2. बायोमेट्रिक डेटा और फोटोग्राफ को बाद में सत्यापित किया जाएगा। बायोमेट्रिक डेटा सत्यापन संस्था का निर्णय मिलान या बेमेल के सम्बन्ध में अंतिम और उम्मीदवारों पर बाध्यकारी होगा।

उम्मीदवारों से अनुरोध है कि बायोमैट्रिक प्रक्रिया को सुचारू रूप से सुनिश्चित करने के लिए निम्नलिखित बातों का ध्यान रखें :–

- अगर अंगुलियों को मुद्रांकित स्याही/मेहन्दी आदि से कोट किया जाता है तो उन्हें अच्छी तरह से धोना सुनिश्चित करें ताकि परीक्षा/शामिल होने के दिन से पहले पूरी तरह से कोटिंग हट जाए।
- यदि उंगलियाँ गन्दी या धूल भरी हैं, तो उन्हें धोना सुनिश्चित करें और फिंगर प्रिंट (बायोमेट्रिक) कैप्चर करने से पहले उन्हें सूखा लें।
- सुनिश्चित करें कि दोनों हाथों की उंगलियां सूखी हैं।
- यदि कैप्चर की जाने वाली प्राथमिक अंगुली (अंगूठा) घायल/क्षतिग्रस्त है, तो तुरन्त परीक्षा केन्द्र में सम्बन्धित संस्था को सूचित करें।

**लिखित प्रतियोगी परीक्षाओं के लिए केन्द्र :–**

1. परीक्षा केन्द्र जयपुर (राजस्थान) में होगा। RSGSML को किसी भी परीक्षा केन्द्र को रद्द करने या अन्य केन्द्रों को जोड़ने का अधिकार सुरक्षित है।

2. RSGSML, उम्मीदवार को किसी भी केन्द्र को आवंटित करने का अधिकार सुरक्षित रखता है। परीक्षा के लिए केन्द्र/तिथि/सत्र के परिवर्तन के लिए किसी भी अनुरोध पर विचार नहीं किया जाएगा।

3. उम्मीदवार अपने खर्चे पर परीक्षा केन्द्र में परीक्षा के लिए उपस्थित होगा। RSGSML किसी भी हानि/नुकसान/दुर्घटना आदि के लिए जिम्मेदार नहीं होगा।

**चयन प्रक्रिया और मेरिट** : ऑनलाइन परीक्षा दो भागों में होगी :–

1. अंग्रेजी और हिंदी भाषा के परीक्षा को छोड़कर सभी परीक्षा पत्र अंग्रेजी और हिंदी दोनो भाषाओं में प्रदान किए जाएंगे। सभी प्रश्नों के 5 विकल्प होंगे। एक प्रश्न के पांच उत्तरों में से केवल एक ही सही उत्तर होगा। आपको सबसे उपयुक्त उत्तर पर माउस के माध्यम से क्लिक कर चयन करना होगा। आपके द्वारा क्लिक किए गए विकल्प को उस प्रश्न के उत्तर के रूप में माना जाएगा। आपके द्वारा चिह्नित गलत उत्तरों के लिए उस प्रश्न को दिए गए अंकों में से 1/4 अंक की कटौती की जाएगी।

**पार्ट–ए** :– Part-A relating to general issues and is **only for qualifying** to become eligible for consideration. RSGSML shall not recommend any candidate who has failed to obtain **40 % marks in this stage**. However relaxation in minimum marks upto 5% shall be applicable to SC/ST category candidates & Ex-serviceman.

(पार्ट–ए सामान्य मुद्दों से संबंधित है और **केवल अर्हता (Qualifying) हेतु** है। **पार्ट–ए के अंकों को मैरिट में शामिल नहीं किया जावेंगा।** इस चरण में 40 प्रतिशत अंक प्राप्त करना अनिवार्य है। यद्यपि अनुसूचित जाति/अनुसूचित जनजाति वर्ग के उम्मीदवारों और भूतपूर्व सैनिक के लिए 5 प्रतिशत तक न्यूनतम अंकों में छूट लागू होगी।)

**(Objective Type)**

| Sl. No. | Name of the Tests (Not in sequence) | No. of questions | Maximum Marks | Duration |
|---|---|---|---|---|
| 1. | Hindi | 50 | 50 | 30 minutes |
| 2. | English Language | 50 | 50 | 30 minutes |
| 3. | General Awareness | 50 | 50 | 20 minutes |
| 4. | Quantitative Aptitude | 50 | 50 | 35 minutes |
| 5. | Basic knowledge of computer | 50 | 50 | 20 minutes |
| **Question papers of Part -A will be of Secondary Level.** | | | | |

# पाठ्यक्रम (पार्ट–ए)

1. **हिन्दी (Hindi)** :–
   - संधि और संधि विच्छेद ।
   - सामासिक पदों की रचना और समास–विग्रह ।
   - उपसर्ग ।
   - प्रत्यय ।
   - पर्यायवाची शब्द ।
   - विपरीतार्थक (विलोम) शब्द ।
   - अनेकार्थक शब्द ।
   - शब्द – युग्म ।
   - संज्ञा शब्दो से विशेषण बनाना ।
   - शब्द – शुद्धि : अशुद्ध शब्दों का शुद्धीकरण और शब्दगत अशुद्धि का कारण ।
   - वाक्य – शुद्धि : अशुद्ध वाक्यों का शुद्धीकरण और वाक्यगत अशुद्धि का कारण।
   - वाच्य : कर्तृवाच्य, कर्मवाच्य और भाववाच्य प्रयोग ।
   - क्रिया : सकर्मक, अकर्मक और पूर्वकालिक क्रियाएँ ।
   - वाक्यांश के लिए एक सार्थक शब्द ।
   - मुहावरे और लोकोक्तियाँ ।
   - अंग्रेजी के पारिभाषिक (तकनीकी) शब्दों के समानार्थक हिन्दी शब्द ।
   - सरल, संयुक्त और मिश्र अंग्रेजी वाक्यों का हिन्दी में रूपान्तरण और हिन्दी वाक्यों का अंग्रेजी में रूपान्तरण
   - कार्यालयी पत्रों से सम्बन्धित ज्ञान।

2. **अंग्रेजी (English)** :–
   - Tenses/Sequence of Tenses.
   - Voice : Active and Passive.
   - Narration : Direct and Indirect.
   - Transformation of Sentences : Assertive to Negative, Interrogative, Exclamatory and vice-versa.
   - Use of Articles and Determiners.
   - Use of Prepositions.
   - Correction of sentences including subject, Verb, Agreement, Degrees of Adjectives, Connectives and words wrongly used.
   - Glossary of official, Technical Terms (with their Hindi Versions).
   - Synonyms.
   - Antonyms.
   - One word substitution.
   - Forming new words by using prefixes and suffixes.
   - Confusable words.
   - Comprehension of a given passage.

3. **सामान्य जागरूकता (General Awareness)** :–

   Questions in this component will be aimed at testing the candidates general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions relating to India and its neighbouring countries especially pertaining to sports, History, Culture, Geography, Economic Scene, General Polity, Indian Constitution, scientific Research etc. These Questions will be such that they do not require a special study of any discipline.

4. **मात्रात्मक अभियोग्यता (Quantitative Aptitude) :-**
   - Natural numbers, rational and irrational numbers and their decimal expansions, operations on real numbers, laws of exponents for real numbers, rational numbers and their decimal expansions.
   - Ratio and proportion, percentage, Profit and loss, simple and compound interest, time and distance, time and speed, work and time.
   - Collection of data, presentation of data, graphical representation of data, measure of central tendency, mean, mode, median of ungrouped & grouped data.

5. **कम्प्यूटर के मूल सिद्धान्त (Basics of Computer) :-**

- Introduction to Computer & Windows: Input/output Devices, Memory, PORTs, Windows Explorer
- Menu, Managing Files & Folders, Setup & Accessories, Formatting, Creating CD/DVD.
- Word Processing & Presentations: Menu Bars, Managing Documents & Presentations, Text Formatting,
- Table Manipulations, Slide Designs, Animations, Page Layout, Printing.
- Spread Sheets: Excel Menu Bar, Entering Data, Basic Formulae & Inbuilt Functions, Cell & Text
- Formatting, Navigating, Charts, Page Setup, Printing, Spread Sheets for Accounting.
- Working with Internet and e-mails: Web Browsing & Searching, Downloading & Uploading, Managing an E-mail Account, e-Banking.

**पार्ट–बी** :– Part B will be specified for knowledge of the subject/qualification related to the post & is **for preparation of merit**. RSGSML shall not recommend any candidate who has failed to obtain **40 % marks in Part-B.** However relaxation in minimum marks upto 5% shall be applicable to SC/ST category candidates & Ex-serviceman.

(**पार्ट–बी द्वारा मैरिट का निर्धारण किया जावेंगा।** इस चरण में 40 प्रतिशत अंक प्राप्त करना अनिवार्य है। यद्यपि अनुसूचित जाति/अनुसूचित जनजाति वर्ग के उम्मीदवारों और भूतपूर्व सैनिक के लिए 5 प्रतिशत तक न्यूनतम अंकों में छूट लागू होगी)

| S.No. | Name of the Test | No. of Questions | Maximum Marks | Duration |
|---|---|---|---|---|
| 1. | **Subject Knowledge Part- 1** | 50 | 100 | 25 Minutes |
| 2. | **Subject Knowledge Part- 2** | 50 | 100 | 25 Minutes |
| **Question paper of Part -B will be of Graduation Level.** | | | | |

# पाठ्यक्रम (पार्ट– बी)

# Subject Knowledge (Part- 1)

**SUBJECT : INDUSTRIAL FERMENTATION & ALCOHOL TECHNOLOGY**

1. Introduction: Fermentation, types of fermentations and role of microorganism and other condition on fermentation.
2. Raw Materials for fermentative production of alcohol:
3. Molasses: Composition, storage, spontaneous combustion, grades and classification of molasses, clarification of molasses.
4. Other Saccharine Materials: cane juice, beet juice, sweet sorghum, mahua flowers, fruits' juices, etc.
5. Starchy and Cellulosic Materials.
6. Isolation and purification of cultures.
7. Outline of alcohol production by batch fermentation process
8. Alcohol production by continuous fermentation process
9. Modern Techniques of Fermentation: Batch, Semi-continuous, Continuous (Biostil, Multicont or Cascade, Encillium), Melle- Bionet process of yeast Cell Recycling, Bacterial Fermentation &lmmobilised Cell Technique, etc.
10. Production of industrial and power alcohol by azeotrotic distillation. Membrane technology and molecular sieves.
11. Production of grain spirit.
12. Chemical control, Theoretical Yield, Fermentation & Distillation, Efficiency, etc. including calculation.
13. Working of distilleries
14. 14. Working of breweries

15. Fusel oil formation and separation.
16. Scaling problem in distillery.
17. Alcoholometry : Reduction and blending of spirits, denaturation, obscuration & shrinkage, potable liquors, country liquors & Indian Made Foreign Liquors.(IMFL)
18. Production of compressed bakers' yeast,
19. Brewing technology: Malting, mashing, fermentation and pasteurization of beer, defects of beer.
20. Manufacture of wine: types of wines, maturation and fining of wine & production of champagne.
21. Vinegar fermentation
22. Citric acid fermentation.
23. Manufacture of different antibiotics by fermentation.
24. Manufacture of Vitamins – Riboflavin and Vitamin B-12 by fermentation.
25. Miscellaneous fermentations – lactic acid, acetone-butanol, etc.
26. Different method of spent wash treatment including bio-methanation, incineration and bio composting.
27. Effluent treatment Plant of grain and Molasses based Distillery
28. Different method of spent wash treatment in Molasses based distillery including bio-methanation, incineration and bio-composting. Spent wash treatment in grain based distilleries
29. Condensate Polishing Unit (CPU) Technologies: Various CPU technologies generally used in distillery industry.
30. Water Mass balance- Fresh water requirement, Generation of Condensates, Spent lees and spent wash, Recycling and re-usage.

**SUBJECT : DRAWING & DESIGN**

1. Fundamentals of Drawing: Basic Consideration in Process equipment designs; Code of Practice (BIS) for unified pressure nozzles; Method of construction of distillery design and its mechanical properties and strength.
2. Conventional lines- Description of conventional lines, Reading of different scales and their uses.Dimensioning rules, Symbols of different materials.Orthographic projection and definition; Orthographic views; First & Third angle-projection; Isometric/oblique views.
3. Welds & Welded Joints: Types of welding, types of welded joints, welding symbols and their standard location.
4. Pipe Joints & Fittings: Types of Pipes, classification of pipe joints- screw joint, welded joint, flange joint, Pipe fitting- Expansion joint, classification of valves, some common features of valves, valves & valve sheet.

**SUBJECT : BIOCHEMICAL ENGINEERING**

1. Water : Basic Quality Requirements of Water; Production Requirements of Water in Distilleries; Water Sourcing; Borehole water; Surface water; The Principal Characteristics and Requirements of a Distillery Water Supply; Production (Mashing) water; Product water; Process water; Service water; Boiler water; Cooling tower water; General cleaning water; Water Usage Ratios, Conservation Methods and Costs;Water Treatments 2. Antifoams and automatic control of foam.Separation of cells, filtration, centrifugation, ultrasonic disintegration, lyophilisation.
2. Effluents and Co-products Effluent composition; The meaning, and relevance to distillery effluent of: biological oxygen demand; chemical oxygen demand; suspended solids; pH; Relative contributions of different departments to composition of effluent : Typical of water use in spirit production; effluent volume from spirit production BOD and COD (dichromate) of main effluent streams; suspended solids of main effluent streams; pH and temperature range; Effluent analyses BOD, COD total suspended solids.

   Awareness of official requirements for effluent discharges; Precautions and requirements for disposal of used detergents/sanitizers. Effluent treatment; Calculation of effluent treatment. The basic principles of treatment of effluent discharges pH control prior to treatment; aerobic digestion (bio-filters);

anaerobic digestion spraying on farmland; discharge to sea; Environmental implications of these methods; Removal of copper from effluent (precipitation, electrolysis); Processing of distillery stillage (spent wash); Processing of co-products;Separation of solids and liquid of spent wash decanter centrifuge; Factors affecting their capacity to clarify to desired solids concentration; Evaporation: basic principles of natural- and forced-circulation evaporators; falling film evaporator; multiple effect evaporation. Drying of animal feed; disc dryer drum dryer; spray dryer, cyclone dryer, Energy efficiency in processing; Separation of useful sub-products; Preparation as fodder or fertilizer; Preparation as substrate for further distilled products. Carbon dioxide; Collection of CO2 from fermentation vessels; Processing of CO2purity requirements; layout of purification plant knowledge of the function of each column

3. Mixing, type of impellers, processes affected by mixing.

**SUBJECT :MECHANICAL ENGINEERING**

1. Properties of Steam: Use of steam tables, specific volume, internal energy ofsteam, dryness fraction, dry, saturated and superheated steam calculations.
2. Boiler: Types of water-tube boilers, economiser and pre-heater, draught and chimney, boiler operation in brief and calculation of boiler efficiency. Incineration boilers:- General description, application with respect to Distilleries & draw back.
3. Reciprocating Air Compressor: Various uses of Air Compressor, SingleStage Compressor, Derivation of expression for work done and horse power, Elementary idea of two stage compressor.
4. Steam Turbines- Classification of turbines and their working, compounding of steam turbines, advantages and disadvantages of velocity compounding , losses in steam turbines ,governing of steam turbines.
5. Condensers- Introductions, elements of steam condensing plant, advantages of condensers, types of steam condensers, air leakage, its effects on the performance of condensers and methods of its removal. Vaccum efficiency thermodynamic analysis of condensers, Design of condensers.
6. Pump: Types of pumps, construction and working of reciprocal and centrifugal pump, Selection of a pump.
7. Steam consumption in Distilleries including steam requirement for MSDH system & multiple effect evaporator etc

**SUBJECT : AGRICULTURE CHEMISTRY**

1. Sugarcane: Recommended varieties in India and their main characteristics, seed rate, time and method of sowing, irrigation, fertilizer use, control of weeds, insect-pests and diseases, harvesting, processing and yield. Factors affecting sugar yield;
2. Sugar beet: Recommended varieties in India and their main characteristics, seed rate, time and method of sowing, irrigation, fertilizer use, control of weeds, insect-pests and diseases, harvesting, processing and yield
3. Sweet Sorghum: Recommended varieties in India and their main characteristics, seed rate, time and method of sowing, irrigation, fertilizer use, control of weeds, insect-pests and diseases, harvesting, processing and yield.
4. Cassava: Recommended varieties in India and their main characteristics, seed rate, time and method of sowing, irrigation, fertilizer use, control of weeds, insect-pests and diseases, harvesting, processing and yield.
5. Sweet Potato: Recommended varieties in India and their main characteristics, seed rate, time and method of sowing, irrigation, fertilizer use, control of weeds, insect-pests and diseases, harvesting, processing and yield.
6. Barley: The Physiology and Morphology of Barley; Barley plant development, Barley fertilization; Two- and Six-rowed barley; Barley grain development, post-fertilization; Structure of the barley grain; Composition of cereal grains; Environmental and Agronomic Factors influencing the Growth of Barley; Climate; Soil; Soil nutrients; Crop competitors – weeds, pests and diseases; Harvesting and Storage of Barley;Yield of Barley; Moisture at harvesting; Barley drying; Barley storage; Dormancy; Reasons for dormancy; Mechanism of dormancy; Barrier effects of seed coats; Effects of light on dormancy;

Presence and absence of inhibitors; Shifts in oxidative pathways; Genetic controls; Overcoming dormancy; Types of dormancy

7. Agronomic Factors influencing Yield of Maize, Wheat, Rye/Mustard, Rice.

**SUBJECT : INSTRUMENTATION**

1. Basic Instrumentation and its Characteristics (Static and Dynamic)
2. Pressure and Vacuum measurement its application in Distillery. Calibration of Pressure and vacuum gauge, level measurement.
3. Temperature Measurement and its application in distillery. Calibration of various temperature measuring instruments
4. Flow Measurement and instrumentation based on variable head and variable area Electromagnetic Flow meter construction, working principle, theory, maintenance, accuracy and application. Mass flow meter consumption, working, principle, maintenance and application.
5. Analytical Instrumentation (pH, gas analysis, conductivity, Turbidity etc)
6. Control Valves - The basic design features, respective merits and typical distillery applications of the following types of valve: butterfly diaphragm; gate globe; Design features and applications in distillery plant of the following types of valve: pressure relief pressure reducing; anti-vacuum
7. Control valves :- Construction, Types, flow characteristics , valve body material & selection of control valve.
8. Process Control System – Open and closed Loop; on and off control; P, PI, PD, PID controller; PLC, DCS, SCADA
9. Different Control schemes used in distillery i.e. Reflux to Distillate ratio control, temp control of a distillation column tray, reflux drum level control etc. Various closed loop control in a distillation column

## Subject Knowledge (Part- 2)

**SUBJECT : ORGANIC CHEMISTRY**

1. Optical Isomerism: Definition, Cause of optical activity and chirality, and R/S configuration. Enantiomers, Diastereomers, Racemic modification and Mesoisomers, Resolution of Racemic modifications.
2. Carbohydrates Monosaccharides: Classification, properties and reactions of monosaccharides taking glucose as an example, Inter-conversions of monosaccharides, Configurations of aldopentoses and aldohexoses, Epimers and epimerisation, mutarotation , Cyclic structures of glucose and fructose (pyranose and furanose forms).
3. Amino Acids:
   a. Classification, properties and chemical reactions, Maillard reaction, Major amino acids present in cane juice and molasses.
   b. Nature of non nitrogenous organic acids present in sugarcane juice.
4. Alcohols: Nomenclature, Classification, Methods of preparation, General properties and chemical reactions , Distinction between primary, secondary and tertiary alcohol, Distinction between ethyl and methyl alcohol, amyl alcohol and its isomers, Alcohols of fuel oil, Preparation of anhydrous alcohol by azeotropic distillation, Industrial production of ethyl alcohol from petroleum gases, Chemicals derived from ethyl alcohol, Gasohol.
5. Carbohydrates - II : Disaccharides: Classification, nomenclature and general methods for determination of their structure, Preparation, isolation and detailed study of the structure of maltose, cellobiose, lactose, sucrose, melibiose&trehalose.
6. Oligosaccharides and polysaccharides: Classification, Occurrence, detailed study of the structures and their uses with examples. (Raffinose, Cellulose, Starch, and Dextran).

**SUBJECT : PHYSICAL CHEMISTRY**

1. Analytical Chemistry: Mole, Normality, Molarity, Molality, Formality, ppm, ppb, ppt, Mole fraction, Equivalent weight and numerical based on it.
2. Basic concepts of measurement of electrical conductivity and its relation with ions in solution. Strong and weak electrolyte, Specific conductivity, Molar conductivity, Equivalent conductivity. Application of conductance measurement conductivity based superheaters.
3. Acids and Bases: Arrhenius concept, Proton transfer theory, Lewis concept, Dissociation of weak acid, the pH Scale, pH measurement using Hydrogen electrode, Glass electrode, Buffer mixture of weak acid and its salts. Calculation of pH values of buffer mixtures. Henderson's equation. 4. Distribution law; Association and dissociation of solute, Principles of extraction and its application. Batch and continuous extraction.
4. Thermodynamics: First law of thermodynamics, Internal Energy, Enthalpy & Heat Content, Second law of thermodynamics, Entropy, Free Energy, Chemical Potential.
5. Colorimeters and spectrophotometers-their principle, working diagrams, Beer-lambert's law and its derivation, colour and its measurement. Factors affecting colour measurement. lamda max and its determination/factor affecting lamda max.
6. Heterogeneous system, phase rule and its limitation, application to binary liquids, partially miscible and immiscible liquid,upper and lower consulate Temperature.

   a. Phase diagram for one component system. b. Azeotrope 15
7. Adsorption; Difference between adsorption and absorption, Adsorbent, Adsorbate Chemisorption and Physisorption, Factors influencing Adsorption. Active carbon, adsorption of colouring matter on active carbon.

**SUBJECT : BIOCHEMISTRY**

1. Introduction : Significance of biochemistry to the living systems. Structure & functions of cell organelles – cell wall, cell membrane, nucleus, mitochondria, ribosome, endoplasmic reticulum, etc.
2. Carbohydrates : Outline of the structure and functions of carbohydrates important to living systems, metabolism of carbohydrates including glycolysis, HMP pathway, glyoxalate cycle, TCA cycle, Entner-Duodoroff pathway, gluconeogenesis .
3. Proteins: Outline of the structure of the common amino acids present in proteins, their general properties, metabolism of amino acids including deamination, transamination and decarboxylation, physical & chemical properties, classification and structure of proteins. Isolation, purification and estimation of proteins.
4. Nucleic Acids: Outline of the structure & functions of purine & pyrimidine bases, nucleosides and nucleotides, structure and biosynthesis of nucleic acids, protein biosynthesis.
5. Lipids: Outline of the structure and functions of fatty acids, glycerides, steroids and phospholipids, brief outline of fatty acid biosynthesis & breakdown.
6. Enzymes: Nature, occurrence, classification of enzymes, outline of enzyme kinetics, competitive, non-competitive and uncompetitive inhibition.
7. Bioenergetics: Brief account of electron transport chain, oxidative phosphorylation photophosphorylation, Z scheme, C3 cycle and C4 pathway.

**SUBJECT : ELECTRICAL ENGINEERING**

1. D.C. Generator: Basic principle, classification, construction and working, EMF equation, losses in generator, efficiency.
2. D.C. Motor: Basic principle, construction, classification, electromagnetic torque, application of DC motor.
3. Transformer: Principle, types, losses and efficiency.
4. Induction Motor: Principle, Types of induction motors and their application, Maintenance of induction motors.

5. A.C. Generator. Principle, construction and testing.
6. Study of electrical system of Distillery, generation , utilization.

**SUBJECT : CHEMICAL ENGINEERING** :-

1. Introduction - Study of elementary chemical engineering concepts – unit operations and unit process.
2. Fluid mechanics :-
   (a) Classification of fluids and fluid flow phenomena.
   (b) Pipeline flow. Bernoulli's equation. Friction losses and pressure drop in pipelines
   (c) Mixing and agitation- Types of mixing equipment
   (d) Transportation of fluids- Classification of pumps Power requirement. Head capacity and NPSH for pumps.
3. Heat Transfer :-
   (a) Heat transfer without change of phase- conduction and convection
   (b) Heat transfer by change of phase-Mechanism of boiling and condensation
   (c) Basics of heat transfer.
   (d) Effect of Non condensable gases on condensation
   (e) Heat transfer equipment- Single pass and multipass heat exchangers, vaporizers, reboilers and condensers.
4. Distillation :-
   (a) Types of distillation processes-Batch and continuous, Equilibrium, azeotropic and extractive, steam distillation.
   (b) Fractional distillation of binary mixture- theoretical/actual plates, plate efficiencies (overall, point and Murphree), minimum and optimum reflux ratio
5. Health & Safety - Fire and explosion risks of ethanol; Flash points of aqueous alcohol solutions; Flammable and explosive concentrations of alcohol vapour; Fire and explosion risks of alcohol, and their prevention, in batch and continuous distillation in storage and maturation in blending and packaging in leakage or spillage; Carbon dioxide; Physiological effects of CO2; Dangers of working in fermentation vessels and surrounding areas; Safety precautions

**SUBJECT : APPLIED MICROBIOLOGY**

1. Introduction: Importance of microorganisms, occurrence, kinds of microorganisms, Historical developments in microbiology.
2. Morphology & Classification: Isolation of pure culture, identification & maintenance of cultures.
3. Control of Microorganisms: Physical methods: filtration, irradiation, sterilization etc., chemical methods: antimicrobial agents, germicides, antibiotics, etc.
4. Microbial Physiology: Natural & laboratory environment, growth media, factors affecting growth, determination of cell mass and cell number, phases of microbial growth, mean generation time, bacterial sporulation.
5. Properties of Yeast :Yeast morphology, The principal organelles of the yeast cell and their functions: cell wall nucleus; cytoplasm plasma membrane; mitochondrion vacuole; Mechanism of reproduction by budding; Characteristics of culture yeasts; Principles of yeast classification; concept of genus and species cell and spore morphology;fermentation and aerobic growth tests; Identification of *Saccharomyces cerevisiae* and yeasts of natural fermentations.
6. Nutritional requirements of yeast : The sources of carbon, nitrogen, salts, metal ions and growth factors; Their importance for healthy yeast growth and fermentation; The role of molecular oxygen; purity requirements of air Components of wort which are not utilised by yeast

7. Hygiene - Plant cleanliness and sterility; Cleanliness/sterility requirements of different stages of the process; Influence of process plant surfaces: cast iron, copper, stainless steel, wood; Importance of design features of pipe work and fittings; Principles of layout and operation of a cleaning-in-place system; The range and main constituents of cleaning and sterilizing agents; Safety requirements for handling detergents and sanitizers; Advantages and disadvantages of hot vs cold sterilization; Detection and quantification of residual surface contamination: visual inspection rinse sampling;swab sampling; Types of spoilage organism; Micro-organisms which can spoil wort/must and fermentation, their origin and effects *Acetobacter*and *Gluconobacter; Escherichia* and *Enterobacter; Lactobacillus* and other lactic acid bacteria : good and bad effects; *Obesumbacterium*and*Zymomonas;* Wild yeasts.

ऑनलाईन परीक्षा प्रक्रिया में प्रक्रियागत समस्या उत्पन्न होने की संभावना को पूर्णतः खारिज नहीं किया जा सकता है। अतः ऑनलाईन परीक्षा में यदि कोई समस्या उत्पन्न होती है तो पुनः परीक्षा का अधिकार पूर्णतः RSGSML के पास सुरक्षित होगा। पुनः परीक्षा के लिए उम्मीदवारों के पास कोई दावा नहीं होगा।

सफल उम्मीदवारों को अपने निम्नलिखित मूल दस्तावेजों के सत्यापन के लिए, समिति के समक्ष इस उद्देश्य के लिए सूचित तिथि के साथ स्व–सत्यापित फोटोस्टेट प्रति के एक सेट के साथ उपस्थित होना अनिवार्य होगा :–

- उम्मीदवार की स्कैन की गई फोटो और हस्ताक्षर के साथ आवेदन का प्रिंटआउट।
- जमा की गई ई–रसीद का प्रिंटआउट।
- शैक्षणिक योग्यता हेतु जारी डिग्री/अंतिम डिग्री।
- विश्वविद्यालय द्वारा जारी किए गए सभी वर्षों/सेमेस्टर की मार्क–शीट।
- माध्यमिक स्कूल परीक्षा का प्रमाण पत्र /मार्क–शीट जिसमें उम्मीदवार की जन्म तिथि अंकित हो।
- शारीरिक रूप से विकलांग उम्मीदवार (विकलांगता वाले व्यक्ति) के मामले में सम्बन्धित सक्षम प्राधिकारी द्वारा जारी मेडिकल प्रमाणपत्र (विकलांगता के प्रकार और विकलांगता का प्रतिशत)।
- सम्बन्धित सक्षम प्राधिकारी द्वारा जारी विवाह पंजीकरण (यदि विवाहित है)।
- विधवा के मामले में, सक्षम प्राधिकारी द्वारा जारी किए गए उसके पति का मृत्यु प्रमाण पत्र।
- तलाक के मामले में, अदालत द्वारा तलाक देने का प्रमाण पत्र।
- विवाहित उम्मीदवारों के मामले में, 100 रुपये के स्टाम्प पेपर पर एक हलफनामा जो स्पष्ट रूप से सभी बच्चों के नाम और जन्म तिथि का संकेत देता हो।
- विश्वविद्यालय या संस्थान जहाँ से अंतिम शिक्षा प्राप्त की है, के सक्षम प्राधिकारी से चरित्र प्रमाण पत्र और दो जिम्मेदार व्यक्ति जो स्कूल या संस्थान या विश्वविद्यालय से सम्बन्धित नहीं है से चरित्र प्रमाण पत्र जो आवेदन भरने के लिए निर्धारित अंतिम तिथि से छह महीने से अधिक पुराना नहीं हैं।
- विधिवत रूप से स्टाम्प पेपर पर एक हलफनामा कि उसके खिलाफ कोई आपराधिक मामला किसी भी अदालत में लंबित नहीं है/उसे दोषी ठहराया नहीं गया है।
- स्वास्थ्य प्रमाण पत्र।
- पुलिस वेरिफिकेशन।
- पहले से ही सरकारी विभागों/सार्वजनिक उपक्रमों/स्वायत्त निकायों के साथ कार्यरत उम्मीदवारों को नियोक्ता से अनापत्ति प्रमाण पत्र देना होगा (एनओसी)।
- नोटरी पब्लिक द्वारा विधिवत रूप से सत्यापित स्टाम्प पेपर परएक शपथ पत्र कि उसने कोई दहेज नहीं दिया/लिया है।
- उम्मीदवार, जो किसी भी श्रेणी के तहत आरक्षण का लाभ उठाना चाहते हैं, उन्हें चयनित/नियुक्त होने से पहले, उनके आरक्षण के समर्थन में प्रासंगिक प्रमाण पत्र प्रस्तुत करने की आवश्यकता होगी।
- वे उम्मीदवार जिनकी वार्षिक पारिवारिक आय 2.50 लाख रू से कम है और वे इस आधार पर आवेदन शुल्क के रूप में 250/– जमा कर रहे हैं, को अपनी वार्षिक पारिवारिक आय के समर्थन में दस्तावेज तैयार करने होंगे।
- कोई अन्य दस्तावेज, जैसा कि सूचित किया जा सकता है।