpy, relation between heat capacities, sign conventions, calculations of heat (q), work (w), internal energy (U), and enthalpy (H)</p>
<b>6</b>	<p><b>Industrial Organic chemistry</b></p> <p>Introduction to industrial organic chemistry, Industrial Organic Chemicals, Chemicals from ethylene, Chemicals from propylene, Chemicals from benzene, Toluene and Xylene (BTX Process), Chemicals from acetylene, Synthesis gas, Ammonia (Haber Process), Carbon monoxide, Sources of chemicals other than petroleum and natural Gas, Polymers, Plastics, Elastomers (Rubbers), Catalytic organic reactions.</p>
<b>7</b>	<p><b>Aromatic Hydrocarbons – haloarenes, phenols, ether and epoxides</b></p> <p><i>Aromaticity:</i> Introduction, Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples</p>
<b>Section – B : INTRODUCTION TO FOOD</b>	
<b>1</b>	<p><b>Constituents of food:</b></p> <p>(i) Carbohydrates: Different carbohydrates such as starch, cellulose, sugars, pectin, fiber etc. and their significance in diet; Changes in carbohydrates during processing; Interaction of carbohydrates with other food constituents and their implications; Special application of carbohydrates in gels, emulsions, stabilization of food systems, etc.</p> <p>(ii) Proteins: Classification, Structure, Biological functions, Properties of proteins-denaturation, gelation, dough formation, foaming etc., Effect of processing on proteins, Amino acids-classification and properties, Peptides.</p> <p>(iii) Fats: Classification of lipids, Chemical aspects of fats-lipolysis, autoxidation, thermal decomposition, and chemistry of frying, Role of lipids in food flavor, Measurement of lipid oxidation-peroxide value, iodine value, TBA test, etc.</p> <p>(iv) Fibers: Classification, Physicochemical and functional properties</p>
<b>2</b>	<p><b>Food Nutrition:</b> Nutritional aspects of foods, Relation of food and diseases, Nutritional requirement of special group of people, Effect of food processing on food nutrition. Structure and functions of Vitamins, Minerals, and other ME.</p>
<b>3</b>	<p><b>Food Safety:</b> Types of hazards, Risk assessment, Existing and emerging pathogens. Microbial spoilage of foods, intrinsic factors, microbiology of fruits &amp; vegetable, Meat, fish, sugar &amp; sugar boiled products. Toxins in foods, Pesticides residues in foods, Heavy metals detection.</p> <p>Food contaminants : Microbial, Chemical, Physical.</p> <p>Food adulteration: Common adulterants, simple tests for detection of adulteration.</p>
<b>4</b>	<p><b>Food Additives:</b> Intentional and unintentional additives.</p> <p>Additives used in food preservation such as preservatives, antioxidants, humectants etc. with respect to chemistry and food uses. Additives used as aids in food processing such as Sequestrant, emulsifier, hydrocolloids, non-nutritive sweet, artificial sweeteners, flavour enhancer stabilizers, anticaking and firming agents, flour bleaching and maturing agents, sweeteners, acidulants etc. and their functions in food processing and storage.</p> <p>Safety aspects of Food Additives: Tolerance levels &amp; toxic levels in foods, Legal safeguard, Risks of food additives.</p>
<b>5</b>	<p><b>Food Packaging &amp; labelling :</b> Packaging types, Testing of various packaging materials and packages for evaluation of quality, Food and packaging material interactions including migration, scalping etc., Newer packaging technologies-VP/CAP/MAP; aseptic processing and packaging; active and intelligent packaging, Understanding labelling rules &amp; Regulations, Nutritional labelling, Labeling requirements for pre-packaged food as per CODEX</p>

## पेपर - II

अ.क्र.	घटक
<b>Section – A : INTRODUCTION OF FOOD PROCESSING AND TECHNOLOGY</b>	
1	<b>Principles of food processing and preservation:</b> Food processing and preservation techniques- Pickling, Drying and dehydration, Evaporation and concentration, Freezing, Chilling, Blanching, Pasteurization, Sterilization, UHT processing, Retort processing, Smoking, Curing, Canning, Bottling, Jellying, Food powders, Minimal processing, Photochemical processes, HPP, Hurdle technology, etc.
2	<b>Technology of fruits and vegetables processing:</b> Post-harvest technology; minimal processing; commercial canning of fruits and vegetables; processing and preservation of fruit beverages; processing of fruit preserves; commercial processing technology for value addition; artificial ripening. Carbonated fruits beverages, packaged drinking water.
3	<b>Technology of plantation crops, herbs and spices processing:</b> Processing of minor and major spices; extraction of spice oil and oleoresins; post-harvest processing of plantation crops; processing of medicinal and tuber crops.
4	<b>Technology of meat, fish, poultry and egg processing:</b> Meat processing & Preservation, egg processing and preservation; processing of fish and marine products
5	<b>Technology of cereal processing:</b> Grain storage principles; grain storage structures; wheat milling; paddy processing; parboiling and ageing of rice; barley malting; sorghum, Major & minor millets and oat processing; processing of cereals and millets for food uses. Baking technologies, Baking products, technology of extruded products.
6	<b>Technology of legume and oilseed processing:</b> Types of legumes and pulses; nutritional changes during soaking and sprouting of pulses, milling of pulses, methods used for removal of anti-nutritional compounds; oilseed processing.
7	<b>Technology of milk and dairy processing:</b> Recent dairy developments in India; sampling and quality testing of milk; processing technology of dairy products; dairy plant cleaning and sanitization operational details.
8	<b>Confectionary and Snacks Technology:</b>
9	<b>Unit operations in foods processing:</b> Cleaning, Sorting, Grading, mixing, centrifugation, crystallization, size reduction, membrane separation.
<b>Section – B : NATIONAL/INTERNATIONAL/CODEX STANDARDS</b>	
1	<b>National/International standards:</b> Food Safety and Standards Act, 2006; Structure of FSSAI, Administrative set up at state level, Roles and responsibilities of different food safety regulators, Licensing and Registration, Codex of practice, Guidelines and recommendations, Applying Codex standards, Codex India–Role of Codex Contact point, National Codex Contact Point (NCCP). Core functions of NCCP-India, WTO, WHO, FAO, SPS, TBT etc.
<b>Section – C : EMERGING TECHNOLOGIES IN FOOD PROCESSING</b>	
1	<p><b>Emerging Food:</b></p> <p><b>Organic food:</b> Production, processing and regulation, Organic certification process, Organic food labelling, etc.</p> <p><b>GM food:</b> Production, processing and regulation, Main issues of concern for Human Health, How are GM Food regulated Internationally, Regulation in India. Role of WHO to improve evaluation of GM food, Benefits &amp; Controversies.</p> <p><b>Irradiated Food:</b> How is food Irradiated, Sources of radiations used, Potential uses of Food Irradiation, Labelling of Irradiated Food, Doses of irradiation.</p> <p><b>Functional Foods and Nutraceuticals :</b> Functional foods from plant and animal sources, Nutraceuticals, Dietary supplements, Regulation.</p> <p><b>Food Fortification:</b> Fortification with micronutrients, Bio fortification, Current mandatory fortifications, Fortification strategies and practices, Health implication of food fortification.</p>

<b>2</b>	<b>Emerging Processing Techniques:</b> Ohmic heating, Microwave heating, RF heating, HPP, PEF, Ultrasound, Hydrodynamic cavitation, Cold plasma, UV irradiation, Pulsed Light etc.
<b>3</b>	<b>Emerging Analytical Techniques:</b> Spectroscopic (UV, IR, NMR, Mass, Raman) and Chromatographic (TLC, HPLC, HPTLC, GC).
<b><u>Section – D : OTHER RELATED ACTS.</u></b>	
<b>1</b>	B.I.S (Bureau of Indian Standards)
<b>2</b>	C.R.P.C/I.P.C.
<b>3</b>	EC(Essential Commodities Act)
<b>4</b>	Consumer Protection Act.

दिनांक – १४/१२/२०२२

सचिव  
महाराष्ट्र लोकसेवा आयोग