Government of Jammu and Kashmir
J&K Services Selection Board
Sehkari Bhawan, Rail Head Complex, Jammu
(www.jkssb.nic.in)
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NOTICE (Syllabi)

WRITTEN TEST & SYLLABI for the Posts - Advt. no. 04 of 2016 (Part-2)
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It is notified for the information of all concerned that:

1. J&KSSB intends to conduct WTRITTEN-TEST (objective-type) for various posts advertised under Notification No. 04 of 2016 dated 21.10.2016 in future.

2. Regarding this, SYLLABI for the posts of *Jr Grade Nurse, FMPHW, Computer Programmer* and *Electrician* were notified vide this office no. SSB/Sel/Secy/2016/20217-25 dated 18-11-2016.

3. Now, SYLLABI for the posts of *Food Safety Officer* and *Assistant Public Analyst* have also been formulated and are hereby notified for the information of all concerned.

4. These syllabi are annexed hereunder as Annexure "A" & "B", respectively.

Sd/-
(Dr. Rehana Akhtar Bijli), KAS
Secretary I/C,
J&K Services Selection Board,
Jammu.

No. SSB/Sel/Secy/2016/20950-58 Dated: 14-12-2016.

Copy for information to the:-
1. Principal Secretary to Hon'ble Chief Minister, J&K, Civil Secretariat, Jammu.
2. Principal Secretary to the Hon'ble Governor, J&K, Rajbhawan, Jammu.
3. Director Information, J&K Government Jammu with the request to publish the above notification in at least three leading local newspaper of Jammu/Srinagar on three consecutive dates
4. Director, Radio Kashmir, Jammu / Srinagar. He is requested to kindly broadcast the above said notification appropriately.
5. Director, Doordarshan Kashmir, Jammu / Srinagar. He is requested to kindly telecast the above said notification appropriately.
6. Additional Secretary Law, J&K S.S.B., Jammu
7. Administrative Officer, Service Selection Board, Jammu / Srinagar.
8. Private Secretary to Ld. Chairperson, J&KSSB for information of Ld. Chairperson.
9. Incharge Website, SSB. He shall upload the notice on the official website of the Board.

Government of Jammu and Kashmir

J&K Services Selection Board

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Annexure "A"

Sub: Syllabus for written test (Objective Type) for the posts of FOOD SAFETY OFFICER

Marks :-150

Time :- 2.30 Hours

MICROBIOLOGY (10 MARKS)

- History and scope microbiology–Historical development in food preservation, foodspoilage and food poisoning.
- Microbial growth pattern–Growth curve of microbial cultures, its application to foodpreservation.
- Factors affecting microbial growth–pH, moisture content, Eh, nutrient content,antimicrobial constituents, biological structures, extrinsic factors.
- Control of microbial growth in foods–High temperature, freezing, refrigeration, chemical preservatives, irradiation.
- Types of microorganis–Mold-general characteristics, morphological features, reproduction, physiological requirements, common molds associated with foods.
- Bacteria–Morphological, physiological characteristics, Cell wall characteristics of Gram +ve and Gram –ve bacteria. Important food spoilage and pathogenic bacteria, associated with foods.
- Yeast- General Characteristics, reproduction, cultural characteristics, physiological characteristics.
- Viruses- Structure and replication with particular reference to food born viruses.
- Biochemical changes caused by micro organisms–Degradation of carbohydrates, fermentation, degradation of lipids, degradation of proteins and amino acids, putrefaction.
- Microbial contamination and spoilage of foods–Vegetables, cereals, pulses, oilseeds, milk andmeat during handling, processing and storage.
- Microbiology of water and Atmosphere.
- Spoilage of processed foods –Canned products, causes of spoilage, appearance of spoiled cans,types of spoilage of canned foods by yeast, moulds and bacteria.
- Food borne disease –Staphylococcal gastroenteritis, Botulism, Listeriosis, Salmonellasis,Shigillosis, Diarrhea, Dysentery.
- Toxicants of microbial origins –Aflatoxins, ochratoxins, patulin, botulim, enterotoxins.
- Detection of food borne pathogens - Physical, chemical and immunological methods of detectingmicrobes in foods with special reference to *Staphyllococcus, Clostridium, Lysteria, Yersenia, Salmonella, Escherichia, Vibrio.*
- Enumeration of micro-organisms– TPC, Yeast and mould count, ANPC, Most probable number. Biochemical characteristics.

CHEMISTRY/BIOCHEMISTRY (20 MARKS)

- Carbohydrates–Classification, Structure and properties. Chemical reactions in foods, starchgelatinization and retrogradation, modified starches, alginate, pectin, carageenan. Non-enzymatic browning, Factors affecting the rate of non- enzymatic browning.
- Lipids - Classification, Structure and use of lipids in food, saturated and unsaturated foods,hydrogenation of fats.
- Physical and chemical properties of lipids–Lipid oxidation, rancidity, factors affecting rate ofoxidization, methods to measure lipid oxidization, control of rancidity.
- Effect of processing on functional properties and nutritive value–Thermal decomposition,chemistry of frying.
- Protein and amino acids - Physical and chemical properties, protein structure, forces governingstability of proteins, denaturation.
- Functional properties of proteins –Protein hydration, solubility, emulsifying properties,foamingproperties.
- Modification of proteins –Alkylation, acylation, phosphorylation, esterification, enzymaticmodification.
- Effect of processing on protein quality
- Water in foods–Water activity and shelf life of foods, moisture sorption isotherms, hysteresis.
- Water solute interactions- Free water, bound water, interaction of water with ionic and non-ionicgroups.
- Enzymes–Classification and kinetics. Papain, lipoxygenase, PPO, use of pectnaise, cellulase and amylase in foodindustry.
- Loss of vitamins and minerals due to processing.
- Pigments in foods –Heme compounds, chlorophyll, alteration of chlorophyll, preservation ofchlorophyll during processing, carotenoids and their properties, anthocyanins, their properties and stability, betalains and their properties, use of pigments and biocolours.
- Food flavours –Taste modalities, sweet, sour, bitter and salty, astringency, pungency, flavoursfrom lactic acid –ethanol fermentation.
- Browning reactions –Enzymatic and non enzymatic, factors effecting their rate.
- Food additives and their classification.
- Refractometry–Theory, instrumentation, specific & molar refraction, variables affectingrefractive measurements, its applications, types of refractometers.
- Principles and application of colorimetery–Optical aspects (hue, value, chroma),tristimuluscolour system, tintometers & hunter lab CDM.
- Flame photometry–Concept of ground state, excited state, ionization energy.resonance line, inferences , components of flame emission spectrophotometer.
- Principles and application of atomic absorption spectroscopy–Components of atomicabsorption spectroscopy, ICP.
- X-ray analysis of foods–Properties, production & detection, x- ray tubes, detectors, x-rayfluorescence, sources, application in food industry.
- Electrophoresis–Applications, principles of separation of neutral molecules, separation ofoptical isomers and buffers.
- Mass spectroscopy–Components, Low voltage Mass Spectrometry, Quantitative analysis.
- Chromatography–Different types (HPLC, Paper Chromatography, TLC, GLC) their principlesand applications.
- Rheology measurement–Farinograph, Amylograph, Viscosity measurement, Texture analysis.
- Enzymatic methods, DSC, SEM.
- Rapid methods of microbial analysis, immunoassays.
- Nuclear magnetic resonance (NMR) –Principle, Components, Interpretation of NMR spectra,application of NMR.
- Preparation and standardization of solution
- Estimation of moisture, crude protein,crude fat, crude fiber and Ash.

- Qualitative tests for Carbohydrates.
- Estimation of Total phenolic content and myoglobin.

FOOD PROCESSING (30 MARKS)

- Thermal Processing –Canning, Sterilization, Pasteurization, Extrusion.
- Dehydration–Water activity, types of dryers, effect of dehydration on food quality. Freezedrying. Intermediate moisture foods.
- Fermentation–Types, nutritional importance of fermented foods.
- Preservation by chemicals –Benzoate, sorbate, propionate, sulphur dioxide, anti oxidants,
- Hurdle Technology
- Irradiation–Units of irradiation, mechanism, dosimetery, equipment, effect of irradiation on micro-organisms, and onfood. Safety and wholesomeness of irradiated foods.
- Aseptic processing–Equipment, characteristics, HTST and UHT processing,
- Membrane processing–Advantages, types of membranes, equipments, applications and effect onfoods.
- Minimally processed foods–Preservation and packaging of minimally processed foods.
- Microwave processing–Electro magnetic spectrum, difference between microwave and infraredenergy, dielectric constant, relaxation time, equipment and applications.
- Refrigeration and frozen storage- Components of refrigerator, freezing curves, equipment,freezing and chilling injuries.
- Controlled atmospheric storage –Principle, design considerations, effects of CA storage on foodquality.
- Modified atmospheric storage - Gas storage, hypobaric storage.
- Thermal process calculations- D Value, Z value, F value calculation of process time for cannedfoods.
- Size reduction –Elastic stress limit, yield point, Kicks law, Rittengers law, Bonds law.Equipment for fibrous foods – slicing, dicing, flaking, shredding, pulping and chopping. Equipment of dry foods –ball mills, disc mills, hammer mills, roller mills. Size reduction of liquid foods –homogenization,
- Food plant design - General consideration in designing the plant, plant location.
- Food plant hygiene –Cleaning, sterilizing, waste disposal methods.
- Can Fabrication.
- Flexible packaging materials and their properties
- Biodegradable, edible and active packaging.
- Packaging requirements of fruits / vegetables, meat, milk, fruit juices and pulps, spices.
- Dietary fibre-hypocholesterolemic, hypolilpidemic and hypoglycemic effects, its role in prevention of CHD.
- Probiotics and prebiotics –common probiotic products, yoghurt, kefir and ice-cream. Health benefits of probiotics.
- Omega 3 fatty acids- introduction, nomenclature.Biological and functional effects.
- Role of phytochemicals and antioxidants disease prevention agents.
- Naturally occurring toxins in foods –occurrence and denaturation.
- Toxins produced during processing.
- Residues in animal and plant products.

FOOD QUALITY ASSURANCE (20 MARKS)

- Objectives, importance and functions of quality control.
- Methods of quality assessment-Subjective & objective methods.
- Sampling-Types of samples, preparations & preservation of sample, sampling errors. Factors affecting sampling size.
- Statistical quality control-X & R charts, steps for developing control charts.

- Properties of foods– Colour, gloss, flavour, consistency, viscosity, texture & their relationship quality.
- National & international Food laws – Food Saftey and Standards Act 2006, Codex Alimenta Commission, grades and standards. IPR and patents.
- General hygiene and sanitation in food industry– GMP, HACCP.
- Food adulteration and food safety– Physical, chemical & biological hazards in foods.
- Methods of evaluation of different food adulterants.
- Establishment of food testing laboratory– Infrastructure requirement, design and accreditation considerations.
- Sensory evaluation - Definition, objectives.
- Panel screening - Selection methods, interaction and threshold.
- Sensory evaluation methods / training– Difference tests (Paired comparison, Duo Trio, Triangle), Rating (ranking, single sample, two sample, multiple sample, hedonic), sensitivity threshold test.
- Quality evaluation of foods – Fruits, vegetables, cereals, dairy products, meat, poultry, egg and processed food products.

BIOTECHNOLOGY (10 MARKS)

- History and development of biotechnology.
- Scope and limitations of food biotechnology.
- Use of biotechnology in food industry, baking, fat and oil industry, fruit and vegetable industry, dairy industry.
- Application of genetics to food production. Basic concepts and methods of cloning, immobilization of microbial and cultured plant cells, Solid state and submerged fermentation, fermenter design.
- Principles of downstream processing- Bacterial starter culture, methods of inoculum and medium preparation, slurry processing and product isolation.
- GM foods– Safety aspects, consumer's attitudesmarketing.
- Technological aspects of industrial production of enzymes (amylase, pectinase, proteases).
- Production of organic acids, amino acids, vitamins, antibiotics, baker'syeast,single cell proteins, enzymes.
- Immobilized enzymes –Methods of immobilization, effects of immobilization.
- Sprouts–Bio-chemical changes during sprouting, nutritional significance.
- Fermented foods–Origin, scope and developmental, sauerkraut, yoghurt, cheese, miso, tempeh,idli, dosa, cider, fruit vinegar, vegetable pickle, traditional dairy products (kaladi).
- Regulatory and social aspects of biotechnology of foods.

AGRICULTURAL PRODUCTS (20 MARKS)

- General introduction to cereals, new varieties, production trends of wheat, rice, barely, oats, corn, sorghum, pearl millet and minor millets in India.
- Structure and nutrients distribution in cereals.
- Wheat–Structure, types and composition of wheat grain, molecular basis of wheat grain hardness and softness.
- Milling of wheat–Quality of flour and flour treatment.
- Manufacturing techniques, uses and functionality of vital wheat gluten. Structure and functionality of wheat proteins. Carbohydrates and Lipids in bread making. Enzymes of wheat and their technological significance.
- Determination of quality characteristics of flours.
- Dough chemistry and rheology.
- Technology of bread, biscuits, cakes, durum wheat and pasta products.
- Rice- Grain structure, chemical composition, milling, milling machine.

- Effect of different factors on milling yield and rice quality. By products of rice milling and their utilization.
- Parboiling of rice, effect of aging on rice quality, rice products, enrichment with vitamin and minerals, byproduct utilization.
- Chemical constituents, processing, pearling and malting of barley.
- Corn - wet and dry milling, corn flakes.
- Preparation of extruded products.
- Structure and composition of pulses, their importance in Indian diet
- Dhal milling and processing of pulses.
- Fermented and traditional products.
- Fruit maturing and ripening indices.
- Principles and methods of fruit and vegetable preservation.
- Composition and related quality factors for processing.
- Principles of storage of fruits and vegetables.
- Types of storage: natural, ventilated, low temperature storage, CA and MA storages.
- Preservation of fruits and vegetables, by heat, chemicals, sugar, salt, fermentation, drying etc.
- Canning of fruits and vegetables, tin cans, glass containers, seaming technology.
- Aseptic canning technology.
- Fruit & vegetables juices - Preparation and preservation of juices, syrup, cordials, nectars, juice concentrate.
- Pectin and related compounds, jams, jellies, marmalades, preserves, candies.
- Theory of gel formation.
- Pickles and vinegar production, tomato products.
- Drying and dehydration of fruits and vegetables, problems related to storage of dehydrated products.
- Freezing and freeze-drying of food and frozen products.
- Fruit products order (FPO) and quality control.

DAIRY TECHNOLOGY (15 MARKS)

- Diary industry in India and its scope.
- Sources and composition of milk, nutritive value.
- Factors affecting composition of milk.
- Processing of market milk- standardization, toning of milk, homogenization.
- Storage, transportation and distribution of milk. Pasteurization and sterilization.
- Milk products - Processing of cream, butter oil, cheese spread, condensed milk, evaporated milk, whole and skimmed milk.
- Production of Ice creams.
- Quality control in Ice cream manufacturing.
- Production of fermented milk products.
- Instantization of milk and milk products.
- Judging and grading of milk and its products.
- In plant cleaning system.
- Quality standards of milk and milk products.
- Packaging of dairy products.
- By product utilization.
- Quantative estimation of milk constituents suchas moisture, total solids, fat, acidity, specific gravity.

MEAT, FISH & POULTRY PRODUCTS (15 MARKS)

- Scope of meat industry in India with special reference to J&K.
- Sources of meat, composition and nutritive value of meat.

- Microscopic structure of meat.
- Factors affecting meat production and quality.
- Slaughtering of animals and poultry.
- Inspection and grading of meat.
- Factors affecting post mortem changes.
- Properties and shelf life of meat.
- Meat quality evaluation.
- Mechanical deboning.
- Meat tenderization and aging, pickling and smoking of meat.
- Meat plant sanitation and safety.
- By product utilization.
- Recent trends in meat processing.
- Traditional meat products of J&K.
- Structure, composition, nutritive value and functional properties of eggs.
- Preservation of eggs by different methods.
- Factor affecting egg quality and measures of egg quality.
- Types of fish, composition, structure.
- Post mortem changes in fish.
- Handling of fresh water fish.
- Canning, smoking, freezing and dehydration of fish.
- Fish sausage.
- Radiation processing

OIL TECHNOLOGY (10 MARKS)

- Nomenclature of saturated and unsaturated fatty acids
- Common sources of vegetable oils and their oil content
- Chemical characterization of fats and oils.
- Properties of common oils-Soybean, peanut, Corn, Sunflower, safflower, Canola, Olive, Coconnut, palm oil.
- Extraction and rendering- Physical and chemical refining
- Bleaching, Hydrogenation
- Interesterfication, Winterization
- Dewaxing, Fractionation
- Exterfication, Blending, Deodorization
- Storage and protection of oils
- Plasticization and flaking
- Bulk oil shipments
- Common tests for quality control of oils

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Annexure "B"

Sub: Syllabus for written test (Objective Type) for the posts of ASSISTANT PUBLIC ANALYST

Marks :-150
Time :- 2.30 Hours

Inorganic Chemistry (25 Marks)

1. Chemical periodicity
2. Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules (VSEPR Theory).
3. Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.
4. Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.
5. Transition elements and coordination compounds: structure, bonding theories, spectral and magnetic properties, reaction mechanisms.
6. Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.
7. Organometallic compounds: synthesis, bonding and structure, and reactivity. Organometallics in homogeneous catalysis.
11. Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

Physical Chemistry (25 Marks)

1. Basic principles of quantum mechanics: Postulates; operator algebra; exactly-solvable systems: particle-in-a-box, harmonic oscillator and the hydrogen atom, including shapes of atomic orbitals; orbital and spin angular momenta; tunneling.
2. Approximate methods of quantum mechanics: Variational principle; perturbation theory up to second order in energy; applications.
3. Atomic structure and spectroscopy; term symbols; many-electron systems and antisymmetry principle.
4. Chemical bonding in diatomics; elementary concepts of MO and VB theories; Huckel theory for conjugated π-electron systems.
5. Chemical applications of group theory; symmetry elements; point groups; character tables; selection rules.
6. Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules; basic principles of magnetic resonance.
7. Chemical thermodynamics: Laws, state and path functions and their applications; thermodynamic description of various types of processes; Maxwell's relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le Chatelier principle; elementary description of phase transitions; phase equilibria and phase rule; thermodynamics of ideal and non-ideal gases, and solutions.
9. Electrochemistry: Nernst equation, redox systems, electrochemical cells; Debye-Huckel theory; electrolytic conductance – Kohlrausch's law and its applications; ionic equilibria; conductometric and potentiometric titrations.
10. Chemical kinetics: Empirical rate laws and temperature dependence; complex reactions; steady state approximation; determination of reaction mechanisms; collision and transition state theories of rate constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.
11. Colloids and surfaces: Stability and properties of colloids; isotherms and surface area; heterogeneous catalysis.
12. Solid state: Crystal structures; Bragg's law and applications; band structure of solids.
13. Polymer chemistry: Methods of synthesis, Properties (mechanical & thermal) Molar masses; kinetics of polymerization.

Organic Chemistry (25 marks)

1. IUPAC nomenclature of organic molecules including regio- and stereoisomers.

2. Principles of stereochemistry: Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.
3. Aromaticity: Benzenoid and non-benzenoid compounds – generation and reactions.
4. Organic reactive intermediates: Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes and nitrenes.
5. Organic reaction mechanisms involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.
6. Common named reactions and rearrangements – applications in organic synthesis.
7. Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic). Chemo, regio and stereoselective transformations.
8. Concepts in organic synthesis: Retrosynthesis, disconnection, synthons, linear and convergent synthesis, umpolung of reactivity and protecting groups.
9. Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction – substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio-discrimination. Resolution – optical and kinetic.
10. Pericyclic reactions – electrocyclisation, cycloaddition, sigmatropic rearrangements and other related concerted reactions. Principles and applications of photochemical reactions in organic chemistry.
11. Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S).

ANALYTICAL CHEMISTRY (45 Marks)

Basics of analytical chemistry
Solutions and their concentrations: Different ways of expressing the concentration of a solution.
Standard solutions, primary standards, secondary standards. Standardization of a given solution.
Description and use of common laboratory apparatus: Volumetric flasks, burettes, pipettes, meniscus readers, weighing bottles, different types of funnels chromatographic columns, chromatographic jars, desiccators, drying ovens, filter crucibles, rubber policeman.
Calibration and use of volumetric glass ware.
pH meter: components of pH meter, use of pH Meter, maintenance of pH meter,
Errors in Chemical Analysis-Accuracy and Precision.
Calibration curve.
Safety with chemicals and waste.
Gravimetric and Volumetric Analysis
Centrifugation Methods- Types of centrifugation techniques.
Sampling methods
Chromatographic techniques Introduction,Types and Classification; principles – differential migration, nature of partition forces, partition, Mobile phases,stationary phases, resolution, separetion time,zone migration, column packing materials, development techniques,differential migration,partition coefficient, retention time, retention volume.. Plate theory, HETP, band broadening, efficiency and resolution.Basic principles and applications of–Liquid-Solid and Liquid-Liquid column chromatography. Paper and thin layer chromatography, ion exchange (size exclusion), Gas-Liquid chromatography.HPLC-theory,column efficiency,extra column and band broadening,temperature effects and diffusion.Chiral chromatography,chiral stationary phases,applications of HPLC, Electrophoresis.
Electroanalytical and Thermal Methods Electrophoresis:Factors affecting ion migration, electro-osmosis, theory and applications of capillary electrophoresis. Polarography – diffusion current, half-wave potential, Ilkovic equation, DME. (Applications in organic/inorganic analysis). Amperometric titrations-Basic principle and applications. Coulometry and Electrogravimetry: Electrogravimetry, Controlled-Potential Coulometry, Constant-Current Coulometric Titrations. Thermal Methods; Thermogravimetry (TG/TGA), Differential Thermal analysis (DTA), Diffrential scaning calorimetry (DSC), Thermometric titrations
Ultraviolet spectroscopy: Ultraviolet absorption spectra of enones, dienes (homo and heteroannular) carbonyl compounds, aromatic and heteroaromatic compounds. Effect of conjugation on ultraviolet spectra, Woodward-Fieser rules, application and limitation. Kuhn's rule, application to conjugated polyenes.
Infrared Spectroscopy: Introduction, instrumentation and sample handling, characteristic vibrational frequencies of hydrocarbons, alcohols, ethers , phenols,amines, aldehydes, ketones, acids, anhydrides, esters, lactones, amides and conjugated carbonyl compounds. Effect of hydrogen bonding on vibrational frequencies in IR spectra.Overtones, combination bands and Fermi resonance. FT-IR
Mass Spectrometry
Introduction, instrumentation, Ionization methods like EI, CI, SIMS, FAB, MALDI, ESI, MS/MS. Mass Analyzers like Magnetic Sector Mass Analyzer, Double Focusing Mass Analyzer, Quadrupole Mass Analyzer, Time-of-Flight. Mass Analyzer Determination of Molecular Formula, Role of Isotopes, Nitrogen Rule, Metastable Peak. Fragmentation pattern like Stevenson rule , initial ionization event, α-cleavage, inductive cleavage, two bond cleavage, Retro-Diels. Alder cleavage, McLaffertey Rearrangements. Fragmentation pattern of alkanes, alkenes, alcohols, phenols, aldehydes,

ketones, Carboxylic acids, Amines, Problems based on Mass Spectroscopy. Some specific examples from natural products like flavanoids terpenes, steroids, alkaloids.

1H Nuclear Magnetic Resonance Spectroscopy

Basic concepts, Mechanism of Measurements, Chemical shift values for various classes of compounds. Fourier Transform (FT) , Techniques and advantages, Nuclear Overhauser Effect (NOE). One bond coupling, two bond coupling, three bond coupling, second order spectra A2, AB, AX, AB2, AX2, A2B2. Proton exchange, deuterium exchange, Peak broadening exchange

13C Nuclear Magnetic Resonance Spectroscopy

Carbon 13-chemical shifts , proton coupled and decoupled spectra. Nuclear Overhouser Effect, Off-Resonance De-coupling, Basic concepts of DEPT-45 , DEPT-90, DEPT-135.

Introduction to two-dimensional spectroscopy methods, COSY techniques, HETCOR technique, NOSY,

Structure determination of organic compounds based on their spectral data (UV, IR, NMR and Mass Spectrometry). Problem based exercises.

CHEMISTRY OF FOODS (Marks 30)

Carbohydrates

Definition, classifications. Composition and functions of *monosaccharides, disaccharides and polysaccharides*

Lipids

Fatty acids and Triglycerides. Saturated and Unsaturated fatty acids (MUFA and PUFA). Rancidity of Oils & Fats. Absorption of toxic substances by fat..Cholesterol, transport of Cholesterol in blood stream. Cholesterol and heart diseases, Recommended values of HDL and LDL.

Proteins: Introduction, Amino Acids: Structural features and classification. Primary, Secondary, Tertiary and Quaternary structures of proteins and their significance. Denaturation and Renaturation of proteins.

Enzymes: Classification. Theories of mechanism of action of Enzymes ; Fisher Lock and Key Theory, Koshland's Induced Fit Theory.

Nucleic acids: Structural features of nucleotides, Nucleotides : DNA and RNA.

Vitamins: Classes of Vitamins and their functions. Vitamin deficiency diseases.

Minerals: Macro and Micro minerals. Their functions and diseases caused by their deficiencies.

Food Colours and flavours

Introduction. Pigments in animal and plant tissues: Chlorophyll, Carotenoids, Anthocyanins and other Phenols. Natural and artificial food colorants.

Definition of flavor. Classification of food flavors. Chemical components responsible for the following: Sweetness, Saltiness, Sourness, Bitterness, Astringency, Pungency, Meatiness and Fruitiness. Synthetic flavouring.

Food Preservative

Introduction. Basis of Food Preservation. Food additives: Sodium Chloride, Nitrites, Smoke, SO_2, Benzoates and other Organic acids.

The Undesirables in Food Stuff

Autooxidation and antioxidants. Toxins of plant foods. Toxins of animal foods. Toxic agriculture residue Toxic metal residue. Toxins generated during heating and packaging of food. Environmental pollutants of food stuff. Toxins generated during heating and packaging of food. Environmental pollutants of food stuff.

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